

# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 1  
Introduction

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# 1 Introduction

## 1.1 Purpose of the report

- 1.1.1 Highways England proposes to construct the A358 Taunton to Southfields Dualling scheme (hereafter referred to as 'the proposed scheme'). The proposed scheme is considered a Nationally Significant Infrastructure Project (NSIP) under the *Planning Act 2008* (2008, c.29) [1] (the 'Act') and therefore Highways England proposes to submit an application for a Development Consent Order (DCO) to provide the appropriate planning consent for the proposed scheme.
- 1.1.2 The proposed scheme falls under the criteria included in the *Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017* (SI 2017/572) [2] (the 'EIA Regulations') and is, therefore, an 'EIA Development'. The application for DCO must therefore be accompanied by a statutory Environmental Statement (ES) describing the findings of an EIA undertaken in compliance with the EIA Regulations.
- 1.1.3 Consultation is an important part of the DCO process, and applications need to demonstrate how such consultation has been undertaken. This Preliminary Environmental Information (PEI) Report supports part of the consultation process.
- 1.1.4 This PEI Report has been prepared in compliance with the EIA Regulations to enable the local community, stakeholders and any other interested party to understand the environmental effects of the proposed scheme and enable an informed response to the consultation. The PEI Report sets out how each environmental topic area is being assessed, the potential environmental effects of the proposed scheme based on the information available at the time, and measures proposed to avoid or reduce such effects. This is to support consultees in developing an informed view of the likely significant environmental effects of the proposed scheme.
- 1.1.5 It should be noted that the proposed scheme design is currently under development, environmental information is still being assembled, and impacts are still being identified. The information contained within this PEI Report should be regarded as a preliminary account of the principal environmental issues identified to date. The PEI Report details a number of uncertainties and assumptions and may be subject to change as the environmental assessment work progresses. The PEI Report may also be subject to change as a result of consultation responses which will in turn inform the ongoing environmental assessment process. The results will be reported within the ES which will be submitted to the Planning Inspectorate (PINS) as part of the DCO application.
- 1.1.6 On 19 August 2021, Highways England and the Department for Transport (DfT) announced that Highways England will change its name to National Highways. The name change reflects the role of the strategic road network – to connect the nation's regions – and the part it plays in setting highways standards across the UK. The name change in project documents, reports and communication materials will be a gradual process; this PEI Report, and accompanying appendices and figures, has therefore retained reference to Highways England. It is expected that for the ES, all references to Highways England will be replaced with National Highways.

## 1.2 Overview of the project

- 1.2.1 The proposed scheme is part of a programme of improvements planned along the A303/A358 corridor aimed at improving connectivity between London, the south-east and the south-west. The A303, alongside the A30, forms part of the strategic road network (SRN) and together with the A358, provides important components of that link.
- 1.2.2 The programme of improvements, as set out in the UK government's *Road Investment Strategy* (RIS) [3] made a commitment to "...upgrade all remaining sections of the A303 between the M3 and the A358 to dual carriageway standard, together with creating a dual carriageway link from M5 at Taunton to the A303...".
- 1.2.3 Funding for delivery of the proposed scheme has been confirmed within the second *Road Investment Strategy* (RIS2) [4], which covers the period between 2020 and 2025 and which was published on the 11 March 2020.
- 1.2.4 The A303/A358 corridor is heavily used by long-distance, local business and leisure traffic. It is also critical to the economy of the south-west of England and connects several local towns including Andover, Amesbury, Salisbury, Shaftesbury, Warminster, Yeovil, Honiton, Taunton and Ilminster.
- 1.2.5 The existing A358 between the M5 at junction 25 at Taunton and the Southfields Roundabout on the A303 is predominantly single carriageway with a short dual carriageway section (about 1.2 miles / 1.9km long) in the vicinity of Thornfalcon, and a three-lane section (about 0.4 miles / 0.6km long) on the westbound approach to the junction at Mattock's Tree Hill.
- 1.2.6 This proposed scheme proposes to upgrade the A358 to high-quality dual carriageway between Southfields roundabout on the A303 and the M5 junction 25 at Taunton to address the traffic issues and long delays currently experienced along the route. Further information on the proposed scheme is provided in Chapter 2 The project of this PEI Report.
- 1.2.7 The existing A358 is currently maintained by the local highway authority, Somerset County Council (SCC). The aim is for the sections of the existing A358 required for the proposed scheme to be adopted into the SRN. It will then be trunked, with the Secretary of State (SoS) for Transport becoming the highway authority.
- 1.2.8 A location plan and overview of the proposed alignment is provided in Figure 1.1 Proposed Scheme Location.

### Need for the project

- 1.2.9 Along the A358, there are a number of common issues that result in the poor level of operation often experienced by motorists, businesses and residents. These can be broadly summarised as:
- The mixed road typology – the corridor is comprised of a mix of dual 2-lane, single 3-lane and single 2-lane carriageway which leads to localised congestion where the standard reduces, impacting on journey times and journey time reliability.
  - High level of local roads and private accesses directly joining the road.
  - Accidents – several sections of the corridor suffer from accidents as a result of alignment not in accordance with current standards, poor junction visibility,

changes in road provision and number of private means of access linking onto the road.

- High traffic flows – many sections of the route experience traffic demand above that for which they were designed, leading to long queues.

1.2.10 In addition to these existing issues, the corridor is subject to the pressures brought about through traffic growth, something which is forecast to increase as local authorities along the length of the route seek to deliver their development plans for more jobs and housing, especially as the economic outlook improves.

### 1.3 Legislative and policy framework

1.3.1 To support the preparation of this PEI Report, it is necessary to review the national and local planning policy and legislation that informs the overall approach. Details of the legislation and policies relevant and important to the proposed scheme are presented in this section. Topic specific policies have been reviewed within each of the topic chapters and are set out within Chapter 5 to 14 of this PEI Report.

#### ***Environment Bill 2019 – 2021***

1.3.2 The *Environment Bill* [5] was first introduced to Parliament on 15 October 2019 to tackle environmental priorities by bringing environmental protections and recovery into UK law to protect and enhance the natural environment. The bill aims to lay out a legal framework for the protection and recovery of the environment and will set long-term, legally binding environmental targets.

1.3.3 The bill is currently progressing through parliament following its first reading to the House of Commons on 30 January 2020. It is probable that it will be enacted during the design and construction stages of the proposed scheme and an update will be included in the ES.

#### ***The Planning Act 2008 (the Act)***

1.3.4 The proposed scheme is a NSIP under section 14.1(h) of the Act as it meets the criteria set out in section 22 of the Act.

1.3.5 Section 22(1) states that highway-related development is an NSIP only if it is within one of three specified categories, namely construction, improvement or alteration of a highway.

1.3.6 The proposed scheme is a combination of construction of new highway and widening of the existing carriageway, and meets the following NSIP criteria for construction of a highway:

- The proposed scheme would involve the construction of a highway that is wholly within England.
- National Highways (as the strategic highways company) will be the highway authority for the highway (section 22(4)b of the Act).
- The proposed scheme would involve the construction or alteration of a highway, other than a motorway, where the speed limit for any class of vehicle is expected to be 50 miles per hour (mph) or greater, and the area of development is expected to be greater than the 12.5 hectares (ha) defined in section 22(4)(b) to the Act. The proposed scheme is likely to be greater than 100 ha in area.

- 1.3.7 As the proposed scheme is a NSIP, an application to PINS for a DCO is being progressed.
- 1.3.8 PINS has the responsibility for administering the examination of DCO applications and supporting the appointed examining authority that will make a recommendation to the SoS as to whether to grant development consent and 'make' the order. If granted by the SoS, the DCO will provide the authorisation for the proposed scheme to proceed to construction and subsequent operation.

### **The Environmental Impact Assessment Regulations 2017**

- 1.3.9 The EIA Regulations set out the legislative requirements for undertaking an Environmental Impact Assessment (EIA). EIA is defined by Regulation 5 of the EIA Regulations as a process consisting of:
- “(a) the preparation of an environmental statement or updated environmental statement, as appropriate, by the applicant;*
- (b) the carrying out of any consultation, publication and notification as required under these Regulations or, as necessary, any other enactment in respect of EIA development; and*
- (c) the steps that are required to be undertaken by the Secretary of State under regulation 21 or by the relevant authority under regulation 25, as appropriate, in determining an application”.*
- 1.3.10 The proposed scheme falls within Schedule 1 of the EIA Regulations, and is therefore an 'EIA development'. An EIA will be carried out in accordance with the requirements of the EIA Regulations, the preliminary results of which are reported in this PEI Report. An ES will be prepared to support the application for a DCO.

### **National Policy Statements (NPS)**

- 1.3.11 NPS's are of primary importance to the decision making process when DCO applications are being examined. Section 104 of the Act states that:
- “(2) In deciding the application the Secretary of State must have regard to –*
- (a) any national policy statement which has effect in relation to development of the description to which the application relates (a “relevant national policy statement”) ...*
- (3) The Secretary of State must decide the application in accordance with any relevant national policy statement, except to the extent that one or more of subsections (4) to (8) applies.”*
- 1.3.12 The proposed scheme is a highway-related development under the Act. Therefore, the national policy of relevance is the *National Policy Statement for National Networks (NPSNN)* [6]. The NPSNN sets out the 'vision and strategic objectives for the national networks'. This recognises that there is a critical need to provide safe, expeditious and resilient networks that better support social and economic activity, and to provide a transport network that is capable of supporting economic growth and rebalancing the economy. Section 104(3) of the Act states that the SoS must decide the application in accordance with any relevant national policy statement. As such, the NPSNN is the primary planning policy document for the proposed scheme.

### National Policy Statement for National Networks

- 1.3.13 The *National Policy Statement for National Networks* (NPSNN) [6] sets out the need for, and the government's policies to deliver development of, NSIPs on the national road network in England. The NPSNN also outlines the primary basis for making decisions of development consent for NSIPs in England. The government recognises in the appraisal of sustainability accompanying the NPSNN that some developments will have some adverse local impacts on noise, emissions, landscape/visual amenity, biodiversity, cultural heritage and water resources. The significance of these effects and the effectiveness of mitigation is uncertain at the strategic and non-location specific level of the NPSNN. Therefore, whilst applicants should deliver developments in accordance with government policy and in an environmentally sensitive way, including considering opportunities to deliver environmental benefits, some adverse local effects of development may remain.
- 1.3.14 The environmental requirements of the NPSNN have been taken into consideration when preparing this PEI Report, as described in each on the technical assessment Chapters 5 to 14. Evidence that the EIA has been undertaken in compliance with the NSPNN will be presented in the ES. An updated NSPNN is expected in Spring 2023, and should this come into force prior to the proposed scheme being determined an assessment will be made to ascertain compliance with the new policy.

#### *Drivers of need for development of the national road network*

- 1.3.15 The NPSNN sets out the 'vision' and strategic objectives for the national networks. The NPSNN acknowledges that the national road network that connects cities, regions and international gateways play a significant part in supporting economic growth, economic activity, economic productivity and facilitates passenger, business and leisure journeys across the country. It is also stated that *"well-connected and high-performing networks with sufficient capacity are vital to meet the country's long-term needs and support a prosperous economy"*.
- 1.3.16 The NPSNN states that *"a well-functioning Strategic Road Network is critical in enabling safe and reliable journeys and the movement of goods in support of the national and regional economies."*
- 1.3.17 The NPSNN also outlines the government's vision and strategic objectives for the national networks:
- "The Government will deliver national networks that meet the country's long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system. This means:*
- *Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs*
  - *Networks which support and improve journey quality, reliability and safety*
  - *Networks which support the delivery of environmental goals and the move to a low carbon economy*
  - *Networks which join up our communities and link effectively to each other"*.

### *Assessment principles*

- 1.3.18 The NPSNN predominantly deals with linear infrastructure, designed to link together separate points and provide connectivity to the wider network. Development and benefits are usually determined by economy, population, location and the level of improvement provided.
- 1.3.19 Paragraph 4.2 outlines that *“subject to the detailed policies and protections in this NPS, and the legal constraints set out in the Planning Act, there is a presumption in favour of granting development consent for national networks NSIPs that fall within the need for infrastructure established in this NPS. The statutory framework for deciding NSIP applications where there is a relevant designated NPS is set out in Section 104 of the Planning Act.”*
- 1.3.20 Paragraph 4.3 states the considerations required for the SoS:
- “In considering any proposed development, and in particular, when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State should take into account:*
- *its potential benefits, including the facilitation of economic development, including job creation, housing and environmental improvement, and any long-term or wider benefits;*
  - *its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.*

*In this context, environmental, safety, social and economic benefits and adverse impacts, should be considered at national, regional and local levels. These may be identified in this NPS, or elsewhere.”*

### National Planning Policy Framework

- 1.3.21 The *National Planning Policy Framework* (NPPF) [7], last updated in July 2021, sets out the government’s planning policies for England and the requirements for the planning system. It provides a framework within which local authorities and residents can produce local and neighbourhood plans reflecting the needs and priorities of communities.
- 1.3.22 The NPPF seeks to achieve sustainable development through three overarching objectives which are interdependent but need to be pursued in mutually supportive ways. The three objectives are an economic objective, a social objective and an environmental objective.
- 1.3.23 The NPPF does not contain specific policies for NSIPs for which particular considerations apply. NSIPs are determined in accordance with the decision-making framework set out in the Act and relevant National Policy Statements (NPS) for major infrastructure. For highways schemes, the relevant NPS is the NPSNN, details of which are outlined above.

### **Local plans**

- 1.3.24 Applications under the Act are not subject to s38(6) of the *Planning and Compulsory Purchase Act* (2004, c.5) [8], which states that determination of a planning application must be made in accordance with the local development plan, unless other material considerations indicate otherwise. Local plans may be

factored in during the consideration of applications for DCO consent, but it is unnecessary for such applications to comply with the development plan.

- 1.3.25 If there is a conflict between the NPS and local policies, the NPS takes precedence.

#### Relevant planning authorities

- 1.3.26 The proposed scheme is situated within the boundaries of three authorities:

- Somerset County Council (SCC): The upper tier planning authority for the county of Somerset. The county council is responsible for the most significant local government services in most of the county. The county council has jurisdiction across the four non-unitary districts of Somerset comprising Mendip, Sedgemoor, South Somerset and Somerset and West Taunton.
- South Somerset District Council (SSDC): The lower tier planning authority for the South Somerset District. SSDC is the local planning authority responsible for planning and development in the district.
- Somerset West and Taunton Council (SWTC) (formerly Taunton Deane Borough Council and West Somerset Borough Council): The lower tier planning authority for West Somerset and Taunton. SWTC is the local planning authority responsible for planning and development in the West Somerset and Taunton non-unitary district.

#### Local development plans

- 1.3.27 Local development plans of relevance are listed below. Specific environmental policies from local plans are included, where relevant, within the individual environmental chapters (Chapters 5-14) of this PEI Report.

- SCC:
  - *The Somerset Minerals Plan Development Plan Document up to 2030* (Adopted 2015) [9]
  - *The Somerset Waste Core Strategy 2013-2028* (Adopted 2013, currently under review) [10]
  - *Somerset's Future Transport Plan 2011-2026* (Adopted 2011) [11]
- SSDC:
  - *South Somerset Local Plan 2006-2028* (Adopted 2015) [12]
  - *South Somerset Environment Strategy* (Adopted 2019) [13]
- SWTC:
  - *Taunton Deane Local Plan 2004* (Adopted 2004, currently under review). Many policies no longer apply, but a small number are Saved Policies [14]
  - *Taunton Deane Adopted Core Strategy 2011-2028* [15]
  - *West Somerset Local Plan to 2032* (Adopted 2016) [16]
  - *Taunton Deane Site Allocations and Development Management Plan* [17]

#### **Non-statutory plans**

- 1.3.28 This section outlines the non-statutory plans of relevance.

Blackdown Hills Area of Outstanding Natural Beauty (AONB) Management Plan (2019-2024) (Adopted 2019)

- 1.3.29 The AONB is partially bound by the M5 and A35 trunk road and is dissected by the A303/A30. The A358 and A373 are acknowledged in the *Blackdown Hills Area of Outstanding Natural Beauty (AONB) Management Plan (2019-2024)* [18] as major periphery roads. In relation to the potential development in the future, it is stated that: *“Alterations or improvements to any of the above routes could have an impact on the special qualities and setting of the AONB, and affect local communities. Full consideration of the environmental and landscape impacts would be required as part of the feasibility and scheme development.”*
- 1.3.30 The vision for the Blackdown Hills AONB in 2029 outlined in the management plan is as follows:
- “The Blackdown Hills remains an ancient landscape of small villages and farms, deep valleys and high hedges shaped by its unique geology.*
- Its sense of tranquil timelessness and lack of change provides reassurance in a polluted, overcrowded world and gives a sense of well-being to residents and visitors alike.*
- Its wildlife is thriving and heritage conserved due to sympathetic management that is keeping alive traditional skills. They are enjoyed and understood by local people and visitors alike.*
- Vibrant, diverse communities, with a strong sense of identity, live and work sustainably, supporting the local economy and conserving and enhancing the area’s rich resources for future generations.”*
- 1.3.31 The Blackdown Hills AONB contains all elements of the ‘natural beauty criterion’ outlined by Natural England, comprising landscape quality, scenic quality, relative wildness, relative tranquillity, natural heritage features and cultural heritage.
- 1.3.32 A non-exhaustive list of policies within the Blackdown Hills AONB Management Plan pertinent to the proposed scheme (Transport and Highways) are outlined below:
- **Policy TH1:** Road and transport schemes (including design, maintenance, signage, landscaping and safety measures) affecting the AONB will be undertaken in a manner that is sensitive and appropriate to landscape character, having regard to the purpose of AONB designation and conserving and enhancing the area’s special qualities. The landscape and cultural features of the AONB’s road network (including hedge banks, flower-rich verges, and locally distinctive historic highway furniture) will be protected and conserved.
  - **Policy TH2:** Traffic management measures will be supported which reduce the impact of large and heavy vehicles on the most minor roads and help to provide a safer environment for walking, cycling and horse riding, where this is compatible with conserving and enhancing natural beauty.
  - **Policy TH3:** Promote the development of high quality, integrated and sustainable transport services and initiatives in and around the AONB where they can be achieved without compromising the conservation of natural beauty and local character.

## A Green Future: Our 25 Year Plan to Improve the Environment

- 1.3.33 *A Green Future: Our 25 Year Plan to Improve the Environment* (the '25 Year Environment Plan') [19] sets out the UK government's action plan to help the natural world regain and retain good health. Through the adoption of the plan, the government seeks to achieve cleaner air, water, improved biodiversity, climate and environmental resilience, efficient and sustainable resource/land use and enhancement and engagement with the environmental and cultural environment. This plan does not form part of the development plan for the area but is an important and relevant national strategy that the proposed scheme will have regard to.
- 1.3.34 The six key areas that the 25 Year Environment Plan policy actions focus upon are outlined below:
- Chapter 1: Using and managing land sustainably
  - Chapter 2: Recovering nature and enhancing the beauty of landscapes
  - Chapter 3: Connecting people with the environment to improve health and wellbeing
  - Chapter 4: Increasing resource efficiency, and reducing pollution and waste
  - Chapter 5: Securing clean, productive and biologically diverse seas and oceans
  - Chapter 6: Protecting and improving the global environment

## **1.4 The Applicant**

- 1.4.1 Highways England is the Applicant and the strategic highways company as defined in the *Infrastructure Act 2015* (2015, c.7) [20] and is charged with operating, maintaining and improving England's motorways and major A roads on behalf of the DfT.
- 1.4.2 Highways England is responsible for motorways and major (trunk) roads in England. Their road network totals over 4,300 miles (6,920km). Whilst this represents only 2% of all roads in England by length, these roads carry a third of all traffic by mileage and two-thirds of all heavy goods traffic.

## **1.5 Competent expert evidence**

- 1.5.1 The EIA Regulations require that the PEI Report and ES are prepared by 'competent experts' (as referred to in Regulation 14 (4)(a)). The EIA is being undertaken by Arup and Ramboll on behalf of Highways England. Both organisations have been awarded the EIA Quality Mark from the Institute of Environmental Management and Assessment (IEMA), demonstrating competency in ES preparation.
- 1.5.2 The EIA is being undertaken by competent experts with the relevant and appropriate level of experience in their respective topics. The EIA technical leads responsible for the individual chapters and professionals responsible for coordinating and managing the EIA/ES will be summarised at the start of the relevant ES chapter.

## 1.6 Stakeholder engagement

### Consultation undertaken to date

- 1.6.1 Following a stakeholder mapping exercise, the first of a series of workshops with key statutory stakeholders took place in December 2015. The workshop was attended by representatives from:
- Local authorities: SCC, SSDC, and Taunton Deane Borough Council (now incorporated into SWTC).
  - Statutory environmental bodies (SEB): Environment Agency, Natural England, and Historic England.
  - A non-statutory consultee, the National Trust, who were invited due to key interests in this area.
- 1.6.1 The purpose of the workshops was to keep the key statutory stakeholders up to date with the project's progress, seek views to ensure the project was aligned with local plans and receive input into the ongoing stakeholder engagement programme.
- 1.6.2 During the initial meeting, the attendees identified a number of additional stakeholders that possessed additional technical knowledge, information, and local area expertise that would be beneficial during the options development stage. The additional stakeholders were subsequently included in the stakeholder engagement programme. Details of the workshops held, the topics discussed, and the location are summarised in Table 1-1.

**Table 1-1 Stakeholder workshops**

Meeting agenda	Date	Location
Introduction to the A358 project and Highways England/Mott MacDonald Sweco Joint Venture team.	4 December 2015	Taunton Deane Borough Council offices
Scheme progress and Development Consent Order (DC) process.	22 March 2016	Taunton Deane Borough Council offices
Scheme progress and options development.	13 July 2016	Taunton Deane Borough Council offices
Scheme progress, parish council engagement and the public consultation.	11 November 2016	Taunton Deane Borough Council offices
Scheme progress and plans for the supplementary consultation with key stakeholders.	4 October 2017	Taunton Deane Borough Council offices

- 1.6.3 In addition to the stakeholder workshops, a group was formed to assist with the development of a draft Statement of Community Consultation (SoCC) for best practice purposes. The SoCC development group comprised local authority communications, planning and community engagement officers. Many of the group's suggestions and local information knowledge was incorporated into the draft SoCC, which included recommendations about identifying and engaging with different sectors of the community, including hard to reach groups. The final SoCC has been prepared for the 2021 statutory consultation.
- 1.6.4 A period of key stakeholder engagement commenced during the summer of 2016 with a series of meetings with key and statutory stakeholders. The information and views captured during the meetings was considered during the planning of the public consultation processes.

- 1.6.5 Early consultation has been held with local parishes along the route. Parish council area group (PCAG) meetings were held in November 2016 with all of the parish councils within the vicinity of the proposed scheme extents. These provided a forum for the parish councils to discuss their priorities, perceptions and concerns about the proposed scheme.
- 1.6.6 A further period of non-statutory public consultation commenced on 28 March 2017, open to the public. A series of consultation events were held for key and local stakeholders, including the public, where the scheme proposals could be viewed and discussed with the project team. Stakeholders were encouraged to provide their feedback about the proposed scheme proposals through a questionnaire, which was available to collect at the stakeholder events, as well as being available to complete online. The consultation period was scheduled to end on 20 May 2017. However, this was extended due to a period of purdah for the General Election. The final scheduled event on 8 May 2017 was postponed and rescheduled for 30 June, and the consultation period close date was moved to 16 July 2017.
- 1.6.7 A strong feedback theme from the initial 2017 consultation was a wish to see more options for connecting with the M5, for providing traffic relief for the village of Henlade, and for connecting more directly with the future 'Nexus 25' development (a major new employment site planned in the southeast quadrant of the existing M5 junction 25). This feedback was carefully considered and informed the decision that it would be beneficial to re-consult and seek further views on the whole scheme with alternative options presented. The second non-statutory public consultation for the proposed scheme commenced on 16 January 2018 and ran until 27 February 2018.
- 1.6.8 The design was further developed following feedback on the options received from the public consultations in 2018. A Community Liaison Forum meeting was held in February 2019 before the preferred route announcement was made in June 2019. A further Community Liaison Forum meeting was also held in September 2019.
- 1.6.9 In November 2020, new suppliers were appointed by Highways England to take forward the design and construction of the proposed scheme. Preliminary design and development of the preferred route commenced in January 2021 and an Environmental Scoping Report [21] was submitted to PINS in March 2021.
- 1.6.10 A Scoping Opinion was received from PINS on behalf of the SoS in May 2021 [22] in response to the Scoping Report. Comments received on Chapters 1-4, and the respective specialist topics reported on in Chapters 5-14 will be formally responded to within the ES.
- 1.6.11 Further consultation and engagement has continued throughout 2021 as part of the development of the preferred route, comprising:
- three community forums in March, May and June
  - one walking, cycling and horse-riding forum in May
  - various one-to-one meetings with stakeholders and landowners
- 1.6.12 During the community forums, representatives from local Parish Councils and resident groups have been provided with key updates on the proposed scheme, including the preliminary design, and an open forum for feedback, insight and discussion has been provided. This feedback has been noted and reviewed as

part of the proposed scheme's design process. To ensure safety measures during Covid-19, these events have been held virtually.

### **Proposed consultation**

- 1.6.13 Statutory consultation is proposed to take place from 12 October 2021 until 22 November 2021.
- 1.6.14 The Statutory Consultation is planned to comply with sections 42, 45, 46, 47 and 48 of the Planning Act 2008 in the following ways:
- Section 42: Relevant consultees will be consulted, in accordance with sections 42 (a)(aa)(b)(c) and (d).
  - Section 45: outlines the timetable for consultation, of which the A358 statutory consultation will be greater than the minimum 28 days required.
  - Section 46: Highways England will notify the SoS of the proposed application via the PINS
  - Section 47: people who live and work in the vicinity of the scheme will be consulted and a SoCC outlining how consultation will take place will be prepared.
- 1.6.15 The PEI Report will be made available for consultation by the relevant consultees outlined above. In addition to the following documents:
- Consultation brochure
  - Feedback questionnaire
  - Map of the route
  - Plans of the scheme
  - Notice of application
  - SoCC
- 1.6.16 The feedback received during consultation will be carefully considered. Responses will be taken into account in finalising our application before we submit it to the PINS.
- 1.6.17 We will summarise our findings in a Consultation Report which will include a description of how our application was informed by the responses received, and outline any changes made as a result of consultation. The Consultation Report forms part of our submission to the PINS.

## **1.7 Structure of the PEI Report**

- 1.7.1 The main text of this PEI Report is divided into four parts:
- Chapters 1 to 4 introduce and describe the proposed scheme, the considered alternatives and the approach/methodology of the EIA.
  - Chapters 5 to 14 present the preliminary assessment of the likely significant effects of the proposed scheme in relation to ten specialist topics covering aspects of the environment (based on survey data available at the time).
  - Chapter 15 considers the potential inter-relationships between the environmental aspects covered in Chapters 5 to 14, and between the proposed scheme and other developments in the surrounding area.
  - Chapter 16 presents a preliminary summary of the likely significant environmental effects.
- 1.7.2 The specialist topics covered in Chapters 5 to 14 of this PEI Report are:

- Chapter 5: Air quality
- Chapter 6: Cultural heritage
- Chapter 7: Landscape and visual
- Chapter 8: Biodiversity
- Chapter 9: Geology and soils
- Chapter 10: Material assets and waste
- Chapter 11: Noise and vibration
- Chapter 12: Population and human health
- Chapter 13: Road drainage and the water environment
- Chapter 14: Climate

1.7.3 A separate document has also been prepared to provide a Non-Technical Summary (NTS) of this PEI Report.

1.7.4 Three other PEI Report chapters are provided that collate the abbreviations (Chapter 17) and glossary of terms (Chapter 18) used within the PEI Report.

## 1.8 Next steps

1.8.1 This PEI Report has been prepared to support consultees in developing an informed view of the likely significant effects of the proposed scheme. Highways England invites comments on the proposed scheme and the environmental issues addressed in this PEI Report.

1.8.2 Further details on the consultation and downloadable copies of this PEI Report and NTS can be downloaded at:

[www.highwaysengland.co.uk/a358-taunton-to-southfields](http://www.highwaysengland.co.uk/a358-taunton-to-southfields)

1.8.3 All consultation responses must be made in writing (subject to any coronavirus [COVID-19] restrictions in place at the time) by:

- Completing the online feedback questionnaire via:  
[www.highwaysengland.co.uk/a358-taunton-to-southfields](http://www.highwaysengland.co.uk/a358-taunton-to-southfields)
- Requesting a hard copy of the freepost questionnaire to be sent to you in the post and return to our freepost address.
- Picking up a hard copy at one of our display/deposit locations which can be posted via freepost.
- Email us or write to us at the following addresses:
  - Email: [A358TauntontoSouthfields@highwaysengland.co.uk](mailto:A358TauntontoSouthfields@highwaysengland.co.uk)
  - Freepost: FREEPOST A358 TAUNTON TO SOUTHFIELDS

1.8.4 All responses must be received by **22 November 2021 at 11:59pm. Responses received after that date may not be considered.**

1.8.5 After the consultation period, all responses will be considered in finalising the proposed scheme design and progressing the EIA and ES. Comments will be taken into account when considering the need for further assessment or modification to the proposed scheme design or mitigation measures.

1.8.6 Following submission of the DCO application, PINS will consider, on behalf of the SoS, whether the application should be accepted for examination. If the application is accepted, consultees including the general public will then be able to make relevant representations about the proposed scheme and its potential impacts. The documents accompanying the DCO application will be publicly

available on the PINS website, and consultees will be able to submit comments to PINS. These comments will then be considered as part of the examination into the DCO application. Following examination, PINS will make a recommendation to the SoS, who will then decide whether to grant a DCO.

- 1.8.7 If the DCO is granted, construction is planned to start in late 2024 and the proposed scheme is due to open to traffic in mid-2028.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 2 The  
Project

HE551508-ARP-EGN-ZZ-RP-LE-000017

22/09/21

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## 2 The Project

### 2.1 Introduction

- 2.1.1 This chapter provides an overview of the site location and context together with a detailed description of the proposed scheme and outline details of the incorporated environmental mitigation measures (section 2.6), the construction, operation and long-term management (section 2.7), and the demolition of the proposed scheme (section 2.8).
- 2.1.2 The proposed scheme is presented in Figure 2.1 General Arrangement.

### 2.2 Project objectives

- 2.2.1 The overall project objective is to create a dual carriageway link from the M5 at Taunton to the A303 at Southfields roundabout. The new dual carriageway will comprise new and upgraded stretches of the existing A358 road and will be integrated into the strategic road network (SRN). The design will aim to address the existing traffic issues and long delays currently experienced along the route.
- 2.2.2 The UK government's *Road Investment Strategy* [1] outlines an overall ambition to improve connectivity between the South-West and London and the South-East of the UK. Further information on the need for the proposed scheme is provided in section 1.2 of Chapter 1 Introduction.
- 2.2.3 The scheme vision, design principles and scheme-specific objectives are identified in Table 2-1.

**Table 2-1 Scheme vision, design principles and objectives**

<b>Scheme vision</b>	
The A358 Taunton to Southfields Dualling Scheme (the 'proposed scheme') announced within the UK government's RIS will provide a high quality dual carriageway between the M5 motorway and the A303 at Southfields roundabout, Ilminster. The proposed scheme is part of a programme of improvements planned along the A303/A358 corridor aimed at improving connectivity between London, the South-East and the South-West. The A303, alongside the A30, forms part of the SRN and together with the A358, provides the link between London, the South-East and the South-West. The environmental strategy is to invest for the long-term and capture the vision for the environment which is "...a <i>strategic road network working more harmoniously with its surroundings to deliver an improved environment</i> ". This includes conserving energy, water and other resources, reduce waste and phase out the use of ozone depleting substances and minimise the release of greenhouse gases, volatile organic compounds and other substances damaging to health and the environment.	
<b>Scheme design principles</b>	
"Designing an inclusive, resilient and sustainable road network" in accordance with "The road to good design". [2]	
<b>A358 scheme objectives</b>	
<b>Employment:</b> facilitate growth in employment at key locations and centres along the A303/A358/A30 corridor and to the South-West region	<b>Housing:</b> facilitate growth in housing at key development hotspots along the corridor
<b>Capacity:</b> reduce delays and queues that occur during peak hours and at seasonal times of the year	<b>Resilience:</b> improve the resilience of the A303/A358/A30 route corridor
<b>Safety:</b> improve safety along the A303/A358/A30 route corridor	<b>Safety:</b> improve safety at along the A358 Taunton to Southfields route for non-motorised users (NMU)

<b>Connectivity:</b> improve the connectivity of the South-West to the rest of the UK, to reduce peripherality and improve business and growth prospects	<b>Environment:</b> avoid unacceptable impacts on the surrounding natural environment and landscape and optimise the environmental opportunities and mitigation that the intervention could bring
<b>Severance:</b> reduce severance on local communities	<b>Quality of life:</b> promote opportunities to improve the quality of life for locals

2.2.4 The development of the proposed scheme has considered the feedback received during the stakeholder workshops (as listed in Table 1-1 in PEI Report Chapter 1 Introduction), the 2018 non-statutory consultation and 2021 community forums, as well as the results of ongoing surveys and assessments. The preliminary design, and the assessment of its likely significant environmental effects, are presented in this Preliminary Environmental Assessment (PEI) Report.

## 2.3 Project location

2.3.1 The preferred route for the proposed scheme was announced by the Secretary of State (SoS) on 19 June 2019. The proposed scheme is part of a programme of improvements planned along the A303/A358 corridor aimed at improving connectivity between the south-west and London and the south-east of the UK. The A303, alongside the A30, forms part of the SRN and together with the A358, provides this link. The existing A358 is situated entirely within the county of Somerset, spanning across the Somerset West and Taunton District and the South Somerset District. The two Districts meet at approximately chainage (Ch) 9+430 of the proposed scheme (located approximately 0.27km north-west of Folly Drove).

The location of the proposed scheme is presented on Figure 1.1 Proposed scheme location.

### Existing route corridor

2.3.2 The existing section of the A358 between Taunton and Ilminster is approximately 8.5 miles (13.6km) long, running from junction 25 on the M5 (National Grid Reference (NGR): ST255247) to Southfields roundabout on the A303 (NGR: ST342153). The existing A358 forms part of the local highway network and is maintained by Somerset County Council (SCC).

2.3.3 The route predominantly comprises single carriageway, with a short section of dual carriageway (approximately 0.8 miles/1.3km) between Henlade and Mattock's Tree Green. This is preceded for 500m to the east by a section of single carriageway with an overtaking lane as the road ascends to the crest at Mattock's Tree Green. There is also a short section of dual carriageway on the approach to the M5 junction 25.

2.3.4 At the north-western limit of the proposed scheme, the A358 forms one of six arms of the M5 junction 25 roundabout, which is a partially signalised four-lane roundabout under the M5 motorway. This junction allows access from the A358 to the M5 and into Taunton. At the eastern end of the proposed scheme, the A358 forms one of five arms of the Southfields roundabout which is situated on the A303 at the western end of the Ilminster Bypass. This junction provides access into Ilminster, Horton Cross and to the A303.

2.3.5 Along the A358 between Taunton and Southfields roundabout, there are numerous at-grade local road junctions, the most notable of which is the traffic-signal controlled junction with the A378 at Mattock's Tree Green. Other local

roads provide access to local villages such as Ilton, Ashill, Hatch Beauchamp, Bickenhall, Thornfalcon, Ruishton and Henlade.

- 2.3.6 There is currently one grade-separated crossing over the A358. This carries the A358 Hatch Beauchamp Link road over Griffin Lane on a substantial structure which has recently been strengthened following the identification of potential weaknesses.
- 2.3.7 Along the A358 motorists currently experience high volumes of traffic, primarily because, for many sections of the route the current traffic demand is above that for which they were designed. This is exacerbated in the summer when there is typically 30% growth in traffic along the A303 corridor due to holiday traffic.
- 2.3.8 As well as experiencing high levels of congestion, there are several locations along the A358 where clusters of accidents have been reported. The accident types were predominantly rear end collisions, vehicles turning in or out of local minor roads or head-on collisions. In addition, a number of public rights of ways (PRoW) (i.e. footpaths, bridleways, byways open to all traffic, and restricted byways), undesignated paths and cycle routes cross the existing road.
- 2.3.9 The existing A358 has been the subject of a number of upgrades. The short dualled section at Mattock's Tree Green appears to have been upgraded in the 1960s or 1970s, possibly in response to the poor vertical alignment and associated visibility through this section which is likely to have made overtaking and turning manoeuvres at the A378 junction particularly dangerous on the single carriageway. The single carriageway section around Hatch Beauchamp was constructed as a bypass in the 1980s, the original route of the A358 having passed through the centre of the village. Similarly, the section of single carriageway around the village of Ashill was constructed as a bypass in the 1990s.

### **The surrounding environment**

- 2.3.10 The existing A358 passes through a largely rural area between Taunton and Ilminster, with various agricultural land uses and villages, hamlets and scattered farms and individual dwellings.
- 2.3.11 The A358 provides direct access to local communities (such as Ruishton, Haydon, Henlade, Thornfalcon, West Hatch, Hatch Beauchamp, Ashill, Broadway and Horton Cross), businesses and local facilities including churches, indoor sports facilities, schools, care homes, doctor's surgeries and shops. Taunton Gateway Park and Ride is located within 500m of the M5 at Taunton. 23 PRoW as well as other routes cross or meet the A358 and have been identified as potentially impacted by the proposed scheme.
- 2.3.12 The land adjacent to the A358 is predominantly grade 3 agricultural land, with pockets of grade 4 at the southern end of the proposed scheme and land associated with Venner's Water further north; elements of grade 1 and 2 lie in close proximity to the A358. It is currently estimated that 25-30 individual farm holdings are present along the route.
- 2.3.13 A number of potentially contaminative land uses have been identified along the route, including historical landfills, sewage works, commercial activities and fuel storage sites as well as evidence of made ground of unknown quality. Six records of historic landfills have been identified within 500m of the A358, two of which intersect the route.

- 2.3.14 There are two Air Quality Management Areas (AQMA) near to the A358; East Reach AQMA (2km west) and Henlade AQMA (300m north) which were declared by Somerset West and Taunton Council (SWTC) for exceedances of the national annual mean objective for nitrogen dioxide (NO<sub>2</sub>). There are currently no AQMAs associated with the A358.
- 2.3.15 Existing noise and vibration in the area is likely to be dominated by road traffic noise from the A358, A303, A378 and M5. Noise sensitive areas along the A358 are associated with individual or small groups of dwellings.
- 2.3.16 Several ecological designated sites are located near to the A358. These comprise, but are not limited to: Somerset Levels and Moors Special Protection Area (SPA) and Ramsar (3.5km north-east); Severn Estuary Special Area of Conservation (SAC) and Ramsar site (7km north); Thurlbear Woods and Quarrylands Site of Special Scientific Interest (SSSI) (1.5km south-west); and Barrington Hill Meadows SSSI and National Nature Reserve (NNR) (1.7km south); Bickenhall Orchard Local Nature Reserve (LNR) (550m south-west); South Taunton Streams LNR (690m west of the link road to M5 junction 25); and Children's Wood / Riverside Park LNR (900m north). A further 15 SSSIs are located within 200m of the A358.
- 2.3.17 Along the A358 corridor are existing hedgerows, veteran trees and watercourses that have the potential to support flora and fauna of ecological importance. Ecological records identify a number of protected species present in the surrounding environment, including Bewick's swan (*Cygnus columbianus bewickii*), bats and dormouse (*Muscardinus avellanarius*).
- 2.3.18 There are 12 known watercourse crossings along the A358 route. The channels that are officially designated under the *EU Water Framework Directive* (WFD) [3], as enacted by the *Water Environment (Water Framework Directive) (England and Wales) Regulations 2003* [4], as WFD waterbodies are:
- Broughton Brook
  - Meare Stream
  - Fivehead rivers (2 main channels)
  - River Ding
  - River Isle
- 2.3.19 However, all watercourses that cross the A358 route are located within catchments that are associated with these designated waterbodies.
- 2.3.20 A number of these watercourses are considered minor and therefore would be accommodated by piped culverts. However Back Stream, Cad Brook, Venner's Water, Fivehead River and Broughton Brook are accommodated by larger structures, such as underpasses. The A358 crosses areas of Flood Zones 2 and 3 and is in an area at risk of flooding from the Clatworthy and Luxhay Reservoirs located to the west of Taunton and from Chard Reservoir located to the north-east of Chard.
- 2.3.21 Blackdown Hills Area of Outstanding Natural Beauty (AONB) is located approximately 2.2km west at its nearest point to the proposed scheme.
- 2.3.22 The proposed scheme would pass through three National Character Areas (NCA): NCA 140, Yeovil Scarplands; NCA 143, Mid Somerset Hills; and NCA 146, Vale of Taunton and Quantock Fringes. An additional NCA (NCA 147, Blackdowns) is located approximately 1.5km to the south-west at its nearest point to the route. It also passes through the local landscape character areas (LLCA)

from the Taunton Deane Landscape Character Assessment: 1a, Vale of Taunton Deane; 4a, Fivehead Farmed and Wooded Vale; and 5a, North Curry; and will also pass through the following Lower Lias Foothills and Lowland LLCA within Region 2 (Blackdown Hills Plateau Foothills and Valleys) of the Landscape of South Somerset character assessment.

2.3.23 There are 141 listed buildings located within 1km of the A358, including:

- Four Grade I Listed Buildings: Church of St John the Baptist (970m east at Hatch Beauchamp); Church of St George (850m east at Ruishton); Church of the Holy Cross (750m east at Thornfalcon); and Church of St Aldhelm and Eadburga (350m west of the village of Broadway).
- 10 Grade II\* Listed Buildings, with the closest assets being: Musgrave Farmhouse (45m west at Henlade); The Old Rectory (320m west at Ashill) and The Grotto at Jordans (300m east, north-east of Horton Cross). Additionally, the Grade II\* Cross in St Aldhelm and St Eadburga churchyard is also a Scheduled Monument, located approximately 370m south-west in Broadway at the south-eastern end of the proposed scheme.
- 127 Grade II Listed Buildings, ten of which are located within 100m of the proposed scheme.

2.3.24 Other heritage assets near to the A358 include the Grade II Registered Park and Garden at Hatch (Beauchamp) Court (located 490m east of the A358 near Hatch Beauchamp) and three Conservation Areas located within 1km at Hatch Beauchamp, Thornfalcon and Ilminster. There are also a number of areas of woodland, some of which are categorised by Natural England as semi-natural ancient woodland, which contributes to the historic landscape character.

2.3.25 Further information on the existing baseline is presented within the technical assessment Chapters 5-14 of this PEI Report.

## 2.4 Baseline and future scenario

2.4.1 This section provides a description of the baseline scenario and the future baseline scenario.

2.4.2 For each environmental factor the existing baseline scenario and future baseline scenario for the relevant environmental receptors and resources must be defined. These descriptions are outlined in Chapters 5-14 of this PEI Report.

### Baseline scenario

2.4.3 The baseline scenario is the current state of the environment without implementation of the proposed scheme.

2.4.4 As described in section 2.3, the proposed scheme is situated in a predominantly rural area in Somerset, with small settlements scattered along the route. There are approximately 25-30 farm holdings adjacent to the existing A358. There are also a number of ecological and heritage assets which are of individual value, but also contribute to the character of the local landscape (including the nearby Blackdown Hills AONB). These aforementioned designations reflect the conservation value of the region, and its rich heritage of human settlement.

### Future baseline scenario

2.4.5 The future baseline is an outline of the likely evolution of the current state of the environment again without implementation of the project, taking account natural

changes and readily available information such as local development frameworks and climate change scenario data.

- 2.4.6 Potential changes to landscape in the future scenarios would not be noticeable, i.e. tree and vegetation growth would not be extensive, landscape pattern or topography is unlikely to change. It is not anticipated that large areas of woodland or hedgerow would be lost.
- 2.4.7 Given the relatively short period of time between the baseline scenario and mid-2028 (opening year) and 2043 (15 years after opening) the features and characteristics of the landscape would remain similar. There would likely be no perceivable change to the landform, land cover, field pattern, land use, or vegetation presence during this time. Management of ecological or heritage assets would remain the same.
- 2.4.8 Hence the future baseline for ecological and heritage assets which contribute to the character of the landscape would remain the same as set out in the existing baseline.
- 2.4.9 Based on the current land use, the future baseline in the absence of the proposed scheme is unlikely to change significantly by 2043. Subtle changes are expected due to climate change, such as some movements of certain species and local population changes; however, the overall habitats and species composition in the study area are expected to be broadly similar to that of the existing baseline.
- 2.4.10 Therefore, the future baseline would remain the same as set out in the existing baseline.

## 2.5 Project description

### Detailed description of the preliminary design

- 2.5.1 The proposed scheme would provide 8.5 miles (13.6km) of new, rural dual carriageway for the A358. The new dual carriageway would connect Junction 25 of the M5 at Taunton with the existing A303 at Southfields roundabout near Ilminster and would be completed in line with current trunk road design standards. The section west of the proposed Mattock's Tree Green junction would be offline to the existing road corridor, while the section east of the junction would use the existing corridor.
- 2.5.2 The term 'chainage' (Ch) is used to refer to the distance measured in metres along the centre line (middle) of the proposed scheme. For example, Ch 2+300 refers to a location 2,300 metres along the centre line of the proposed scheme. The chainages referred to in the text are indicated on Figure 2.1 General Arrangement.
- 2.5.3 All distances, directions, areas and lengths referred to in this chapter are approximate.
- M5 junction 25
- 2.5.4 Starting from the north-western end of the proposed scheme, the route would commence at junction 25 of the M5. The existing grade-separated junction would require capacity improvements to accommodate additional traffic generated by the proposed scheme. Improvements include the addition of a segregated left turn lane (SLTL) from Toneyway onto the M5 northbound carriageway as well as widening of the southbound off-slip from three lanes to four for 120m along the

offside lane. A retaining wall approximately 2.5m high would be required to accommodate the widened carriageway.

#### Park and ride facility

- 2.5.5 Access to the existing facility would continue to use the current arrangement off the existing A358 with egress via the Nexus 25 roundabout to M5 junction 25.

#### Nexus 25 roundabout and link to M5 junction 25

- 2.5.6 A new dual carriageway road link and roundabout junction was constructed providing access to the Nexus 25 Strategic Employment site, located immediately south of the existing Taunton Gateway Park and Ride facility. This road link is approximately 300m long and provides two eastbound and three westbound lanes to the new roundabout at Ch 0+900.
- 2.5.7 The new mainline would connect to a new spur off the Nexus 25 roundabout. The roundabout would require extensive capacity improvements including widening of the existing roundabout as well as the provision of additional lanes on its approaches. Further modifications would be required to the traffic signage, road markings and pedestrian facilities.

#### A358 offline

- 2.5.8 From the Nexus 25 roundabout, the proposed new dual carriageway would then be offline from the existing A358 and be on low embankment to remain above the local flood levels, before continuing east in a cutting cut through a gap between residential properties along Stoke Road in Henlade.

#### Stoke Road overbridge

- 2.5.9 At Ch 2+440, a new single carriageway overbridge would carry Stoke Road over the A358 which would be in a 7m deep cutting at this point. Stoke Road would be realigned slightly to the west on an embankment and set higher than the current road level.

#### Mattock's Tree Green junction

- 2.5.10 East of Henlade, the proposed route would run parallel to the existing A358, initially at ground level but then entering a deep cutting through Mattock's Tree Hill where a new grade-separated junction with slip roads allowing for all traffic movements would be provided at Ch 4+260.
- 2.5.11 The junction would have a dumbbell roundabout arrangement (i.e. a roundabout each side of the main road with an overbridge connecting the two), linking the existing A358 and A378 to the north and Ash Road to the south via a new bridge over the A358. The junction would provide connections to Ash, Henlade, Hatch Beauchamp and the A378.
- 2.5.12 The route would then emerge from the cutting before it reaches the Thornwater Stream. It would continue at ground level through a gap between Bath Cottage and Somerset Progressive School until it reaches West Hatch Lane at Ch 5+600 where the proposed road would gradually adopt the horizontal and vertical alignment of the existing A358 carriageway.

#### Scout camp link

- 2.5.13 A new single carriageway approximately 650m long would be provided to connect from Mattock's Tree Green junction south terminal to Huish Woods Lane to facilitate access to the Scout camp, Somerset Progressive School and local businesses.

### Village Road link (north)

- 2.5.14 A new single carriageway approximately 600m long would be provided to connect Mattock's Tree Hill Road (the existing A358 carriageway) to Village Road, providing improved access to Hatch Beauchamp.

### Griffin Lane

- 2.5.15 At Ch 6+550, the existing bridge carrying the single carriageway A358 over Griffin Lane, would be retained in its current form as the westbound carriageway of the proposed dual carriageway. A new bridge would be constructed to the north to carry the proposed eastbound carriageway.

### A358 online

- 2.5.16 From Griffin Lane, the proposed scheme would follow the alignment of the existing A358 through to Southfields roundabout. All at-grade existing junctions and direct accesses would be stopped up along the length of the proposed scheme. The proposed dual carriageway would follow the alignment of the existing A358 Hatch Beauchamp Link Road except for an 800m section at Kenny.

### Bickenhall Lane

- 2.5.17 A new 900m length of single carriageway and a bridge over the A358 would be provided at Ch 7+550 to connect Bickenhall Lane across the route.

### Village Road link (south)

- 2.5.18 A new single carriageway approximately 1,350m long, and bridge over the A358 would be provided at Ch 8+500 to connect Village Road (south) across the route to a portion of the retained A358 carriageway. A new junction would be provided with Staple Fitzpaine Road.
- 2.5.19 Between Ch 9+200 and Ch 10+000, the proposed route would be constructed off-line to the east of the existing carriageway. This would enable the existing road to be retained as a local route between Ashill and Hatch Beauchamp and provide access to existing properties along this section of the route.

### Stewley Link

- 2.5.20 A new 800m long single carriageway link would be provided from Stewley Lane to Ashill Road north of the proposed Ashill junction.
- 2.5.21 This new link would provide access to property along the northern side of the route from the Capland area including the sewage treatment works and Park Lane, as well as providing emergency access to Merryfield Military Airfield.

### Ashill junction

- 2.5.22 At Ch 12+100, a new grade-separated junction with slip roads for all movements would be provided at Ashill. The junction utilises a 'diamond' arrangement due to the relatively low traffic volumes and would provide a link between Ashill village to the west and Rapps/Ilton to the east by means of a new bridge over the A358.

### Broadway Street link

- 2.5.23 A new single carriageway approximately 1500m long, running adjacent to the route, would be provided to connect Broadway Street to Ashill Road providing access to properties along the western side of the route.

### Southfields roundabout

- 2.5.24 The Southfields Roundabout would be upgraded to provide a dedicated and segregated left-turn lane (SLTL) between the A358 and A303 eastbound carriageway, creating a free flow of traffic for this particular movement.
- 2.5.25 Minor improvements to the existing A303 westbound entry and A358 eastbound entry would also be provided to increase capacity at the roundabout.

### Access-ways

- 2.5.26 Several new or relocated vehicle access-ways would be provided across the proposed scheme to accommodate vehicle access to private property or to infrastructure elements (including structures or drainage ponds) for the purpose of maintenance.

### Capland Lane link

- 2.5.27 The existing Capland Lane junction on the A358 would be closed by the proposed scheme and road access to the adjacent community would be via local roads, some of which are affected by localised surface flooding.
- 2.5.28 The provision of a new single carriageway link between Capland Lane and Village Road or the improvement of local roads to improve flood resilience, are two alternative options under consideration. Currently the design is not developed sufficiently to allow assessment of the environmental impact of either of these options, but an options appraisal approach will be followed, and should one of the options be taken forward, it will be described in Chapter 3 Alternatives, of the Environmental Statement (ES).
- 2.5.29 Additional areas within the proposed scheme boundary have been included to allow for the inclusion of any resultant design changes.

## **Earthworks**

### Geology and ground conditions

- 2.5.30 The most prevalent bedrock deposits are the Branscombe Mudstone from the start of the proposed scheme to approximately Ch 6+200, the Blue Lias Formation from Ch 6+200 to Ch 9+500, and finally the Charmouth Mudstone Formation for the rest of the proposed scheme. Other deposits appear less frequently and/or are at depth and unlikely to be encountered by the proposed scheme. Refer to Chapter 9 Geology and soils of this PEI Report for further information on the existing baseline.
- 2.5.31 Potentially contaminated sites are present in the vicinity of the proposed scheme as summarised below:
- Former Thornfalcon refuse tip / Thornfalcon tip
  - Ashill Bypass Site A landfill, a former inert landfill site
  - Off-line former Ashill petrol filling station (PFS) and Shell PFS and service station at Horton Cross
  - Former, now disused, Great Western Railway (GWR) alignment near West Hatch Land
  - Foresters Garden Buildings north west of West Hatch Lane
  - Former, now disused, GWR alignment north of Greenway Lane
  - Former Near Dairy Farm landfill
  - Texaco PFS and Motorhome dealership

- Former Butler's fuel depot
- Hatch Green Garage (former PFS) and coach depot
- Former Land east of Bow Bridge landfill and gravel pit
- Former Saw Mills landfill

#### Earthworks design

- 2.5.32 In general earthworks slopes have been assumed to be at 1:3 (vertical-horizontal) for all cuttings and embankments along the proposed scheme. This is appropriate for the mainly cohesive soils that would be collected from on-site excavations and reused as fill along the route.
- 2.5.33 The principal cuttings are at Stoke Road and Mattock's Tree Green junction, with a maximum depth of 8m.
- 2.5.34 The principal embankments would be constructed at Bickenhall Lane, Village Road link (south) and Ashill junctions. The embankment heights would typically be a maximum of 8m to achieve adequate bridge clearance over the route.
- 2.5.35 Low embankments are also proposed at the east and west ends of the proposed scheme where the alignment crosses low lying ground, to ensure the road remains above design flood level. Minor cut and fill earthworks are also required along the remainder of the proposed route to provide space for the additional carriageway.

#### Material re-use and acceptability

- 2.5.36 A preliminary assessment of earthworks materials volumes has been undertaken. Approximate bulk quantities are indicated in Table 2-2.

**Table 2-2 Bulk earthworks quantities**

Description	From Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Net (m <sup>3</sup> )
Modelled cut and fill	731,300	680,300	51,000
<b>Total</b>	<b>731,300</b>	<b>680,300</b>	<b>51,000</b>

- 2.5.37 It is anticipated that the majority of the site-won materials would be acceptable for re-use.
- 2.5.38 As the general cut/fill quantities are approximately in balance, there is likely to be a limited volume available for landscaping fill.

#### Earthworks for landscaping

- 2.5.39 The design would incorporate earthworks with the landscape to mitigate the visual impact of the proposed scheme and integrate it into the surrounding landscape. The offline section would make use of cuttings through the higher ground around Henlade and Mattock's Tree Green. Much of the online section of the route would be close to the general ground level, matching the existing A358 alignment. The new grade-separated junctions would require embankments for the slip roads, connecting local roads and bridges. The amount of landscaping fill available is expected to be limited and, therefore, mitigation measures such as earthworks screening bunds would be restricted to selected locations.

#### **Structures**

- 2.5.40 Thirteen new structures would be provided, and seven existing structures would be extended for the proposed scheme, with two existing structures re-used. Preliminary details of each are listed in Table 2-3.

**Table 2-3 Proposed and re-used structures**

Chainage (Ch)	Structure name	Purpose	Width (m) [1]	Clearance (m) [2]	Height above existing ground level (m) [3]	Length (m) [4]
1+310	Black Brook Tributary culvert 1	New underbridge carrying the A358 over a tributary to Black Brook	6	2.5	N/A	30
1+700	Black Brook Tributary culvert 2	New underbridge carrying the A358 over a tributary to Black Brook	6	1.5	N/A	45
2+430	Stoke Road overbridge	New overbridge carrying Stoke Road over the A358 and providing connectivity between the villages of Henlade and Lower Henlade	12.3	6.5-7.5	0 (cutting)	30
3+050	Thornwater Stream South culvert	New underbridge carrying the A358 over Thornwater Stream	4	2.5	N/A	40
4+300	Mattock's Tree Green junction overbridge	New overbridge carrying the proposed junction link road over the A358 at Mattock's Tree Green junction	15.9	9-10	0 (cutting)	30
5+700	Meare Stream culvert (Culvert 1928)	Extension to the existing culvert to allow Meare Stream to cross under the A358	N/A	1.5m diameter	N/A	65
6+550	Griffin Lane underbridge westbound	Existing underbridge carrying the A358 westbound carriageway over Griffin Lane, two farm tracks and a minor watercourse	11.65	7	0 (cutting)	75
6+550	Griffin Lane underbridge eastbound	New underbridge carrying the A358 eastbound carriageway over Griffin Lane, two farm tracks and a minor watercourse	16.5	7	0 (cutting)	70
7+150	Hatch Park cattle creep	Extension to the existing underpass to allow landowner access under the A358	3	2.9 (maximum)	N/A	55
7+480	Bickenhall Lane overbridge	New overbridge carrying Bickenhall Lane over the A358	11	6-7	4-8	50
8+200	Fivehead River underbridge	Extension to an existing underbridge carrying the A358 over Fivehead River and an access path	11.55	2.7m (access path), 3.9m (channel invert)	N/A	30

Chainage (Ch)	Structure name	Purpose	Width (m) [1]	Clearance (m) [2]	Height above existing ground level (m) [3]	Length (m) [4]
8+500	Village Road overbridge	New overbridge carrying the proposed Village Road over the A358	12.3	7-7.5	8	40
9+400	High Bridge underbridge north	New underbridge carrying the A358 over a tributary to Venner's Water and a farm track. The new underbridge is next to, but separate from, an existing structure under the A358 which would become part of the local road network.	6	3.5	N/A	30
10+550	Venner's bridge	Extension to an existing underbridge carrying the A358 over Venner's Water	8.2	2.5	N/A	30
10+550	Venner's bridge (Stewley Link)	New underbridge carrying Stewley Link over Venner's Water	8.2	2.5	N/A	15
10+900	Sunnyside underpass	Extension to an existing underbridge carrying the A358 over a farm track	3.4	3.1	N/A	30
12+100	Ashill junction overbridge	New overbridge carrying the proposed junction link road over the A358 at Ashill junction	12.3	6.5-7.5	10-11	50
12+950	Cad Brook bridge	Extension to an existing underbridge carrying the A358 over Cad Brook	6.5	2.4	N/A	30
12+950	Cad Brook bridge (Broadway Street link)	New underbridge carrying Broadway Street link over Cad Brook	6.5	2.4	N/A	15
13+800	Ding Mill culvert	Extension to the existing culvert allowing the River Ding to cross under the A358	1.8	2.8	N/A	60
14+000	Ding bridge westbound	Existing underbridge carrying the A358 westbound carriageway over Back Stream and a farm track	8.2	3.2	N/A	15
14+000	Ding bridge eastbound	New underbridge carrying the A358 eastbound carriageway over Back Stream and a farm track	8.2	3.2	N/A	15

[1] Dimension given is either the clear opening of underbridge/underpass/culvert, or the width between parapets on overbridges.

[2] *Dimension is either the clearance to the A358 under the bridge for overbridges, the clearance to the road under the bridge for underbridges, or the opening size underneath the A358 for underpasses/culverts.*

[3] *Dimension is the height of the junction/bridge above existing ground level.*

[4] *Dimension is the distance between abutments either side of the A358 for overbridges, or the distance through the culvert/underpass (total including proposed extensions to existing structures).*

## **Flood risk and drainage design**

### Flood risk

- 2.5.41 All sources of flood risk to and from the proposed scheme, including the impact of a changing climate on flood risk, are being assessed as part of the Flood Risk Assessment (FRA) that will accompany the ES and Chapter 13 Road drainage and the water environment of this PEI Report.
- 2.5.42 The proposed scheme design would manage all rainfall event up to the 1 in 100-year return period event plus an allowance of 40% for climate change as required by the Environment Agency (EA) [5] and *Design Manual for Roads and Bridges* (DMRB) CG 501 *Design of Highway Drainage Systems (formerly HD 33/16, TA 80/99)* [6].

### Drainage strategy and design

- 2.5.43 The highway drainage design is designed in accordance with DMRB CG 501 *Design of highway drainage systems* and DMRB LA 113 *Road drainage and the water environment* [7].
- 2.5.44 The A358 mainline and grade separated junctions slip road drainage systems would be adopted and maintained by Highways England. The local road drainage systems would be adopted and maintained by SCC. The road drainage for the proposed scheme would be managed using a series of attenuation basins, which are assumed to remain dry most of the time.
- 2.5.45 The Highways England and SCC drainage systems would be kept separate wherever practicable.
- 2.5.46 Wherever practicable, drainage collection and conveyance methods would be designed sustainably and accordance with the *Sustainable Drainage Systems Manual* (Ciria Report C753) [8].
- 2.5.47 Drainage systems would be designed to ensure that the critical storm for the 1 year return period event is conveyed without surcharge and there is no surface water flooding on the highway for the critical rainfall duration for the 1 in 5-year return period event. An allowance of 20% for climate change has also been included.

### Highway drainage – A358

- 2.5.48 Edge of pavement drainage details for the A358 would be selected in accordance with the recommended solutions in CG 501 *Design of highway drainage systems*. Where practicable vegetative systems are preferred over conventional. Likely solutions are outlined below.
- 2.5.49 In cuttings and embankments, the preferred verge solution would be surface water channels, either grassed or concrete, and filter drains.
- 2.5.50 The preferred central reserve detail, for super elevated carriageways or when existing drainage assets are to be retained, is a concrete surface water channel.

- 2.5.51 Where kerbs are required, the surface water runoff would be drained via gully outlets or combined kerb and drainage units.
- 2.5.52 Cut-off ditches at the top of cuttings and the bottom of embankments would be incorporated to intercept natural run-off from adjacent land. Where necessary for reasons of slope stability the ditches at the top of cuttings may be lined. If the natural topography falls away from the road alignment, cut off ditches would not generally be provided other than to mitigate local flooding risk, or for slope stability reasons.
- 2.5.53 When the highway is in deeper cutting, verge filter drains would also drain the subsurface of the pavement along with the surface water runoff from the slopes. They may also serve a function lowering groundwater to ensure slope stability.
- 2.5.54 Narrow filter drains or fin drains would be used to drain the road pavement where this is not already provided for by a filter drain.
- 2.5.55 Wherever practicable, systems draining trafficked paved road surfaces would be kept separate from those intercepting groundwater and run-off from earthworks slopes.

#### Highway drainage – local roads

- 2.5.56 For local roads adoptable by SCC, road drainage in cuttings would typically comprise combined filter drains and grassed surface water channels. On shallow embankments with no kerbs the default would be over-the-edge drainage with swales or ditches, or otherwise gully outlets where kerbs are provided.

#### Cross drainage and watercourses

- 2.5.57 Several watercourses and streams would cross the route of the proposed scheme. The flows in these watercourses would be maintained within their catchment through culverts wherever possible.
- 2.5.58 No EA designated main river crossings are required for the proposed scheme.
- 2.5.59 The proposed new cross drainage culverts would be designed to convey the 100-year event plus a 40% allowance for climate change.
- 2.5.60 Hydraulic performance of any proposed extensions to existing culverts would be checked to ensure capacity is adequate as culvert extensions may increase head loss and upstream water levels. When extending an existing culvert, discharge capacity would be provided as like-for-like as a minimum.
- 2.5.61 Details of existing and proposed culverts and underbridges are presented in Table 2-4. Culvert sizes and form would be refined at detailed design.

**Table 2-4 Existing and proposed culvert/underbridge details**

<b>Name</b>	<b>Mainline Chainage (Ch)</b>	<b>Structure Type</b>	<b>Total Length (m) [1]</b>	<b>Width (m) [2]</b>
Black Brook Tributary culvert 1	1+310	Proposed culvert	30	6
Black Brook Tributary culvert 2	1+700	Proposed culvert	50	6
Thornwater Stream south culvert	3+050	Proposed culvert	40	4

Name	Mainline Chainage (Ch)	Structure Type	Total Length (m) [1]	Width (m) [2]
Culvert 1611 (existing structure ref: 2280301)	5+400	Existing drainage culvert extension	TBC	0.9
Culvert 1783 (existing structure ref: 2290601)	5+550	Existing drainage culvert extension	TBC	0.9
Meare Stream culvert (Culvert 1928) - existing structure ref: 2290501)	5+700	Existing drainage culvert extension	65	1.5 (diameter)
Griffin Lane underbridge westbound (existing structure ref: 2290201)	6+550	Existing underbridge	15	75
Griffin Lane underbridge eastbound	6+550	Proposed underbridge	15	70
Fivehead River underbridge (Existing structure ref: 2190301)	8+200	Existing underbridge extension	30	11.55
High Bridge underbridge north	9+400	Proposed underbridge	30	6
Folly Main culvert (existing structure ref: 3100801)	9+700	Existing drainage culvert extension	TBC	0.8
Venner's bridge (existing structure ref: 3111301)	10+550	Existing underbridge extension	30	8.2
Venner's bridge (Stewley Link)	10+550	Proposed underbridge	15	8.2
Cad Brook bridge (existing structure ref: 3131401)	12+950	Underbridge extension	30	6.5
Cad Brook bridge (Broadway Link)	12+950	Proposed underbridge	15	2.4
Jordan's Pipe culvert (existing structure ref: 3122101)	13+350	Existing drainage culvert extension	TBC	0.9
Ding Mill culvert (existing structure ref: 3131501)	13+800	Existing drainage culvert extension	60	1.8
Ding bridge westbound (existing structure ref: 3131601)	14+000	Existing underbridge	15	8.2
Ding bridge eastbound	14+000	Proposed underbridge	15	8.2

[1] Dimension is the approximate distance through the culvert/underbridge (total including proposed extensions to existing structures).

[2] Dimension is the clear horizontal opening of the culvert/underbridge.

2.5.62 In addition to the culverts in Table 2-4, there would be a number of culverts managing land drainage or minor watercourses under local roads adjacent to the proposed scheme, and numerous smaller culverts conveying flows from the cut-off ditches under tracks, walking, cycling and horse riding (WCH) and private accesses.

### Watercourse realignment/diversion

- 2.5.63 The widening of the A358 at Southfields roundabout impacts the River Ding directly. This would require the existing bridge to be extended and the realignment of the stream.
- 2.5.64 At Henlade, the Black Brook watercourse and associated land drainage would be realigned as part of the proposed new highway alignment.
- 2.5.65 The proposed scheme would seek to de-culvert existing sections of culverted watercourse and minimise the introduction of new culverted sections of the watercourse where possible.

### **Walking, cycling and horse riding**

- 2.5.66 Walking, cycling and horse riding (WCH) routes include PRow, the national cycle network (NCN) and local roads that are popular with walkers, cyclists and equestrians. A network of PRow crosses the A358 corridor. The network comprises primarily of footpaths in addition to a small number of bridleways and restricted byways. However, safe crossing points are limited where these routes interface with the existing A358. Promoted routes include the Neroche Herepath, NCN route 33 and the Taunton Cycle Trail.
- 2.5.67 The proposed scheme aims to ensure that existing routes remain accessible where possible for the local community and visitors to the area. Necessary mitigation of the WCH network has been explored with stakeholders.
- 2.5.68 The proposed scheme would provide a number of new and safe PRow crossings of the proposed route through the construction of overbridges and underpasses. The details will be presented in a Public Rights of Way Management Plan that will be produced as part of the ES.

### **Lighting**

#### Existing lighting

- 2.5.69 Lighting is currently only provided at the M5 junction 25, Nexus 25 roundabout (including the short length of roadway between the two) and at Southfields roundabout.

#### Proposed lighting

- 2.5.70 The basis of the lighting proposals used for optioneering phase has subsequently been replaced with TA 501 *Road lighting appraisal* [9], and the need for provision of lighting at the proposed junctions has been re-assessed based on TA 501.
- The mainline would not be lit, apart from the immediate approaches to the Nexus and Southfields roundabouts. The extent of lighting would be limited (approximately 160m from junction conflict points) to ensure the requirements in British Standard (BS) 5489-1:2020 *Design of road lighting. Lighting of roads and public amenity areas. Code of practice* [9] are achieved.
  - Based on the assessment undertaken to TA501, the provision of lighting at the proposed Mattock's Tree Green and Ashill junctions would not be justified based on the economic assessment. A sensitivity analysis was also taken to understand if justification could be provided based on an adjustment in terms of night-time accident rate, uplift in perceived night-time accident savings and no allowance for any extra over costs associated with energy and carbon. The

findings from the sensitivity analysis confirmed that lighting would not be justified.

- The provision of lighting on other local roads is not expected to be required except for some limited locations at the tie-in of the new road alignment with existing local roads, where limited lighting may be required. An assessment for any underpasses to determine the provision of daytime lighting will be undertaken to determine if illumination is required.
- Temporary construction lighting would be intermittently used throughout the construction phase for select operations in isolated locations only and as required by the contractor.

#### Fencing, walling and other boundary treatments

2.5.71 Boundary fencing would be proposed along the proposed highway boundary and at other locations such as offline cycle or equestrian routes and attenuation basins. The fencing would comprise timber post and four rail fencing, stockproof fencing, mammal proof fencing or other landscape-led proposals such as hedgerows.

#### **Technology**

2.5.72 The preliminary scheme design includes limited technology to support the maintenance and operation of the new road and has been developed in agreement with the Highway England's Maintenance, Operations and Technology teams.

2.5.73 The following intelligent transport systems (ITS) equipment is being proposed on the proposed scheme:

- Subject to a review of the current CCTV provision and coverage at M5 junction 25 and the proposed A358 tie-in, additional CCTV installation(s) may be implemented. This is being established with Highways England's South-West Regional Operations Centre.
- Emergency Roadside telephones would be provided within laybys.
- Traffic detection / vehicle counting loops have been designed in accordance with TD131 *Roadside technology and communications* [10], with an average spacing of 500m across the length of the proposed scheme.
- Necessary electrical interfaces to feed the technology equipment is being proposed at regular intervals based on location of technology assets.
- Ducting and cabling routes along with civil assets (chambers) within the proposed verge to accommodate these installations. Alternatively, wireless communication proposals are being discussed with Highways England's National Road Telecommunications Service (NRTS).

2.5.74 Any power cabinets agreed with the Distribution Network Operator (DNO) would be located close to the fence line within the verge.

#### **Temporary works**

2.5.75 Full details of the temporary works including the temporary compounds and topsoil storage areas are considered and described in the environmental topic chapters (PEI Report Chapter 5-14), where relevant. The time period covering temporary works elements will be provided in the ES when this information becomes available.

### Construction compounds and storage areas

- 2.5.76 It is currently proposed to include one main compound and a crusher/material stockpile compound. The main compound is proposed to be located at Ch 0+100, situated in the adjacent fields south of the westbound carriageway.
- 2.5.77 The main compound would remain in place for the duration of construction (2024-2028).
- 2.5.78 Operations at the main compound would include office and welfare accommodation, training and induction facilities, emergency recovery and safe refuge facilities, material storage, waste segregation areas, plant lay down area, fuel storage and car/minibus parking for staff and operatives. The main compound would also act as holding points for oversized deliveries until they are able to access the required area on site.
- 2.5.79 A crusher and material stockpile compound would be located in fields on the south side of the new alignment of the A358 between Ch 2+300 and Ch 2+600.
- 2.5.80 To facilitate movement of material to and from this compound, and to reduce the amount of construction traffic using the existing road network, haul routes would be created. Where practicable, these are likely to be routed along or immediately adjacent to the proposed mainline route; however, where this is not practicable, additional temporary land use may be required adjacent to the works to enable access to the local roads network.
- 2.5.81 Construction traffic that is required to use the existing road network would be restricted to using the SRN, as far as is reasonably practicable.
- 2.5.82 In addition to the crusher, bulk stone and topsoil storage, a small office and welfare facility would be maintained at this location for staff and workforce engaged with material handling.
- 2.5.83 Satellite compounds for construction of the junctions, local road overbridge and underbridges are located at the following locations:
- Stoke Road overbridge
  - Mattock's Tree Green junction overbridge
  - Griffin Lane underbridge
  - Bickenhall Lane overbridge
  - Village Road link (south) overbridge
  - Ashill junction overbridge
  - Southfields roundabout
- 2.5.84 These small satellite compounds would include a small office and welfare facility together with limited storage facilities for materials. They would remain in place only for the duration of the specific works (typically 2-3 years).

### Borrow pits

- 2.5.85 Construction of the proposed scheme would require excavation in places to form cuttings for the highway and this material would then be used to form embankments. The design aims to balance these 'cut and fill' requirements as far as practicable; therefore, no borrow pits are required.

### Temporary drainage

- 2.5.86 Where possible, the permanent earthworks drainage would be installed before the start of the main construction programme, with cut-off ditches and filter drains; and these would manage the surface water run-off towards and within the site

and discharge it into the existing watercourses via the temporary/permanent basins as required.

- 2.5.87 The contractor will obtain temporary discharge consents and abstraction licences from SCC and EA. Temporary settlement basins/tanks would be used to ensure any site surface water discharge to the adjacent watercourses is of the required quality, with any suspended solids given the opportunity to settle out prior to discharge into receiving waters.
- 2.5.88 At watercourse crossings, during the construction of the permanent culverts, it is assumed that multiple temporary smaller pipes (same cross-sectional area as the existing) would be used adjacent to the new crossing with the watercourses locally temporarily realigned to suit.

#### Access arrangements

- 2.5.89 It is a project requirement to maintain two-way traffic along the existing A358 during the construction of the proposed scheme. However, where construction activities such as existing online bridge demolition, modification or construction (e.g. bridge deck beam installation) prohibits safe road operation, limited temporary road closures may be required at night and weekends.
- 2.5.90 Although a significant section of the works would be constructed offline at sections where local roads and the offline elements of the works tie into the existing A358 a higher degree of temporary traffic management measures during construction would be required, such as narrow lanes, lane closures, contraflow and two-way and three-way lights.
- 2.5.91 The existing A358 is not identified as an abnormal load route.

#### **Scale of development**

- 2.5.92 The draft Development Consent Order (DCO) would allow for the proposed scheme to be constructed anywhere within the maximum extent of the defined limits within which the draft DCO will authorise. These are known as the limits of deviation (LOD). Further details on limits of deviation are provided in Chapter 4 Environmental assessment methodology of this PEI Report. These would be further detailed in the ES and in the draft DCO.

#### **Off-site works**

- 2.5.93 Confirmation of any off-site works required to facilitate the development (delivered by Highways England or other parties); would be detailed in the ES.

## **2.6 Environmental mitigation design measures**

- 2.6.1 The proposed scheme design has emerged as part of an iterative process between the engineering and environmental design and assessment teams, and through active engagement with statutory consultees, key stakeholders and the wider public. Throughout the iterative design process, interventions have been made and integrated into the proposed scheme with the primary purpose of avoiding or reducing adverse effects at source and to make the proposed scheme fit better into its landscape setting. These measures are considered integral to the proposed scheme and are termed as 'embedded mitigation'.
- 2.6.2 DMRB LA 104 *Environmental assessment and monitoring* [11] defines embedded mitigation as "...project design principles adopted to avoid or prevent adverse

*environmental effects*". Embedded mitigation is reported as part of the proposed scheme description and not repeated in each environmental factor assessment.

- 2.6.3 The environmental design incorporates landscape, biodiversity and cultural heritage mitigation and enhancements, to create a coordinated coherent scheme. Essential mitigation and any enhancement measures are reported in each environmental factor chapter (Chapters 5-14). Further details on the approach to mitigation of impacts can be found in Chapter 4 Environmental assessment methodology.
- 2.6.4 These are identified on PEI Report Figure 7.8 Environmental Masterplans and described in outline below.

### **Embedded mitigation**

- 2.6.5 The following section identifies design and construction measures which are integrated into the proposed scheme to avoid, prevent or reduce adverse environmental effects both during construction and operation of the proposed scheme.

#### Air quality

- 2.6.6 During construction, there is the potential for changes in air quality due to dust emissions from construction activity. Best practice mitigation measures to reduce effects from construction dust will be included in the Environmental Management Plan (EMP) that will be produced as part of the ES and to support the DCO application. The mitigation measures would reduce the impact of construction dust effects to negligible. No other specific mitigation has been incorporated for air quality.

#### Cultural heritage

- 2.6.7 The environmental mitigation plan, described in Chapter 7 Biodiversity, includes a range of embedded landscape features which are intended to soften the visual impact of the proposed scheme and includes areas of new woodland and native hedgerow creation which would screen views of the road from a number of heritage resources. This would prevent or reduce adverse effects on heritage resources which would have been created by the construction of the proposed scheme. The detail of this is reported in Appendix 6.4 Preliminary impact assessment tables of this PEI Report.
- 2.6.8 Noise mitigation is reported on in Chapter 11 Noise and vibration of this PEI Report. This would reduce or prevent adverse effects on heritage resources arising from changing noise levels.
- 2.6.9 The archaeological mitigation works would be undertaken during the preliminary works (the majority of the archaeological fieldwork and recording) and construction works stages. The Detailed Archaeological Mitigation Strategy and Overarching Written Scheme of Investigation will set out appropriate measures to be undertaken during the preliminary works and construction stages to ensure that the mitigation measures embedded in the proposed scheme design are appropriately implemented. This would likely include a combination of essential and embedded mitigation, although the detail of this requires the results of the ongoing geophysical survey, trial trenching and building assessment. The results of these surveys will be used to further develop the strategy for mitigation,

including embedded mitigation such as relocating proposed tree planting or ponds to avoid identified buried remains. This will be reported within the ES.

### Landscape

2.6.10 Embedded mitigation measures for landscape and visual has been combined with ecological mitigation. The landscape design incorporates a range of embedded landscape features such as woodland, grassland and water features. These are described in Chapter 8 Biodiversity of this PEI Report.

2.6.11 The landscape objectives for the proposed scheme are to:

- link with local green infrastructure strategies, initiatives, and strategic green infrastructure opportunities
- consider distant views from the Blackdown Hills AONB (day and night)
- inform engineering design to avoid or reduce impacts
- respond to the rural characteristics of the wider landscape
- reinforce landscape structure perpendicular to, as well as along, the road corridor
- reinstate vegetation and screening function lost alongside existing road corridor during construction
- deliver environmental elements/mitigation with multiple functionality
- design planting and structures to respond to local typologies and characteristics

2.6.12 Specific embedded essential mitigation as it relates to landscape and visual impacts is described below:

- Revision of proposed access arrangements to Merryfield Airfield and Rapps to avoid potential impacts on Ashill Wood/Every's Copse ancient woodland and nearby mature trees.
- Positioning Bickenhall Lane overbridge at a location where it has minimised height compared to the surrounding landscape due to the A358 being in cutting.
- Positioning Village Road overbridge further north to avoid visual impacts on residential properties in close proximity, and landscape impacts on mature hedgerow trees to the south.
- All bridge structure wing-walls to:
  - avoid prominent wing-walls in views from the wider landscape
  - allow hedgerow planting on approaches to get as close as possible to the A358
  - result in visual narrowing of cuttings at Stoke Road and Mattock's Tree Green junction.
- Re-design of property access at Jordans to avoid impacts on mature trees near the existing entrance.
- Addition of a new PRow link to the west of the proposed scheme between Nexus 25 roundabout and Stoke Road to retain views towards Stoke Hill and Blackdown Hills AONB without the proposed scheme and passing traffic restricting or interrupting the view.
- Widening online sections to one side only, where possible, to increase the retention of existing vegetation and its associated screening and landscape functions.

### Biodiversity

- 2.6.13 Embedded mitigation during the construction phase would be identified in the Register of Environmental Actions and Commitments (REAC), contained within the EMP. This would be developed to avoid or reduce the potential construction impacts on habitats and species and would seek to employ best-practice methods for dealing with habitat loss, habitat severance, disturbance and species mortality.
- 2.6.14 The EMP would include specific construction phase method statements that would address potential impacts on habitats and species and would detail the timing of works, roles and responsibilities of the contractors, control measures, training and briefing procedures, risk assessments and monitoring systems to be employed during planning and construction for all relevant environmental factor areas. Prior to construction the EMP would be updated to include additional items identified during the DCO examination and decision stages, and with additional input from the contractor.
- 2.6.15 The EMP would include site-specific methods, e.g. temporary use of silt busters or bales which would be used to prevent silt or contaminants from being released into watercourses during construction. Such precautions would be undertaken in accordance with relevant legislation and undertaken in compliance with the relevant Guidance for Pollution Prevention (GPPs) and industry best practice [12].
- 2.6.16 Additional mitigation to protect ancient woodland habitat would include a buffer zone of at least 15m between the works and the woodland edge in accordance with Natural England guidelines. There are two locations where this buffer cannot be achieved due to the proximity of the ancient woodland to the existing A358; these are at Bickenhall Wood and Saltfield Copse. In these instances, further assessment of root protection areas and refinement of the proposed scheme design will be undertaken to reduce potential impacts to root protection areas.
- 2.6.17 The root protection areas and canopies of hedgerows, scattered trees, and woodland to be retained within the proposed scheme, would be protected during construction in accordance with British Standard (BS) 5837:2012 *Trees in relation to design, demolition and construction. Recommendations* [13]. Measures for protection would be included in the EMP and would refer to root protection areas as defined within the Arboricultural Impact Assessment (AIA). Consideration should be given to the retention and management of edge habitats, within the protected root protection areas, for the benefit of wildlife during construction. It is acknowledged that some overhanging branches from trees adjacent to construction areas may need to be subject to pruning in order to protect trees from accidental damage by construction machinery. Such works would be avoided through careful design of construction logistics where possible, and where required would be carried out by suitably experienced arboriculturalists to maintain the health of the trees.

### *Protected and notable species*

- 2.6.18 It is anticipated that the effects of disturbance or risk of mortality to species during construction would be mitigated through specific construction phase method statements detailing best practice that would address potential impacts on species and prevent committing offences in relation to the *Wildlife and Countryside Act 1981 (as amended)* [14]. General best practice measures that address multiple ecological receptors are detailed below. Where protected species are present, further measures are likely to be required. The details of which would be agreed with Natural England through the licencing process. Draft

Protected Species Licences will be submitted separately from the DCO application, and will be detailed in the Consents and Agreements Position Statement.

- 2.6.19 Construction activities could result in individual birds and/or their active nests being injured/killed and/or destroyed, respectively. For this reason, vegetation clearance would be planned to be undertaken between September and February outside of the core breeding bird season, which is considered as March-August, inclusive. If this is not possible and works are required within this period, vegetation clearance works would adopt a precautionary working method including nesting bird surveys to identify nesting birds within 24 hours of the commencement of clearance, and a watching brief by a suitably experienced ecologist during all vegetation clearance where visibility (for nest detection) is limited on the pre-works surveys. If nesting birds are encountered, a suitable working buffer distance from the nest would be devised, by a suitably experienced ecologist, and the nest left until all young have fledged.
- 2.6.20 Sensitive programming of construction works would be implemented to avoid or reduce potential impacts such as mortality or disturbance to species. Details will be incorporated in the EMP and could include:
- Sensitive timing of works involving watercourse realignment to reduce impacts upon riparian mammals, aquatic macroinvertebrates and fish translocation.
  - Sensitive timing and methodologies of vegetation clearance and manipulation regard to nesting birds, hazel dormouse and other species such as reptiles and amphibians to be overseen by a suitably experienced ecologist.
  - Avoidance of ground works in key reptile and dormouse habitat between October and April to prevent harm to hibernating animals.
- 2.6.21 Restrictions on working hours to avoid night working (taken as the period 30 minutes before sunset to 30 minutes after sunrise) would be implemented in key locations so that there is no light spill in the vicinity of watercourses and key bat flight lines or roosts and adjacent habitats. Any temporary task requiring lighting would use directional lighting and would be designed to ensure that there is no light spill over 0.5 Lux on any identified bat commuting and foraging areas, roosting habitat or water courses with regard to bats and otters. Detailed lighting restrictions would be provided in the EMP. Lighting designed to be sensitive to bats and otters, would also benefit other nocturnal wildlife such as owls and badgers.
- 2.6.22 All excavations would be closed overnight, or ramps provided to reduce risk of trapping or injuring wildlife in them.
- 2.6.23 A pre-construction check for invasive plant species, both terrestrial and aquatic, would be undertaken at the appropriate time of year to inform any requirement to avoid or remove invasive species.
- 2.6.24 The implementation of biosecurity best practice described as 'check, clean, dry' would help to mitigate any potential mobilisation of invasive aquatic plant species and also chytrid fungus which effects amphibians. Measures for dealing with invasive species and implementing biosecurity measures would be incorporated in the EMP.
- Geology and soils
- 2.6.25 The proposed scheme footprint has been reduced and designed to limit impacts on agricultural land and soil resources.

- 2.6.26 Adoption of appropriate mitigation for soil handling and restoration to mitigate the effects on soil resources is by two primary means:
- Development of a Soil Resource and Management Plan (SRMP) during the pre-construction phase, which would identify the existing soil resources that would be affected by the proposed scheme, based on detailed soil surveys information. The SRMP would be and implemented by the contractor.
  - Adherence to good practice guidance on soil handling and storage, in accordance with Department for Environment, Food and Rural Affairs' (Defra) *Code of Construction Practice for the Sustainable Use of Soils on Construction Sites (2009)* [15].
- 2.6.27 To inform the assessment on geology and soils receptors the proposed scheme design is being developed in accordance with CD 622 *Managing Geotechnical Risk* [16], which describes best practice in relation to managing the risk associated with the ground. This includes best practice on characterising a site, including geology, geomorphology, hydrogeology and land contamination.
- 2.6.28 Technical consultation is undertaken with various statutory and non-statutory bodies and external sources to obtain the latest information on baseline conditions.
- 2.6.29 Site investigation would be undertaken prior to construction, to investigate areas of potential land contamination which have been identified as part of baseline assessment, potentially presenting a moderate to high risk to identified receptors (human health, surface water, groundwater). The additional information obtained from the site investigation would enable further definition of potential risk to human health and Controlled Waters. This would identify the requirement for additional site investigation, further risk assessment and/or mitigation works to be incorporated into the design, where risks are assessed as significant.
- 2.6.30 Based on available baseline information a potential significant effect has been identified to off-site human health receptors (residential) from potential ground gas/vapours associated with historic landfills intersected by the proposed scheme. Mitigation (if required, subject to completion of the site investigation) to remove potential secondary/preferential pathways to off-site receptors may include construction of an engineered cap for placement of new service ducts/drainage, installation of passive gas venting layer and/or treatment of old service ducts/drainage.
- 2.6.31 Waste hierarchy principles are to be used at every stage of the project, as appropriate to identify opportunities for reuse of soils within the proposed scheme. This can be achieved through:
- Promotion of sustainable reuse of excavated made ground and natural soils either within the proposed scheme or at a receiver or hub site. A Materials Management Plan (MMP) will be prepared by the contractor in advance of construction works in accordance with *CL:AIRE Definition of Waste Code of Practice (DoWCoP) (2011) (v.2)* [17].
  - A Site Waste Management Plan (SWMP) is to be prepared to detail the amount of waste to be produced, how it would be used, recycled or disposed of.
- 2.6.32 An EMP will be prepared and developed by the contractor prior to the start of construction works. Where significant residual effects have been identified, the EMP shall include remediation and remediation monitoring requirements, to be

agreed with the relevant authorities, in accordance with DMRB LA 109 *Geology and soils* [18].

- 2.6.33 The proposed scheme design would also include assessment of ground aggressivity and selection of appropriate concrete class and pile design, for the site-specific ground conditions and structural loading.

#### Material assets and waste

- 2.6.34 Design measures include, but are not limited to, applying the five key principles for Designing out Waste as outlined by the Waste and Resources Action Programme (WRAP) *A Design Team Guide for Civil Engineering* which has been summarised below:

- Design for Reuse and Recovery – this includes the reuse of materials and components recovered from on site or from other sites, use of recycled materials and use of “new” materials that contain a high percentage of recycled material.
- Design for Off Site Construction – this includes identifying if any part of the design can be prefabricated / manufactured off site and assembled on site rather than constructed in-situ.
- Design for Material Optimisation – consideration should be focussed on using less material and producing less waste; for example, through “lean design” and reducing variables and bespoke elements in materials and design.
- Design for Waste Efficient Procurement – this includes utilising the procurement process of materials and services to inform design development, reducing waste in the supply chain, consideration where waste arises and where waste can be reduced in construction methods.
- Design for Deconstruction and Flexibility – consider maintenance and adaptability for future uses, how constructions can be deconstructed effectively at end of life and avoiding the use of materials that prevent future recycling.

#### Noise and vibration

- 2.6.35 A low noise thin surface course system (TSCS) would be incorporated throughout the proposed scheme. At present this is assumed to achieve a similar noise reduction as the existing A358 low noise road surface but opportunities to improve on this will be further investigated and reported in the ES.
- 2.6.36 Mitigation measures designed into the proposed scheme to reduce impacts, including noise during operation, are achieved through careful design of the horizontal and vertical alignment of the road. Roadside landscaping and screening have been incorporated into the design<sup>1</sup>. This will result in the number of people adversely affected by noise across the proposed scheme being reduced. The approach is in line with the aim of government noise policy to minimise, as far as is sustainable, adverse impact on health and quality of life. The horizontal alignment of the proposed scheme, as part of the engineering design, has resulted in larger distances between dwellings and the new A358 where practicable.

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<sup>1</sup> Note that the noise assessment presented in PEI Report Chapter 11 Noise and vibration does not currently take into account the latest DF2 landscape bunding. This will be included in the assessment for the ES.

### Population and health

- 2.6.37 The design of the proposed scheme has, where possible, avoided direct impacts on development land, businesses and agricultural land holdings, with appropriate embedded mitigation developed in order to mitigate potential effects where possible (e.g. early re-provision of access to ensure accessibility during construction).
- 2.6.38 During construction we will engage with all identified commercial property and businesses to minimise disruption and maintain access arrangements where possible. Through the design of the proposed scheme, appropriate access would continue to be provided. Where concerns have been raised by landowners and tenants about the proposed scheme and its potential effects on business and agricultural land holding viability, landowner engagement has helped inform design with appropriate mitigation measures agreed and incorporated as part of the proposed scheme.

### Road drainage and the water environment

- 2.6.39 All construction activities associated with road drainage and the water environment are to be completed in compliance with the EMP which would include items such as:
- Management of chemicals and fuels
  - Sediment/surface water run-off control
  - Monitoring requirements for water quality
  - Storage of materials
  - Dewatering protocol
  - Piling risk assessments
  - Working near watercourses protocol
  - Localised flood risk management measures
- 2.6.40 During the operational phase, the design will implement the following measures to manage impacts on affected surface watercourses:
- New crossings of watercourses will be minimised and only implemented where essential.
  - The length of crossings along the watercourse will be kept to a minimum.
  - The width and height will be based on existing crossings to maintain baseline conditions, although an iterative assessment process will be applied so that impacts in terms of flood risk, water quality and hydro-geomorphology can be reduced as far as it technically feasible.
  - Any new crossings (including clear span bridges or culverts) will be designed to minimise effects on the existing flow regime and hydro-geomorphological conditions of the channel.
- 2.6.41 Channel diversions and realignments required as part of the proposed scheme have been designed to match existing conditions (as far as possible) to maintain existing flood risk, water quality and hydro-geomorphological conditions.
- 2.6.42 Further embedded mitigation measures associated with specific watercourses are provided in Table 13-11 within Chapter 13 Road drainage and water environment of this PEI Report.

## Climate change

### *Greenhouse gas (GHG) emissions*

- 2.6.43 The proposed scheme considered a variety of alternative options to solve the identified capacity problem on the existing A358 before defining and refining the preferred option. An assessment of carbon was undertaken during option selection, which identified the Pink option as having a small benefit (lower construction emissions) compared to the Orange and Blue options (these options are described in Chapter 3 Assessment of alternatives, to this PEI report).
- 2.6.44 As the proposed scheme design has been refined during the preliminary design stage, consideration has been given to options that reduce or avoid carbon emissions. This included:
- removal of retaining walls at Stoke Road/Henlade
  - simplification of overbridge and connecting road junction at Mattock's Tree Green junction which reduces overall material demand compared to the baseline option
- 2.6.45 Existing pavements will be retained wherever possible within the proposed scheme to reduce the requirement for additional materials and construction.
- 2.6.46 The proposed scheme has been designed to minimise the requirement for energy consuming operational equipment such as street lighting or intelligent transport systems wherever possible. Where lighting may be required, for example at Southfields junction, LED/demand sensitive lighting is proposed to reduce GHG emissions.
- 2.6.47 Materials and assets would be specified for longer lifespans to avoid future need for replacement.
- 2.6.48 Further refinements to the design will be reported in the ES.

### *Vulnerability to climate change*

- 2.6.49 The proposed scheme has been designed to improve its resilience to climate change through a range of design and construction standards, good engineering practice and material specification measures and in compliance with the EMP include but are not limited to:
- The use of construction materials with appropriate durability requirements (such as increased resilience to thermal loading from fluctuating temperatures).
  - Risk of heat stress to site personnel from exposure to extreme temperatures to be managed through the provision of necessary personal protective equipment and facilities.
  - Sufficient time to be included within the construction programme or considering changing the timing of construction activities to reduce risks relating to site personnel, plant and machinery associated with high temperatures and prolonged periods of heavy precipitation.
  - Material stockpiles, drainage infrastructure and structures to be inspected before and after extreme weather events to ensure stability and incorporating such measures into materials management plans.
  - Provision of flood compensation storage areas.
  - Soft landscape features to be maintained following establishment through watering in periods of dry weather and carrying out periodic inspections to monitor the establishment of new planting.

## 2.7 Construction, operation and long-term management

### Construction programme

- 2.7.1 The start date for the construction phase would depend upon several factors including the outcome of the DCO process and the date the DCO comes in to force, should it be made by the SoS, and the date the requirements contained within Schedule 2 of the Order are discharged.
- 2.7.2 All previously made Orders have contained a definition of 'commence' which allows limited operations to be undertaken once the Order comes into force. These generally include operations such as archaeological investigations, ground investigations, advanced ecological mitigation and the establishment of construction compounds. All other construction operations require the requirements contained within the made Order to be discharged prior to construction commencing. The requirement discharge is subject to stakeholder consultation and approval by the SoS.
- 2.7.3 Taking into account the above statutory restrictions, it is currently anticipated that the construction activities would commence in 2024 and the proposed scheme open to traffic in mid-2028.
- 2.7.4 The construction programme would be finalised by the contractor in advance of the commencing the works. An outline construction programme, including the duration, anticipated phasing, working hours and any requirement for night-time working would be included within the ES.
- 2.7.5 The current proposal is for the works to be completed as one single project, reducing any long-term impact on the local area, access and communities. This construction would be separated into two main phases:
- Phase 1 would be works adjacent to the existing A358 between junction 25 of the M5 to Southfields roundabout. During phase 1 we would maintain one lane open in each direction while we construct the new road alongside. To safely install the beams for the new overbridges at Ashill junction, Village Road link (south) and Bickenhall Lane overnight road closures would be required.
  - Phase 2 would be the upgrade and construction of the new westbound carriageway that would be built online over the existing A358 road.

### Construction activities

- 2.7.6 The construction activities for the proposed scheme would be typical of a major highway scheme and would include the following:
- Advanced works comprising ecology and landscape mitigation (e.g. habitat creation, moving of badger setts, establishing receptor sites for reptiles and amphibians, installation of bat and bird boxes and ecological ponds, vegetation clearance) and archaeological investigations (excavations)
  - Establishment of site compounds, laydown areas and facilities
  - Vegetation clearance
  - Statutory utility diversions
  - Bulk earthworks, including excavation of cuttings and creation of embankments
  - Drainage works
  - Construction of bridge structures, including piling
  - Road pavement works

- Signage, lighting and street furniture
- Auxiliary works including local roads, WCH routes and ecology structures
- Landscape and planting works

### **Construction access and vehicle movements**

2.7.7 The construction of the proposed scheme would use typical construction techniques associated with major infrastructure projects.

2.7.8 Construction of the proposed scheme would require a large quantity of plant and equipment. The high volume of material to be moved would require large excavators, articulated dump trucks, dozers, compactors plus graders, bowzers and stabilising plant. To construct the structures, large piling rigs and heavy-duty cranes would also be required. Exact plant numbers and type would be determined by the construction methodology and the volume of material to be handled on-site.

2.7.9 It is currently assumed that a haul road strip 15m wide would be required parallel to the embankments/structures with access gained from existing local roads, where reasonably practicable, and created from laybys on the A358.

### **Excavated materials**

2.7.10 It is estimated that (after allowance for topsoil stripping and existing pavement), there would be approximately 731,300m<sup>3</sup> (cubic metres) of bulk cut available from necessary excavations on-site. This preliminary volume total does not include for excavation for drainage pipes, drainage ditches and ponds and backfill/excavation for structures. These volumes would be refined during the current preliminary design.

2.7.11 Total fill requirements would be 680,300m<sup>3</sup> which excludes a further 190,000m<sup>3</sup> of imported selected fill required for capping and pavement sub-base.

#### Re-use of excavated materials

2.7.12 Using available data, it is assumed that approximately 85-90% of excavated materials would be suitable for re-use as general engineering fill on the proposed scheme (dependent on the material classifications confirmed through ground investigations). Taking this into account, the adjusted volume of excavated material suitable for fill would reduce to 621,600m<sup>3</sup>. Remaining non-suitable material (approximately 109,700m<sup>3</sup>) and excavated topsoil would be stockpiled for use in landscaping

2.7.13 Demolition arisings and marginal materials would also be processed for re-use where possible.

2.7.14 The earthworks strategy, including management of any surplus or deficit of material, would be developed further as part of the EIA to achieve an earthworks cut/fill balance.

### **Statutory utilities**

2.7.15 Construction of the proposed scheme would require the diversion, relocation or protection of several existing utility assets including water, wastewater, electricity and telecommunications. The required diversions would be planned in detail by the contractor as part of the construction works.

2.7.16 Twelve statutory undertakers (SU) with apparatus would be impacted by the proposed scheme, comprising:

- BT Openreach
- CenturyLink Level 3 Communications managed by Instalcom
- GTC
- National Grid
- Mobile Broadband Network Ltd
- Sky UK Limited
- SSE Telecoms
- Virgin Media
- Vodafone
- Wales & West Utilities
- Wessex Water
- Western Power Distribution

- 2.7.17 While most of the utilities affected by the proposed scheme are simply cables or pipes, there are several major elements such as communication masts, pumping or sewage works and sub-stations which would be protected or diverted.
- 2.7.18 There are two assets of national importance, the Level 3 Communications and the National Grid high pressure gas main.
- 2.7.19 The Level 3 Communications assets requires 16 weeks advanced notice period for each outage and only permits one outage every 18 months; this includes outages for other schemes that require diversionary works and any outage required to facilitate emergency works.
- 2.7.20 The National Grid high pressure gas main also has a long lead in time of up to 18 months with works only permitted over the summer period between March and October.
- 2.7.21 Utilities diversions will be assessed in the ES once further information becomes available.

### **Permanent and temporary land-take**

- 2.7.22 The extent of land use requirements during construction and operation are defined by permanent and temporary land-take requirements. These are shown within the proposed scheme boundary line on Figure 2.1 General Arrangement. These would be set out and justified in the Statement of Reasons to accompany the DCO application.
- 2.7.23 Permanent land-take is required to construct, operate and maintain the proposed scheme and includes the footprint of all the proposed highway infrastructure, earthworks and drainage works, also includes the areas for environmental mitigation, such as landscape planting and areas of habitat replacement. Further details on the essential landscaping areas are shown on the Environmental Masterplans (refer to Figure 7.8 Environmental Mitigation Plan).
- 2.7.24 Temporary land-take is required to assist the contractor in the construction of the proposed scheme, including working areas, haul roads, main and satellite site compounds and material/topsoil storage areas, and can also be required for the construction of part of the works with a permanent easement right acquired for operation and maintenance.

### **Environmental Management Plan**

- 2.7.25 An EMP is being developed and will summarise proposed scheme specific actions identified through the EIA process for all environmental factors and would

be presented in the form of a Register of Environmental Actions and Commitments (REAC) within the ES.

- 2.7.26 Prior to the commencement of the construction works, the EMP would be refined by the contractor, in line with DMRB LA 120 *Environmental Management Plans* [19].

## 2.8 Demolition

- 2.8.1 The proposed scheme would require the partial demolition of four existing highway structural culvert wing walls and foundation aprons to allow for the construction of the proposed culvert extension, including:

- Hatch Park cattle creep
- Venner's culvert
- Sunnyside culvert
- Cad brook culvert

- 2.8.2 The proposed scheme would require the demolition of three existing residential properties, comprising:

- Henlade Farmhouse, Stoke Road
- Meadow View, Stoke Road
- Bath Cottage, Village Road

- 2.8.3 One existing parking lay-by would be upgraded to meet the current standards for an emergency lay-by. The remaining parking lay-bys along the existing A358 are not deemed suitable for reuse and would require demolition.

## 2.9 Maintenance

- 2.9.1 A Maintenance and Repair Strategy Statement (MRSS) would be prepared for the proposed scheme, which would identify maintenance proposals for assets and how these assets would be maintained during operation.

- 2.9.2 The maintenance proposals would be developed with engagement with Highways England's Maintenance and Operation team.

- 2.9.3 Maintenance activities would be as authorised under the DCO. As required by the EMP, industry standard control measures would be applied and encapsulated in the third iteration of the EMP for the end of construction. With the implementation of these measures no significant effects are considered likely.

## 2.10 Decommissioning

- 2.10.1 The traffic and economic assessment demonstrate the proposed improvements would operate adequately for the first 15 years of opening to the Design Year of 2043. Typically, highway schemes are designed to have a material life-span of between 20 and 40 years before major maintenance and upgrading is required dependant on material properties, maintenance and usage. Elements including structural concrete and steelwork have extended design lives of up to 120 years.

- 2.10.2 It is considered highly unlikely that the proposed scheme would be decommissioned as the road is likely to have become an integral part of the infrastructure in the area. Decommissioning would not be either feasible or desirable and is therefore not considered further within this PEI Report.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 3  
Assessment of Alternatives

HE551508-ARP-EGN-ZZ-RP-LE-000018

11/09/21

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## 3 Assessment of alternatives

### 3.1 Introduction

- 3.1.1 This chapter of the Preliminary Environmental Information (PEI) Report presents a summary of the alternative options which have been considered and the justification for the proposed scheme.
- 3.1.2 It should be noted that throughout Highways England's Project Control Framework (PCF) stage 3, the design has been developed to improve its performance. Many of these design changes are developments from the PCF stage 2 design and are not alternatives.
- 3.1.3 The *Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017* (the 'EIA Regulations') [1], in regulation 14 (18.d), require that "...a description of the reasonable alternatives studied by the applicant [must be provided], which are relevant to the proposed development and its specific characteristics, and [give] an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment". This chapter provides a preliminary response to this requirement and will form the basis of an alternatives chapter to be included within the ES.

### 3.2 Scheme history

- 3.2.1 The proposed scheme has been under consideration for over six years. It forms part of a programme of improvements planned along the A303/A358 corridor aimed at improving connectivity between London, the South-East and the South-West. The programme of improvements, as set out in the UK government's *Road Investment Strategy* (RIS) [2] made a commitment to "...upgrade all remaining sections of the A303 between the M3 and the A358 to dual carriageway standard, together with creating a dual carriageway link from M5 at Taunton to the A303...".
- 3.2.2 Work on the project began in December 2014 [3], when the government announced funding to deliver improvements along the A303/A358 corridor starting with three schemes:
- dualling the A358 between Taunton and Southfields roundabout on the A303
  - dualling the A303 between Sparkford and Ilchester
  - ongoing improvements on the A303 between Amesbury and Berwick Down
- 3.2.3 Funding for delivery of the proposed scheme was confirmed within the UK government's second *Road Investment Strategy* (RIS2) [4], published on the 11 March 2020, which covers the period between 2020 and 2025.

### 3.3 Assessment methodology

- 3.3.1 The process of options identification and route selection which led to the proposed scheme is summarised below. The process followed the following stages:
- option identification, initial sifting and appraisal
  - options appraisal and sifting to identify options to take forward for further appraisal
  - the selection of the Orange option, which was taken to non-statutory public consultation in March to July 2017

- the selection of three options (the Orange option, the Blue option and the Pink option), which were taken to non-statutory public consultation in 2018
- the selection of a preferred route (Pink Modified option) which was announced by the Secretary of State (SoS) in June 2019 and which forms the basis of the proposed scheme

### 3.4 Reasonable alternatives studied

3.4.1 The options appraisal process has been undertaken in line with Highways England's PCF, the early stages of which are summarised below:

- PCF stage 0 – strategy, shaping and prioritisation. Early initial high-level sifting appraisal to assess the viability of a long list of transport solutions to the problem identified.
- PCF stage 1 – options identification. A selected number of viable options are subject to further traffic, economic and environmental assessment and feedback sought by consultation.
- PCF stage 2 – options selection. The option designs, traffic modelling and economic and environmental assessments are refined following feedback from the consultation. At the end of this stage a preferred route announcement (PRA) is made.
- PCF stage 3 – preliminary design. The preferred route becomes the proposed scheme and this single option is developed to the required preliminary design level to allow full assessment and appropriate planning consent applications to be made.

3.4.2 For PCF stages 0 and 1, initial option sifting was undertaken in accordance with the *Transport Analysis Guidance – The Transport Appraisal Process* or 'WebTAG' [5]. The sift used the *Early Assessment Sifting Tool (EAST)* [6], which forms part of the initial sifting of options. However, as EAST does not provide a numeric score, the assessment team produced a scoring mechanism to allow each option to be directly compared and ranked as described below. The scoring mechanism process followed after using EAST was developed in accordance with the *Transport Analysis Guidance*.

3.4.3 The PCF stage 2 option assessment methodology and conclusions are reported in the *A358 Scheme Assessment Report* [7] published as part of the PRA in 2019 [8]. A summary of the finding of this report is provided below.

3.4.4 A detailed description of all options considered is provided in Appendix 3.1 Route options – stages 0-2 of this PEI Report, a summary of which is discussed below.

3.4.5 In PCF stages 1 and 2, a total of 28 options were assessed against the criteria presented in EAST as well as a series of criteria defined for the project to provide a wide range of options to consider. The options were roughly classified into three groups:

- Central: option 2, option 2/2A, option 2/2B, option 2A/2B, option 2D, option 2/2D (with single carriageway 'Henlade Bypass), option 2/2D (with dual carriageway 'Henlade Bypass), option 2A/2D (with single carriageway 'Henlade Bypass), option 2A/2D (with dual carriageway 'Henlade Bypass), option 3, option 7, option 8, option 8/8A, option 8/8B, option 8A/8B, option 9, option 13, and option 16.
- Northern: option 4, option 4/4A, option 11, option 11C, and option 12.
- Southern: option 1, option 1/1A, option 1/1B, option 14, and option 15.

- 3.4.6 A two-stage assessment was undertaken, firstly against environmental constraints such as Area of Outstanding Natural Beauty (AONB), Site of Special Scientific Interest (SSSI), Scheduled Monuments and Ancient Woodland, and a second against more local criteria such as local air quality, noise and heritage. Further details of the assessment can be found in Appendix 3.1 Route options – stages 0-2 of this PEI Report.
- 3.4.7 Of the options considered, the following were preferred and taken forward for further assessment:
- Option 2A/2B
  - Option 8/8B plus works to junction 25 of the M5
  - Option 8/8B with north facing slips
- 3.4.8 These were renamed the Pink, Blue and Orange routes respectively. A description of each is given in Appendix 3.1 Route options – stages 0-2 of this PEI Report.
- 3.4.9 The Pink, Blue and Orange options were subject to further traffic, economic and environmental assessment to help inform the ‘preferred route’ option. The environmental effects of each of these options is described in Table 3-3 in Appendix 3.1 Route options – stages 0-2 of this PEI Report.
- 3.4.10 Consultation on a single option (the Orange option) was undertaken from March to July 2017 and a further consultation on all three options (the Orange option, the Blue option and the Pink option) was undertaken from January to February 2018. As a result of consultation, three further options were identified:
- A combination route with elements from the original Pink and Orange options (Pink/Orange) – would be approximately 16km long between the M5 and Southfields.
  - A combination route with elements from the Blue and Orange options (Blue/Orange).
  - Ruishton and Henlade Parish Council proposed an option (named the Green option) – this contained elements of the Pink and Orange options, with a novel element between the A358/A378 junction at Mattock’s Tree Green.
- 3.4.11 The methodology employed to appraise the Pink, Blue and Orange options from the 2018 consultation plus the three alternatives identified by consultees was based on the elimination process outlined in the *Design Manual for Roads and Bridges* (DMRB) and comparing option in pairs against the main categories of the Appraisal Summary Table (AST). The option with the least number of significant advantages was eliminated. The remaining option was taken forward for comparison with the next option.
- 3.4.12 The Pink option performed significantly better than the Blue and Orange options in the elimination process in terms of economics and landscape and was the most favourable option. All other options were compared to the Pink option to establish if the options identified as part of the consultation process offered benefits greater than the best performing option (Pink).
- 3.4.13 The Pink option performed significantly better than the Blue/Orange, Pink/Orange and Green options in the elimination process in terms of economics and landscape. All three options were more expensive than the Pink option and caused more significant environmental damage. Where these options did perform better than the Pink option, the differences were not considered to outweigh the economic and landscape advantages of the Pink option. Therefore, all three of

the options identified by consultees at the 2018 consultation (i.e. Blue/Orange, Pink/Orange and Green) were not taken forward. Further information is provided in Table 3-4 of Appendix 3.1 Route options – stages 0-2 of this PEI Report.

- 3.4.14 Re-assessment of scheme costs and risks (to accommodate for further design developments, the change in the scheme delivery programme for the 2018 consultation and the delayed opening year for the scheme) resulted in two of the proposed route options (Pink and Blue) exceeding the budget. Further work was therefore taken to review the updated costs and deliver a route option within the budget, whilst still in compliance with the RIS and RIS2 objectives.
- 3.4.15 The Pink option was the most expensive option, but as the best performing of the three options and the option attracting strongest support from the 2018 consultation, it was therefore trialled for modification to reduce the cost. Further modifications were therefore made to produce the '**Pink Modified**' option
- 3.4.16 The Pink Modified option takes a similar route to the Pink option for the majority of the alignment. This option follows a single alignment from Southfields roundabout on the A303 combining elements of on-line and offline works to connect into junction 25 on the M5, and retaining the bypass at Henlade. It also responds to the public feedback concerning the impact that these junctions and the road in-between, might have on homes, public open space and the countryside. A more detailed description is included in Appendix 3.1 Route options – stages 0-2 of this PEI Report and the PCF stage 2 *A358 Environmental Assessment Report (EAR)* [9].
- 3.4.17 The Pink Modified option was announced as the preferred route in June 2019 [10].

### 3.5 Justification for chosen option

3.5.1 The Pink Modified option meets the proposed scheme objectives, was more affordable and reduces the impact on the countryside. The scheme objectives are met as follows:

- **Employment** – The Pink Modified option provides direct access to Nexus 25 from the east, as well as connecting to the A378. This would help Taunton to become a more attractive place to work and do business by the local population and helps facilitate growth in Somerset and the South-West and along the A303/A358/A30 corridor.
- **Housing** – The Pink Modified option will facilitate growth in housing at key development hotspots along the corridor.
- **Capacity** – The Pink Modified option would provide relief to the traffic congestion in Henlade. The average daily traffic would reduce from 33,500 vehicles to 4,000 vehicles in 2038. By reducing congestion and increasing capacity it would allow mile-a-minute travel as the norm along the new A358.
- **Resilience** – The new road offers connection between the new A358, Nexus 25 development and M5 junction 25. This will help reduce congestion between West Hatch and M5 junction 25.
- **Safety** – The new A358 would see the existing road junctions and private accesses closed with new connections and junctions provided, making journeys safer by avoiding conflicting traffic-turning movements. The scheme would also improve safety by encouraging road users to use the new A358, rather than seeking alternative local routes to avoid congestion into Taunton.

Existing walking, cycling and horse-riding provision would also be enhanced and improved.

- **Connectivity** – Connectivity to the South-West from the South-East and London would be improved, making Taunton and the South-West region more accessible. Daily travel for commuters and local traffic into Taunton would be safer and more reliable, by separating local movements from traffic passing through the area.
- **Environment** – The Pink Modified option avoids the Ancient Woodland at Huish Copse and at Stoke Wood and removes the need to impact the open space.
- **Severance** – The Pink Modified option would provide new connections to the A358, providing safer replacement routes for local communities. Existing walking, cycling and horse-riding provision would also be enhanced and improved.
- **Quality of life** – The Pink Modified option would allow local traffic using the A378 to connect with the upgraded A358 at Mattock's Tree Green junction, improving local journeys into Taunton. The reduction in traffic congestion at Henlade would improve residents' quality of life.

3.5.2 The Pink Modified option was, therefore, announced in June 2019 as the preferred route to be taken forward for PCF stage 3 as it meets the proposed scheme objectives, is more affordable and reduces the impact on the countryside.

## 3.6 Further amendments to the preferred route

### Option appraisals

3.6.1 During the early stages of PCF stage 3, the scheme has undergone further consideration of options into specific design elements along the preferred Pink Modified route in collaboration with the wider scheme team.

3.6.2 Table 3-1 provides a summary of the option appraisals undertaken to date on key features of the preferred route, where the 'original' option forms the 'baseline' to which the other options were compared. The option appraisals that were undertaken include:

- M5 junction 25 southbound off-slip
- Stoke Road link
- Mattock's Tree Green junction
- Scout camp link
- Village Road link (north)
- Bickenhall Lane link
- Stewley link
- Ashill junction
- Village Road link (south) and Capland link
- Broadway Street link
- Southfields link

3.6.3 The appraisal of options considered a range of criteria, not only environmental. These included scheme objectives, technical issues for highways, structures, drainage and earthworks, maintenance and operational issues, buildability, cost, existing commitments, health and safety and carbon. The preferred option was taken on a balance of outcomes.

- 3.6.4 The appraisals, based on professional evaluation, used the following ranking methodology to compare options with the original (baseline) design of the preferred route:
- Major adverse: -2 (significantly worse than the baseline)
  - Moderate adverse: -1 (worse than the baseline)
  - Neutral: 0 (no better/worse than the baseline)
  - Minor beneficial: +1 (better than the baseline)
  - Major beneficial: +2 (significantly better than the baseline)
- 3.6.5 Further information on the option appraisals is provided in Appendix 3.2 Option appraisals of this PEI Report. For the purposes of the PEI Report, only the individual scores for each environmental aspect and the overall score is provided.

**Table 3-1 Summary of options appraisals**

Number of additional options	Description of baseline/original	Description of preferred option	Reasons for choice	Appendix 3.2 ref.
<b>Stoke Road link</b>				
2	The A358 main carriageway would pass between Henlade to the north and Ruishton to the south and would cross Stoke Road. The baseline option would have the A358 dual carriageway in an 8m deep cutting with Stoke Road passing over. The baseline option did not fully consider the length of affected carriageway either side of the proposed overbridge and identified minimal impact on access to adjacent properties. The baseline option adversely impacted two properties, Henlade Farmhouse and Meadow View. Both were subject to blight applications which have been accepted by Highways England. The properties would be demolished in both the baseline and two options.	<u>Option 2</u> . This would be an offline option whereby the proposed Stoke Road overbridge would be located approximately 20m west. The realignment would allow the proposed Stoke Road embankments to be provided without encroaching on adjacent properties to the east of Stoke Road and maintain access. Additional land would be required to the west of the existing Stoke Road.	Access, health and safety, wellbeing, construction	Table 3-1
<b>M5 junction 25 southbound off-slip</b>				
1	Capacity improvements at M5 junction 25 including widening of the existing southbound off-slip from three to four lanes on the off-side approach over a length of approximately 120m. A retaining wall would retain the existing embankment between the slip and M5 southbound carriageway.	<u>Original</u> . As per previous.	Environment, construction, highways, geotechnics, drainage	Table 3-2
<b>Ashill junction</b>				
2	A new 2-level junction with slip roads to accommodate traffic movement in all directions, is proposed at Ashill between the village of Ashill to the west and Rapps and Ilton to the east. The position of the new junction would be located directly over the existing at-grade major/minor junctions, with the proposed bridge sitting directly above the existing western junction (access/egress	<u>Option 2</u> . It proposes that the junction position would stay in a similar location to the baseline option but the overbridge would move about 10m south so that it sits between both existing at-grade junctions. Copse Lane would also be upgraded heading northwards to reconnect Park Barn Lane properties and emergency access to Merryfield Airfield.	Arboriculture, construction, traffic, residents	Table 3-3

Number of additional options	Description of baseline/original	Description of preferred option	Reasons for choice	Appendix 3.2 ref.
	for Ashill). A little further to the east is Copse Lane, an existing private track, which would be upgraded to provide access to Park Barn Lane properties and emergency access to the Merryfield Airfield to the north.			
<b>Bickenhall Lane link</b>				
4	The baseline option would provide a new bridge (A358 eastbound carriageway) over Griffin Lane at Ch 6+600, infill (or demolish) existing agriculture underpass (3m x 3m) at Ch 7+075, construction of a new Hatch Park underpass (8m x 5m) at Ch 7+100 and closure of the existing Bickenhall Lane staggered junction at Ch 7+600.	<u>Option 3.</u> A new road link with bridge over A358 at Ch 7+350, comprising a new 6.0m wide single carriageway road link joining Bickenhall Lane to Staple Fitzpaine Road approximately 780m long. This option would also include: a new overbridge, removal of new Hatch Park underpass; extension of existing agricultural underpass and upgrade to private access to Hatch Park estate from Griffin Lane.	Community, construction, land-take	Table 3-4
<b>Broadway Street link</b>				
2	The current junctions of Broadway Street/Cad Road with the A358 would be closed. Access to, from and across the A358 would be made via the new Ashill split-level junction with slips. During community forums, concerns were expressed about the severance caused by the proposed scheme and the significant need for access to local businesses and employment opportunities at Ilton.	<u>Option 2.</u> It would provide a new link road parallel to the westbound carriageway, connecting Broadway Street to the proposed Ashill junction via Ashill Road. Main features: <ul style="list-style-type: none"> <li>• Approximate total length is 1500m.</li> <li>• Approximately 6m wide single carriageway</li> <li>• Existing vegetation along the new link would be lost</li> <li>• No bridge crossing over the A358 although a new drainage structure would be required under the link road for Cad Brook</li> </ul>	Community, connectivity	Table 3-5
<b>Village Road link (south) and Capland link</b>				
2	In accordance with the requirement to provide GD 300 Level 2 compliance, all at-grade junctions along the A358 are proposed to be closed by the proposed scheme.	<u>Option 2.</u> This option would be a development of Option 1 with the Village Road Overbridge moved approximately 250m west, further away from the properties along the existing Village Road.	Residents, earthworks, land acquisition	Table 3-6

Number of additional options	Description of baseline/original	Description of preferred option	Reasons for choice	Appendix 3.2 ref.
	<p>Access to Stewley and Capland is currently made from Capland Lane and Stewley Lane and the closure of these lanes with the A358 would require access via the proposed Village Road overbridge or Stewley Link (both accessed via Ashill junction). Journeys using these local lanes are longer and it has been reported that Stocks Lane is susceptible to flooding. There is therefore a risk during flood events that residents may be temporarily isolated from the wider road network.</p> <p>For Village Road Overbridge it has been concluded that the PCF stage 2 design would feature embankments that would impact the properties on the existing Village Road both visually and could result in blight and additional land acquisition.</p>	<p>The topography at the revised overbridge location is more favourable and results in the approach embankments being lower and shorter, reducing visual impact in the nearby properties.</p> <p>The proposed scheme boundary would retain the area required for Capland link (connecting Capland Lane with Village Road) in case this is implemented at a later stage. This decision is to be considered for the ES.</p> <p>The proposed scheme boundary currently includes sections of Stocks Lane near Frog Street and Capland Lane junctions for potential local flood mitigation works, if Capland link is not implemented at a later stage.</p>		
<b>Mattock's Tree Green junction</b>				
3	<p>A new 2-level junction with slip roads to accommodate traffic movement in all directions, is proposed at Mattock's Tree Green / A378.</p> <p>The proposed Mattock's Tree Green junction would be a grade separated junction, located to the east of Henlade village. The junction features a dumbbell roundabout configuration with an overbridge that would connect the two roundabouts and the A358 alignment would be in a deep cutting. No access was provided in the preferred route to the 'The Thatch' property.</p> <p>Technically there are design concerns with the baseline design as the vertical alignment would not tie into the existing topographical survey before the existing non-listed bridge on Ash Road.</p>	<p><u>Option 3.</u> The dumbbell arrangement and overbridge have been relocated slightly north as per Option 1. The Ash Road link from the southern roundabout ties in between the two existing bridges, which would not need to be demolished. This option would allow access provision to the existing Ashe Farm, the listed property (The Thatch), Ashe Farm camp site and container yard / business (Eclipse Event Solutions) with only minor junction / access modifications. No other existing properties would be affected by this option.</p> <p>To address concerns regarding the proposed battered slopes encroaching with the listed bridge there may be a need to consider retaining solutions as part of design development.</p>	Demolition, highways design, access, structures, public rights of way, residents, construction health and safety	Table 3-7
<b>Scout camp link</b>				

Number of additional options	Description of baseline/original	Description of preferred option	Reasons for choice	Appendix 3.2 ref.
1	<p>West Hatch Lane junction would be stopped up at the A358 as part of the proposed scheme. A new link from West Hatch Lane would provide access to the Somerset Progressive School, scout camp and local business in the area.</p> <ul style="list-style-type: none"> <li>Length of link = 650m</li> <li>Single carriageway roadway with width = 6m minimum</li> </ul> <p>The baseline route passes through the car park of Somerset Progressive School.</p>	<p><u>Option 1.</u> It would provide a direct link from the proposed Mattock's Tree Green junction southern roundabout.</p> <ul style="list-style-type: none"> <li>Length of link = 700m</li> <li>Single carriageway roadway with width = 6m minimum.</li> </ul>	Community, connectivity, road safety	Table 3-8
<b>Southfields link</b>				
1	<p>The PCF stage 2 scheme design does not provide access to large portions of farmland between Ashill junction and Southfields roundabout.</p>	<p><u>Option 1.</u> It would provide access to farmland by a new access-way running to the north-east of the A358.</p> <ul style="list-style-type: none"> <li>Length approx. = 1km</li> <li>Width of accessway = 3.5m</li> <li>The access-way would further provide access for maintenance to drainage attenuation/ storage ponds.</li> <li>Not surfaced/unbound.</li> <li>Follows natural ground levels typically.</li> </ul>	Accessibility, Community	Table 3-9
<b>Stewley link</b>				
1	<p>The baseline option would provide a road link from Stewley Lane to Ashill Road via a new overbridge over the A358. This was called Kenny link and would also include a new accessway to the sewage treatment works.</p> <ul style="list-style-type: none"> <li>Length of link = 0.8km.</li> <li>Single carriageway road 6m minimum width.</li> </ul>	<p><u>Option 1.</u> Option 1 would omit the Kenny link and instead provide a new link (east of the proposed scheme) to connect Stewley Lane with Ashill junction. It would also connect to Park Barn Lane which would remove the requirement to upgrade Copse Lane as part of the Ashill junction proposals.</p> <ul style="list-style-type: none"> <li>Length of link = 2,300m.</li> <li>Single carriageway road 6m minimum width.</li> <li>No bridge structure proposed.</li> </ul>	Access, Drainage, Earthworks, Construction, Carbon	Table 3-10

Number of additional options	Description of baseline/original	Description of preferred option	Reasons for choice	Appendix 3.2 ref.
Village Road link (north)				
1	<p>All at-grade junctions along the A358 would be closed by the proposed scheme. This includes Village Road which forms a junction with the existing A358 and provides access to the villages of Hatch Beauchamp, Stewley and Capland.</p> <p>The baseline option provides no access from Mattock's Tree Green junction to Village Road. Instead, road users would access the local villages via A378 and Meare Green Lane which is approximately 2.5km longer and would have to use of narrow single-lane roadways with limited passing opportunities.</p>	<p><u>Option 1</u>. It would provide a 600m long section of new single carriageway, approximately 7.3m wide to provide a direct link to the village of Hatch Beauchamp from Mattock's Tree Green junction, via Village Road.</p> <p>The vertical alignment largely follows existing ground levels and would require minimal earthworks.</p>	Community, road safety.	Table 3-11

## Other design amendments

- 3.6.6 There are three further design changes that have been made since PCF stage 2 which have not been subject to an options appraisal as they are considered design development. These are:
- Improvements to Nexus 25 roundabout
  - Omission of retaining walls at Stoke Road overbridge
  - Provision of a segregated left turn lane (SLTL) between the A358 and A303 eastbound at Southfields roundabout
- 3.6.7 The PCF stage 2 design did not envisage any changes to the Nexus 25 roundabout, which was still in planning phase at that time. The roundabout has since been constructed and opened to traffic in April 2021. Further traffic modelling has shown that the current arrangement would not support the operational requirements of the proposed scheme. Therefore, capacity improvements would be required including:
- widening of the existing roundabout to accommodate additional traffic lanes as well as to achieve compliant entry path radius / deflection where possible
  - widening of entry and exit roads to accommodate additional traffic lanes
  - removal of the segregated left-turn lane from the Nexus 25 development
- 3.6.8 The additional land take would result in a small additional loss of land and increase in hard surfaced area, although the improvements would occur within the existing highways boundary.
- 3.6.9 The PCF stage 2 design proposed a retained cutting to the east of Stoke Road to avoid the demolition of two properties located either side of the proposed A358 route on Stoke Road. The retaining structures would be costly, and would take an extended period to construct, making construction impacts on the adjacent properties lengthier. Blight applications [11] by the owners of both properties have been accepted by Highways England and the purchase of the Meadowview property completed in June 2021, with the purchasing of the other property currently in progress; following which they are proposed to be demolished. The demolition of these properties would remove the 'pinch point' at Stoke Road and provide more land for the proposed scheme. This would enable the provision of grassed earthworks cutting slopes and the retaining walls to be removed entirely.
- 3.6.10 The PCF stage 2 design stopped at Southfields roundabout with the widened A358 connecting directly into the roundabout; however, the PCF stage 2 *A358 Scheme Assessment Report* [8] acknowledged that a segregated left turn lane from the A358 eastbound to A303 eastbound could be provided subject to PCF stage 3 traffic modelling. Further traffic modelling has shown that the roundabout would perform better operationally by the provision of this segregated left-turn lane. The additional land take would result in a small additional loss of agricultural land, although most of the change would occur within the existing highways boundary.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

## References

- [1] Secretary of State, "Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017 (SI 2017/572 HMSO)," HMSO, London, 2017.
- [2] Department for Transport, "Road investment strategy: 2015 to 2020," DfT, 2015.
- [3] Highways England, "A303 / A358 corridor: Autumn 2016 Newsletter," Highways England, 2016. [Online]. Available: [https://s3.eu-west-2.amazonaws.com/assets.highwaysengland.co.uk/roads/road-projects/A303-A358/A303\\_A358+Newsletter.pdf](https://s3.eu-west-2.amazonaws.com/assets.highwaysengland.co.uk/roads/road-projects/A303-A358/A303_A358+Newsletter.pdf). [Accessed 17 May 2021].
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- [7] Highways England, "A358 Scheme Assessment Report (Stage 2)," July 2019. [Online]. Available: [https://highwaysengland.citizenspace.com/he/taunton-to-southfields-dualling-scheme/results/a358\\_scheme\\_assessment\\_reportoctober2019.pdf](https://highwaysengland.citizenspace.com/he/taunton-to-southfields-dualling-scheme/results/a358_scheme_assessment_reportoctober2019.pdf). [Accessed 19 May 2021].
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- [11] Highways England, "Your property and blight," 10 February 2020. [Online]. Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/864535/BED19\\_0151\\_Your\\_property\\_and\\_blight\\_2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/864535/BED19_0151_Your_property_and_blight_2020.pdf). [Accessed 22 July 2021].

# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 4  
Environmental Assessment Methodology

HE551508-ARP-EGN-ZZ-RP-LE-000019

08/09/21

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## 4 Environmental Assessment Methodology

### 4.1 Introduction

- 4.1.1 This chapter of the Preliminary Environmental Information (PEI) Report describes the approach taken for the preliminary Environmental Impact Assessment (EIA) of the proposed scheme, including the EIA Scoping process; introduces the requirements of the *Design Manual for Roads and Bridges* (DMRB); and outlines the overall approach to the likely significant effects of the proposed scheme.
- 4.1.2 As stated in Chapter 1 Introduction of this PEI Report, the proposed scheme falls under the criteria included in the *Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017* (SI 2017/572) [1] (the 'EIA Regulations') and is therefore an 'EIA Development'. The application for Development Consent Order (DCO) must therefore be accompanied by a statutory Environmental Statement (ES) describing the findings of an EIA undertaken in compliance with the EIA Regulations.
- 4.1.3 The *National Policy Statement for National Networks* (NPSNN) [2] sets out the need for, and UK government's policies to deliver development of Nationally Significant Infrastructure Projects (NSIP) on the national road network in England and sets out the primary basis for making decisions of development consent for NSIPs in England. The *NPSNN* sets out the 'vision' and strategic objectives for national networks. The criteria for a PEI Report are included in sections 4 and 5 of the *NPSNN*. This PEI Report has been prepared in accordance with these criteria. This is confirmed in each technical section of this report.
- 4.1.4 The adopted scope, approach and method of assessment for each environmental aspect are outlined in the aspect PEI Report chapters (5-14), with further details such as survey methodology, also provided.

### 4.2 Environmental scoping

- 4.2.1 Highways England submitted a formal request for an EIA Scoping Opinion (the 'EIA Scoping Report') [3] for the A358 Taunton to Southfields Dualling Scheme (the 'proposed scheme') to the Planning Inspectorate (PINS) on 23 March 2021. The EIA Scoping Report outlines the proposed scope of works, the methodology to be applied in undertaking the EIA and the proposed structure of the ES. It was prepared in line with Regulation 10 of the EIA Regulations, DMRB LA 103 *Scoping projects for environmental assessment* [4], PINS *Advice Note 7 Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping* [5] and the environmental requirements of the NPSNN [6].
- 4.2.2 PINS reviewed and consulted on the EIA Scoping Report and published an EIA 'Scoping Opinion' on 5 May 2021 (case reference: TR010061) as to the information to be provided in the ES. The Scoping Opinion is available as an online report on the PINS website [7].
- 4.2.3 The Scoping Opinion and the comments from the consultees have been considered in preparing this PEI Report and in undertaking the EIA.

## Design Manual for Roads and Bridges (DMRB)

- 4.2.4 The DMRB is the established guidance for assessing the potential environmental impacts of highway schemes and has been developed by Highways England in collaboration with relevant stakeholders.
- 4.2.5 The environmental assessment is based on the standards outlined within DMRB LA 104 *Environmental assessment and monitoring* [8]. The assessment also complies with the aspect specific standards. The level of assessment applied to each of the technical aspects in this PEI Report is given in each of the specialist aspect chapters (Chapters 5-14).
- 4.2.6 In 2020, the DMRB was extensively updated to ensure full compliance with the requirements of the EIA Regulations. Regulation 14 and Schedule 4 of the EIA Regulations identifies the information for inclusion in an ES. This includes the identification of environmental aspects considered likely to be significantly affected by the proposed scheme. These significant effects may be direct or indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent or temporary, beneficial or adverse.

### Aspects Scoped in

- 4.2.7 The environmental aspects that should be considered as part of the EIA in line with the requirements of the EIA Regulations, and where they have been addressed in the DMRB and this PEI Report, are shown in Table 4-1.

**Table 4-1 EIA environmental aspects and their location in the PEI Report**

Aspects within the EIA Regulations	DMRB guidance	Topics in this PEI Report
Population	LA 112 <i>Population and human health</i> [9] LA 105 <i>Air quality</i> [10] LA 111 <i>Noise and vibration</i> [11]	Chapter 12 Population and human health. Will also draw on information provided in: Chapter 5 Air quality and Chapter 11 Noise and vibration
Human health	LA 112 <i>Population and human health</i> LA 105 <i>Air quality</i> LA 111 <i>Noise and vibration</i>	Chapter 12 Population and human health. Will also draw on information provided in: Chapter 5 Air quality Chapter 11 Noise and vibration
Biodiversity (for example fauna and flora)	LA 108 <i>Biodiversity</i> [12] LA 115 <i>Habitats Regulations assessment</i> [13]	Chapter 8 Biodiversity. Will also draw on information provided in: Chapter 13 Road drainage and the water environment.
Land (for example land take)	LA 109 <i>Geology and soils</i> [14]	Chapter 9 Geology and soils.
Soil (for example organic matter, erosion, compaction, sealing)	LA 109 <i>Geology and soils</i>	Chapter 9 Geology and soils.
Water (for example hydromorphological changes, quantity and quality)	LA 113 <i>Road drainage and the water environment</i> [15]	Chapter 13 Road drainage and the water environment.
Air	LA 105 <i>Air quality</i>	Chapter 5 Air quality.

Aspects within the EIA Regulations	DMRB guidance	Topics in this PEI Report
Climate (for example greenhouse gas emissions, impacts relevant to adaptation)	LA 114 <i>Climate</i> [16]	Chapter 14 Climate change. Will also draw on information provided in: Chapter 13 Road drainage and the water environment.
Material assets	LA 110 <i>Material assets and waste</i> [17]	Chapter 10 Materials assets and waste.
Cultural heritage (including architectural and archaeological aspects)	LA 106 <i>Cultural heritage assessment</i> [18]	Chapter 6 Cultural heritage.
Landscape	LA 107 <i>Landscape and visual effects</i> [19]	Chapter 7 Landscape and visual effects. Will also draw on information provided in: Chapter 6 Cultural heritage.

- 4.2.8 The environmental effects associated with the construction and operation of the proposed scheme have been considered within each aspect chapter (5-14).
- 4.2.9 This PEI Report has also considered the vulnerability of the proposed scheme to major accidents or disasters that are relevant to the scheme. Further detail on this topic is detailed in section 4.9.

#### Aspects Scoped out

##### *Decommissioning*

- 4.2.10 The proposed scheme is unlikely to be decommissioned as it would be an integral part of the Strategic Road Network (SRN). As such, decommissioning was considered within the Scoping Report and was scoped out of the EIA and ES.
- 4.2.11 As stated in paragraph 2.3.3 of the EIA Scoping Opinion, PINS is content with this approach.

##### *Heat and Radiation*

- 4.2.12 Schedule 4 (Regulation 14(2)) of the EIA Regulations outlines a requirement to consider the emission of heat and radiation from a proposed development and the likely significant effects on the environment resulting from it.
- 4.2.13 The proposed scheme is a road improvement scheme, as such it would not generate any notable emission of heat and/or radiation from the proposed works, technology or operation that could result in likely significant effects on the environment. Therefore, further consideration or assessment of heat and radiation was scoped out of the EIA and ES.
- 4.2.14 As stated in paragraph 3.3.12 of the EIA Scoping Opinion, PINS is content with this approach.

##### *Transboundary effects*

- 4.2.15 Regulation 32 of the EIA Regulations outlines a requirement to consider the likely significant effects of a proposed development on the environment of another European Economic Area (EEA) State.

- 4.2.16 PINS's *Advice Note 12: Transboundary Impacts and Processes* [20] provides further guidance upon the consideration of transboundary effects in EIA.
- 4.2.17 A screening matrix, following the PINS long form transboundary screening proforma provided in Annex 1 [21] of PINS's *Advice Note 12: Transboundary Impacts and Processes*, was completed during the EIA scoping exercise and is reported in Appendix A of the Scoping Report. The screening matrix concluded that there were no likely significant transboundary effects. Therefore, further consideration or assessment of transboundary effects was scoped out of the EIA and ES.
- 4.2.18 As stated in paragraph 3.3.22 of the EIA Scoping Opinion, PINS is not aware that there are potential pathways of effect to any EEA States but recommends that, for the avoidance of doubt, the ES details any such consideration and assessment.

### 4.3 Surveys and predictive techniques and methods

#### **Draft Development Consent Order (DCO) boundary and study area**

- 4.3.1 The DCO boundary is based on the land anticipated to be potentially required temporarily and/or permanently for the construction, operation and maintenance of the proposed scheme. Plans to illustrate the draft DCO boundary will be developed and submitted as part of the DCO application.
- 4.3.2 Study areas have been defined individually for each environmental aspect and are outlined in the relevant technical chapter (Chapters 5-14). Study areas have been defined by taking account guidance within DMRB, the geographic scope/area of the potential impacts relevant to that aspect and of the information required to assess those impacts. The study area for the EIA for each environmental aspect incorporates the draft DCO boundary as a minimum.
- 4.3.3 The EIA and ES will be based on the DCO boundary presented in the DCO application.

#### **Identification of the baseline and future baseline scenario**

- 4.3.4 It is important to understand the environment that would be affected by the proposed scheme (the 'baseline conditions') to accurately identify the effects of the proposed scheme on the environment. Understanding the baseline allows the measurement of changes that would be caused by the proposed scheme.
- 4.3.5 To inform the assessment of impacts, a prediction of the future environmental conditions that would exist if the proposed scheme was not constructed is required, against which the impact of the proposed scheme can be assessed. Typically, this includes conditions at the:
- time construction of the proposed scheme is expected to start, for example, taking into account any other developments that are under construction or likely to be complete by this time
  - time the proposed scheme is expected to be open to traffic, the opening year
  - Design Year – 15 years after the proposed scheme opened to traffic
- 4.3.6 Therefore, the identification of the baseline and future conditions involves predicting changes that are likely to occur in the intervening period, for reasons unrelated to the proposed scheme. This would entail taking current conditions and committed development into consideration and using experience and professional

judgment to predict what the baseline and future conditions might look like prior to start of construction and operation of the proposed scheme.

4.3.7 It is essential for an EIA that sufficient data is obtained to form the basis of the assessment. Each of the technical assessment chapters (Chapters 5-14) includes a description of the current (baseline) environmental conditions and future baseline scenario based on the respective study area identified for each technical chapter.

4.3.8 This PEI Report presents baseline information representing the conditions of the environment at the time of writing. When describing the future baseline scenario for each environmental aspect within the respective technical chapters, readily available information such as local plans and climate change scenario data has been utilised to provide a description of the natural changes in the local environment over an appropriate timescale that the datasets support.

### Surveys

4.3.9 Several surveys were undertaken during Highways England's Project Control Framework (PCF) stage 2 findings to inform the baseline for the EIA Scoping Report. These included:

- Site walkovers
- Phase 1 Habitats survey
- National Vegetation Classification (NVC) survey
- Hedgerow survey
- River habitat and river corridor survey (River Ding)
- Bat surveys (including tree and building roost potential inspections, aerial tree-climbing roost inspections, tree and building emergence/re-entry, activity transects, crossing points, static monitoring, hibernation checks, trapping and radio tracking)
- Dormouse surveys (habitat suitability and presence/absence)
- Badger survey (field signs and bait marking)
- Otter surveys (habitat suitability and presence/absence)
- Water vole surveys (habitat suitability and presence/absence)
- Breeding bird surveys
- Wintering bird surveys
- Barn owl surveys
- Great crested newt survey (Habitat suitability index assessment (HSI), eDNA, population size class surveys)
- Reptile survey (habitat suitability and population size surveys)
- White-clawed crayfish survey (habitat suitability and presence/absence survey)
- Aquatic invertebrates survey
- Terrestrial invertebrates survey (including brown hairstreak surveys)
- Fish surveys
- Visit to the site and the surrounding area by Chartered landscape architect

4.3.10 Further surveys were undertaken for PCF stage 3 to inform the baseline for this PEI Report. Surveys that have been undertaken and the results of which were used to inform this PEI Report include:

- Cultural heritage settings assessment
- Geology and soils – site walkover of potential land contamination sites

- Landscape photography for winter and summer in both day and night
- Visibility/viewpoint assessments
- Farm viability survey
- Farm Impact Assessments
- Public Rights of Way (PRoW) (level of use, condition and suitability)

4.3.11 Surveys that are yet to be completed and remain ongoing at the time of the submission of this PEI Report will be reported in the ES. Surveys to be completed include:

- Archaeological geophysical survey
- Archaeological trial trenching
- Archaeological buildings assessment
- Site investigation (combined Geotechnical and Contaminated Land survey)
- Detailed soil and agricultural land classification (ALC) surveys
- Further visibility/viewpoint assessments
- Noise and vibration monitoring
- Water quality survey (remaining)
- UK Habitats Classification (UKHab) surveys
- National Vegetation Classification (NVC) survey
- Hedgerow survey
- River corridor and macrophyte survey (all watercourses)
- Modular River (MoRPh) survey
- Bat surveys (including tree and building roost potential inspections, aerial tree-climbing roost inspections, tree and building emergence/re-entry, activity transects, crossing points, static monitoring, hibernation checks, trapping and radio tracking)
- Dormouse surveys
- Badger survey (field signs and bait marking)
- Otter surveys (habitat suitability and presence/absence)
- Water vole surveys (habitat suitability and presence/absence)
- Breeding bird surveys
- Wintering bird surveys
- Barn owl surveys
- Great crested newt survey (Habitat suitability index assessment (HSI), eDNA, population size class surveys)
- Reptile survey (habitat suitability and population size surveys)
- White-clawed crayfish survey (habitat suitability and presence/absence survey)
- Aquatic invertebrates survey
- Terrestrial invertebrates survey
- Fish surveys
- Tree survey

### **Approach to modelling**

4.3.12 Predictive modelling following industry best practice has been used in the assessment of some environmental aspects. A brief summary of the modelling used is outlined in the sections below.

### Air quality

- 4.3.13 A simple air quality model has been used to assess the potential effects of the proposed scheme on air quality within the study area. Details of the model used, and the results can be found in Chapter 5 Air quality.

### Noise

- 4.3.14 Baseline and proposed scheme operational noise levels have been predicted at each noise sensitive receptor using a detailed noise model calculating in accordance with *Calculation of Road Traffic Noise* (CRTN) [22] and the updated methodology in DMRB LA 111 *Noise and vibration*.
- 4.3.15 Noise levels during typical road construction activities have been predicted in distance bands following the predictive methodology of BS 5228 [23].

### Road drainage and the water environment

- 4.3.16 All the watercourse spanned or affected by the proposed scheme have been screened to determine the appropriate level of analysis required to inform the design and to ensure flood risk is adequately addressed. The screening process has been formulated to determine:
- Watercourses that will be analysed and assessed in detail (1D and 2D fluvial hydraulic modelling) due to an existing mapped flood zone, an existing model and the potential of the proposed scheme to impact on existing flood levels and extents.
  - Watercourses that require analysis along a reach upstream and/or downstream of the proposed scheme to ensure that the impact to existing receptors is fully understood.
  - Watercourses where manual calculations are appropriate.
- 4.3.17 The screening process takes account of the existence of existing mapped flood extent (based on Environment Agency Flood Zone mapping), potential for the scheme to affect hydraulic processes and the presence and type of receptors at risk of flooding (both upstream and downstream) as defined in Table 2 in the *National Planning Policy Framework* (NPPF) [24].
- 4.3.18 The detailed and intermediate analysis of watercourses will be undertaken and reported in the ES. In advance of this information the design of the proposed scheme has progressed based on assumed and estimated information related to flood levels, the capacity of existing and proposed bridges and culverts and areas of floodplain compensation required.
- 4.3.19 Flood levels have been derived along the entire route based on the intersection of Flood Zone 2 extents and topographical survey data. Where Flood Zone 2 data is not available, the Risk of Flooding from Surface Water (RoFSW) 1 in 1000 flood extent has been applied to topographical survey data.

### Climate

- 4.3.20 Baseline GHG emissions for the construction and operational GHG emissions assessment have been determined by modelling of the 'Do-Minimum' traffic data for the opening year (2023) and the future year (2038).

### Landscape and visual

- 4.3.21 The zone of theoretical visibility (ZTV) has been prepared using a digital surface model (DSM) at 2m spatial resolution. It is produced by the Department for Environment, Food and Rural Affairs (Defra) and includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface. The data has a vertical accuracy of +/-15cm (centimetre) Root Mean Square Error (RMSE). The ZTV is based upon the digitally calculated visibility of equally spaced 3D points located along the vertical alignment of the proposed scheme. The ZTV analysis is based on a 4.5m offset from the 3D points (to represent high-sided vehicles) and a 1.6m offset from the DSM (to represent eye height). The analysis provides a method for identifying potential visibility of the proposed scheme to inform viewpoint selection, site walkovers, and impact assessment.

### Other

- 4.3.22 Further information on the modelling used to inform the environmental aspects is provided in the relevant technical aspect chapters of this PEI Report (5-14).
- 4.3.23 Several of the environmental aspects draw from modelling undertaken as part of the design process, such as traffic and transportation modelling. Air quality, noise and vibration, and population and health chapters draw from the outputs from this modelling undertaken.

### **Defining assessment years and scenarios**

- 4.3.24 The assessment of effects in this PEI Report involves comparing a scenario without the proposed scheme referred to as the 'do-minimum' scenario and scenario with the proposed scheme referred to as the 'do-something' scenario.
- 4.3.25 The do-minimum scenario represents the future baseline with minimal interventions and without the proposed scheme infrastructure.
- 4.3.26 The likely significant environmental effects for do-something scenarios are assessed for the baseline year and future year, or series of future years, depending on the environmental aspect considered.
- 4.3.27 For assessing construction phase effects, the baseline year represents the conditions prior to construction starting. The proposed start year of construction is 2024.
- 4.3.28 The opening year is the year the proposed scheme is to become operational, i.e. open to traffic, is 2028. The future year scenario aligns with the design year defined in DMRB (15 years after opening), i.e. 2043.
- 4.3.29 For assessing operational phase effects (such as the effects of traffic on noise and air quality) the baseline year represents the situation prior to any effect, e.g. opening the proposed scheme to traffic. For this PEI Report, the traffic models are based on an opening year of 2023 and a design year of 2038 due to the available traffic forecast data at the time of writing this PEI Report.
- 4.3.30 However, for the purposes of the upcoming ES, new traffic data and modelling will be available and the traffic forecast data will be based on an opening year of 2028 and the design year of 2043.
- 4.3.31 Current scientific knowledge and methods of assessment have been used to identify foreseeable changes.

## Cumulative effects assessment

- 4.3.32 Schedule 4 of the EIA Regulations (Regulation 14(2)) and the NPSNN (paragraph 4.16) state that consideration of how the effects of the proposed scheme would combine and interact with the effects of other developments should be included. Paragraph 4.17 of the NPSNN goes on to say that the interrelationship between effects should be considered.
- 4.3.33 Further advice in relation to cumulative effects is also outlined in PINS Advice note 17 *Cumulative Effects Assessment* [25] and the DMRB. DMRB LA 104 *Environmental assessment and monitoring* states that:
- “...a cumulative impact can arise as the result of:*
- a. the combined impact of a number of different environmental factors-specific impacts from a single project on a single receptor/resource, and/or*
  - b. the combined impact of a number of different projects within the vicinity (in combination with the environmental impact assessment project) on a single receptor/resource.”*
- 4.3.34 The methodology for the assessment of cumulative effects is outlined in Chapter 15 Assessment of cumulative effects of this PEI Report. The combined and cumulative effects of the proposed scheme in conjunction with other proposed developments will be assessed and the findings will be presented within the ES.

## 4.4 General assessment assumptions and limitations

### Dealing with uncertainty

- 4.4.1 In assessing the environmental effects of the proposed scheme, the principle of the ‘Rochdale Envelope’ has been applied, in accordance with PINS *Advice Note Nine: Rochdale Envelope* [26], which states:
- “The ‘Rochdale Envelope’ approach is employed where the nature of the Proposed Development means that some details of the whole project have not been confirmed (for instance the precise dimensions of structures) when the application is submitted, and flexibility is sought to address uncertainty.”*
- 4.4.2 At the current stage in the design process, absolute certainty about construction timing, phasing and methodology is not possible. It is anticipated that, as the design develops, greater certainty will be gained. This will be documented in the ES.

### Limits of deviation

- 4.4.3 Limits of Deviation (LoD) are the limits within which the draft DCO will authorise the A358 to be constructed. Changes to the preliminary scheme design may occur typically as a result of ground conditions or environmental factors which it may not be possible to identify in the period prior to the DCO application. The LoD allow for a small tolerance with respect to any distances and points shown on the plans that will accompany the DCO application. All works would take place within the LoD, the extent of which will be subject to full consideration as part of the EIA for the proposed scheme.
- 4.4.4 The draft DCO will allow for the proposed scheme to be constructed anywhere within the maximum extent of the defined LoD. This would include a vertical

deviation and a lateral deviation. As a result, there is some necessary flexibility as to the exact scheme detail taken through to construction.

- 4.4.5 The LoD will be contained in the DCO and will be considered within the aspect chapters of the ES, having regard to the scope for change from the highway alignment. The assessment approach outlined here accords with the Rochdale Envelope approach outlined above.

### **Traffic modelling**

- 4.4.6 Traffic data used in relevant assessments such as noise, air quality and climate was generated based on the preferred route design available at the start of this stage of works (i.e. PCF stage 3). The engineering design has been developed during this preliminary design stage and the latest design for the proposed scheme is described in Chapter 2 The project of this PEI Report and shown in PEI Figure 2.1 General arrangement. The traffic data on which dependent assessments have been based is therefore not based on the latest engineering design. However, the fundamental principles and highway alignment are consistent and allow the likely significant affects to be identified in this PEI Report. The design, traffic data and assessment will be finalised and reported in the ES. [It should be noted that traffic data does not include provision for decreased traffic flows due to COVID, and therefore the assessments will comprise worst case scenarios.]

## **4.5 Significance criteria**

- 4.5.1 Significance criteria are identified based on the magnitude of the change and the sensitivity of the receptor. The magnitude and sensitivity criteria are described within each of the environmental aspect chapters (5-14) of this PEI Report.
- 4.5.2 The conclusions of this PEI Report the likely significance of environmental effects using established significance criteria, as presented within Section 3 of DMRB LA 104 *Environmental assessment and monitoring* to comply with EIA Regulations. Significance of effect is derived through a combination of the sensitivity of a receptor affected (value or importance) and the magnitude of the impact.
- 4.5.3 For each environmental aspect, the DMRB provides guidance for assigning magnitude of impact, receptor sensitivity, and significance of effect; however, the DMRB states that the approach to assigning significance of effect relies on reasoned argument, the professional judgement of competent experts, and taking on board the advice and views of appropriate stakeholders. For some aspect, predicted effects may be compared with quantitative thresholds and scales in determining significance.
- 4.5.4 The generic criteria for magnitude of impact, sensitivity/value of receptors and how they are combined to give the five proposed criteria for significance of effect, both adverse and beneficial, are replicated from DMRB LA 104 *Environmental assessment and monitoring* in Table 4-2 below for ease of reference. Where aspect specific criteria and descriptors are available, they are described in each technical chapter of this PEI Report. PEI Report Chapter 8 Biodiversity provides an aspect specific sensitivity ranking that differs from Table 4-2.

**Table 4-2 Assessing significance of potential effects**

Environmental value (sensitivity)	Magnitude of potential impact (degree of change)				
	No change	Negligible	Minor	Moderate	Major
<b>Very High</b>	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
<b>High</b>	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
<b>Medium</b>	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
<b>Low</b>	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
<b>Negligible</b>	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

4.5.5 Generic descriptions for each category of significance and how they relate to the planning decision process are shown in Table 4-3. However, in all cases, professional judgement has been applied to the assessment to underpin the conclusion identified through the matrix or calculation assessments. Where professional judgement is used, this is accompanied by a reasoned justification. PEI Report Chapter 8 Biodiversity provides an aspect specific significance category that differs from Table 4-3.

**Table 4-3 Descriptions of the significance of effect categories**

Significance category	Typical description
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

4.5.6 This description of effects suggest that those assessed as Moderate or above are considered to be material in the decision-making process. Therefore, those effects reported as Moderate, Large or Very Large will be considered significant as described under the EIA Regulations.

## 4.6 Duplication of assessment

4.6.1 In addition to the statutory EIA and ES required to support the application for DCO for the proposed scheme, several technical assessments undertaken in line with specific policy or legislation are required. These provide additional information to inform the design and ES and will be prepared separately to avoid duplication of assessment through appropriate cross-referencing.

4.6.2 The other relevant environmental assessments provided as preliminary assessments as part of this PEI Report, or proposed as part of the ES, are described below.

## Habitat Regulations Assessment

- 4.6.3 Habitat Regulations Assessment (HRA) is a recognised step-by-step process to determine the likely significant effects and (where appropriate) assess adverse impacts on the integrity of European designated sites, such as Special Protection Areas (SPA) and Special Areas of Conservation (SAC). In the UK it is also applied to Ramsar sites. Where likely significant effects are identified, the assessment examines alternative solutions and provides justification for imperative reasons of over-riding public interest (IROPI).
- 4.6.4 HRA screening is being undertaken due to the presence of these internationally designated sites, in accordance with DMRB LA 115 *Habitats Regulations assessment*. The HRA screening report can be found in Appendix 8.1 Habitat Regulations Assessment screening of this PEI Report.

## Water Framework Directive

- 4.6.5 The EU *Water Framework Directive (WFD) (2000/60/EC)* [27] was enacted into domestic law by the *Water Environment (Water Framework Directive) (England and Wales) Regulations 2003* [28]. It provides a framework for the protection and enhancement of surface fresh water, estuaries, coastal waters and groundwater.
- 4.6.6 The WFD aims to enhance the current status of all waterbodies (with a target to achieve Good Ecological Status by a stated date) and to prevent deterioration of waterbodies from their current status due to pollution. The requirements of the WFD will be taken into account when planning all activities that may impact the water environment.
- 4.6.7 The PEI Report WFD screening assessment is provided in Appendix 13.2 Water Framework Directive screening. This provides a list of WFD waterbodies in the study area and consideration of source protection zones (SPZ) identifies and identifies the surface- and ground-water bodies screened in for detailed assessment in the WFD Compliance Assessment (to be appended to the ES).
- 4.6.8 The WFD quality and quantity elements identified through scoping and the PEI Report WFD Screening assessment as being at potential risk of impact from the proposed scheme will be assessed in the WFD compliance assessment.
- 4.6.9 The WFD compliance assessment will identify how the proposed scheme has the potential to affect each of the water bodies' quality/quantity elements and if this results in non-compliance with the WFD. The results of the other assessments in ES Chapter 13 Road drainage and the water environment will be used to inform the WFD compliance assessment, where considered applicable.
- 4.6.10 For water bodies that have the potential to be impacted by the proposed scheme, the effect of the proposed scheme on any mitigation measures identified within the relevant River Basin Management Plan (RBMP) will be assessed.

## Flood Risk Assessment

- 4.6.11 A preliminary Flood Risk Assessment (FRA) has been undertaken in accordance with the *NPPF* [24], and is provided as Appendix 13.1 PEIR Flood Risk Assessment. This considers flood risk both to and from the proposed scheme.
- 4.6.12 A standalone FRA for the proposed scheme will be undertaken and attached as an appendix to ES Chapter 13 Road drainage and the water environment. This will include the details of the methodology used to assess the risk of flooding from

pluvial, fluvial, groundwater and infrastructure failure (including existing drainage systems) both to and as a result of the proposed scheme. The FRA will use the latest published climate change allowances.

- 4.6.13 A key component of this will be an assessment of the watercourses crossed by the proposed scheme or in close proximity to the proposed scheme. This element of the assessment will be informed by fluvial hydraulic modelling at bridge and culvert crossings and watercourse realignment or diversions.

## 4.7 Design, mitigation and enhancement measures

- 4.7.1 One of the key requirements of an EIA is that measures are taken to avoid, reduce and, where possible, remedy significant adverse environmental effects. These are termed mitigation measures and their development is part of an iterative EIA process. This section follows DMRB LA 104 *Environmental assessment and monitoring*.
- 4.7.2 Environmental assessment and design shall incorporate mitigation measures using a hierarchical system as per Table 4-4.

**Table 4-4 Mitigation hierarchy**

Mitigation hierarchy	Description
1 avoidance and prevention	Design and mitigation measures to prevent the effect (e.g. alternative design options or avoidance of environmentally sensitive sites).
2 reduction	Where avoidance is not possible, then mitigation is used to lessen the magnitude or significance of effects.
3 remediation	Where it is not possible to avoid or reduce a significant adverse effect, these are measures to offset the effect.

- 4.7.3 Mitigation measures shall be developed in response to the findings of surveys, initial assessments and consultation. These mitigation measures shall be designed principally to address impacts whose occurrence, timing and location can be predicted in advance and are intrinsic to the design of the proposed scheme.
- 4.7.4 Environmental assessment shall report on the following categories of mitigation:
- **Embedded mitigation:** proposed scheme design principles adopted to avoid or prevent adverse environmental effects.
  - **Essential mitigation:** measures required to reduce and if possible offset likely significant adverse environmental effects, further to the reported significance of effects in the environmental assessment.

### Embedded mitigation

- 4.7.5 The first preference in mitigating any impact is to seek engineering design measures to entirely avoid or eliminate the impact. Where this is not possible, the mitigation should seek to reduce the magnitude of the impact. Impacts can be avoided or reduced, for instance, through changes to the horizontal or vertical alignment of the proposed scheme, junction strategy or other aspects of the proposed scheme layout; or through changes in the methods and/or materials to be used in construction.
- 4.7.6 The proposed scheme assessed within this PEI Report includes a number of engineering design measures that have been designed to avoid or reduce

significant adverse environmental effects arising, where practicable. Those measures forming part of the scheme design are summarised within Chapter 2 The project. Such measures are therefore not proposed or reported in this PEI Report as mitigation.

### **Essential mitigation**

- 4.7.7 Where avoidance of an impact through engineering design measures is not possible, or is only partly effective, further mitigation measures may be required. Essential mitigation falls into three broad categories:
- Measures that do not remove an impact but make it less significant. A typical example on the proposed scheme includes planting trees to screen views of the road where it is visually intrusive.
  - The like-for-like replacement of a feature that would be lost. For example, this includes the creation of hedgerows on the proposed scheme alignment to replace those that cannot be avoided.
  - The provision of a beneficial effect that is related to the impact but is not a like-for-like replacement of the feature to be lost. A typical example would be the construction of a bridge to replace an existing culvert, allowing associated watercourse renaturalisation and improving the wildlife corridor function.
- 4.7.8 Mitigation measures can produce adverse as well as beneficial effects, e.g. an environmental noise barrier can increase visual intrusion.
- 4.7.9 Measures identified during the EIA process to further prevent, reduce and, where possible, offset any adverse effects on the environment will be described in the relevant aspect chapters and shown on the Environmental Master Plans as part of the DCO application.
- 4.7.10 The essential mitigation measures identified in the aspect chapters of the ES will be summarised in the Register of Environmental Actions and Commitments (REAC), contained within the Environmental Management Plan (EMP) as part of the DCO application.
- 4.7.11 The significance of an effect is reported after an assessment of the effectiveness of the design and mitigation measures (the residual effect). Assigning significance to an effect after an assessment of the effectiveness of the design allows for positive contribution of all mitigation that is effective, deliverable and committed.

### **Construction mitigation**

- 4.7.12 There are potential impacts to the environment that could occur as a result of the construction process including incidents during construction. The timing and location of these impacts cannot be accurately predicted at this stage. An example would include spillages of fuels, oils or other chemicals.
- 4.7.13 The assessment considers reasonably foreseeable construction impacts. The likelihood of occurrence and the severity of any such incidents can be reduced through good construction site management practices. To help ensure adequate consideration of risks identified during the EIA which would relate to the construction period, an EMP will be prepared. This will set out how construction stage mitigation measures would be implemented to manage those risks and certain requirements for the contractors.

- 4.7.14 The EMP will detail the roles and responsibilities, control measures, training and briefing procedures, risk assessments and monitoring systems to be employed during planning and construction for all relevant environmental factor areas.
- 4.7.15 Each PEI Report aspect chapter describes measures identified to date to be adopted during construction to avoid and reduce environmental effects, such as pollution control measures.

#### **Implementation and enforcement of mitigation**

- 4.7.16 Mitigation will be secured by way of requirements in the DCO. The proposed scheme must comply with these requirements.
- 4.7.17 An EMP will be implemented and is secured through a requirement of the DCO. This will be approved in line with the EMP submitted with the DCO application as part of the ES.
- 4.7.18 Contractors at detailed design and construction will be obliged to comply with the Requirements of the DCO.

#### **Environmental enhancement**

- 4.7.19 Enhancement is a measure that is over and above what is required to mitigate the adverse effects of a scheme. Enhancement opportunities will be considered throughout the design development and shall be reported within the ES aspect chapters.
- 4.7.20 The following items may be relevant to the design and delivery of enhancement opportunities:
- national and local policy requirements
  - policy and performance requirements of the overseeing organisation
  - scheme-specific objectives
- 4.7.21 Where essential mitigation is being delivered for other purposes, this offers an enhancement opportunity where it does not compromise the original objective of that land.

## **4.8 Monitoring**

- 4.8.1 Should the environmental assessment reported in the ES conclude that there are significant adverse environmental effects, in accordance with the requirements of the EIA Regulations, proportionate and appropriate monitoring of associated mitigation measures will be included in the DCO application ES.
- 4.8.2 The ES will document the mitigation and monitoring measures developed through the design and environmental assessment process and any agreements reached with statutory bodies, and how the programme of monitoring will be secured.
- 4.8.3 Monitoring measures should be undertaken as required during construction, handover and through the operation and maintenance periods. These measures will be secured by the EMP and submitted with the DCO application.

## 4.9 Major accidents and disasters

- 4.9.1 The EIA Regulations require the developer to assess the expected significant effects (on the environment) arising from the vulnerability of the proposed scheme to “...*major accidents or disasters that are relevant to that development*”.
- 4.9.2 There is no clear definition of the term ‘major accident and/or disaster’ in the Regulations therefore the following definitions from the Institute of Environmental Management and Assessment (IEMA) *Major Accidents and Disasters in EIA: A Primer* [29] (the ‘IEMA Primer’) were adopted. The primer states:
- Accident – something that happens by chance or without expectation.
  - Disaster – a natural hazard (e.g. earthquake) or a man-made / external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.
  - Major Accident – events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage.
  - Risk – the likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur.
  - Risk event – an identified, unplanned event, which is considered relevant to the proposed scheme and has the potential to result in a major accident and / or disaster, subject to its potential to result in a significant adverse effect on an environmental receptor.
  - Vulnerability – describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Regulations vulnerability refers to ‘exposure and resilience’ of the proposed development to the risk of a major accident and/or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.
  - Significant environmental effect (in relation to a major accident and/or disaster assessment) – includes the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.
- 4.9.3 A Risk Identification exercise was undertaken during scoping and the findings were presented in Appendix B of the Scoping Report. The exercise considered risk events identified in the Register of Civil Emergencies with respect to natural disasters, transport incidents, construction incidents, system failures and security [30]. A source-pathway-receptor model was employed in terms of risks to environmental designated sites, heritage assets and the local community during construction and operation of the proposed scheme. Finally, the Risk Identification considered the existing known mitigation measures and whether there is the potential for major accidents and disasters with the known mitigation in place.
- 4.9.4 A review of nearby sites listed by the Health and Safety Executive (HSE) under the *Control of Major Accident Hazards Regulations 2015 (COMAH)* [31] was undertaken to inform the EIA Scoping Report. This review confirmed that there were no COMAH sites within the HSE land use planning distances and therefore risks associated with COMAH sites were not considered further.
- 4.9.5 The following assumptions were applied to the Risk Identification exercise reported in Appendix B of the EIA Scoping Report when considering risk events:

- The Risk Identification exercise assumed all health and safety risks were adequately covered by the Contractor's health and safety documentation and risk assessments.
- The assessment only covered those risks associated with the infrastructure to be built and did not consider those risks associated with the operation and maintenance of a major highway project.
- Risks to road safety and users during construction and operation were assumed to be considered and assessed as part of the Road Safety Audit for this type of major highway project.
- The Risk Identification exercise did not consider risks where there was no 'source-pathway-receptor' linkage (e.g. an oil spill occurring at an oil depot that is not located near to a watercourse and for which there is no pathway from source to receptor).
- The Risk Identification exercise did not consider major accidents and disasters where risk events were not applicable to the geographic location of the proposed scheme (e.g. volcanic activity, earthquakes, etc).

4.9.6 The Risk Identification exercise considered the potential risk of major accidents and disasters in relation to the construction and operation of the proposed scheme, including:

- flooding
- severe weather
- poor air quality
- wildfires
- widespread electricity failure
- system failures
- pollution incidents
- unexploded ordnance (UXO) (construction stage only)
- attacks during operation

4.9.7 The Risk Identification exercise concluded that all relevant major accidents and disasters considered would be appropriately assessed and mitigated through other environmental aspects proposed in the EIA for the proposed scheme and reported in the ES. Appropriate risk and environmental mitigation measures would be considered, developed, and adopted through compliance with DMRB design standards, applicable legislation and best practice measures employed by Highways England.

4.9.8 Major accidents and disasters were scoped out of the EIA and ES as no risks of major accidents and disasters were anticipated. However, all relevant major accidents and disasters considered would be appropriately assessed and mitigated through other environmental aspects reported in the ES.

4.9.9 PINS specifically requested information on two potential areas of accidents:

- The potential for landslips to occur. This potential risk is covered in the Geotechnical reports (add reference) and will be summarised in the ES.
- The location of two high pressure gas mains near the southern end of the proposed scheme. Discussions are ongoing with the utilities owner at this stage to define and agree the design of mitigation measures to be embedded into the scheme design to avoid risks to these assets. A summary of these will be included in the scheme description in the ES.

4.9.10 As stated in paragraph 3.3.18 of the EIA Scoping Opinion, PINS agreed that major accidents and disasters could be scoped out of the ES as a discrete technical chapter in the ES on the basis that the matter will be considered within other ES aspect chapters.

## **4.10 Consideration of climate change**

- 4.10.1 Chapter 14 Climate outlines a preliminary assessment of the effect of the proposed scheme on climate and the vulnerability of the proposed scheme to climate change, as required by the EIA Regulations. The combined effects of the proposed scheme and potential climate change on the receiving environment, resources, and community (the in-combination climate change (ICCC) impacts) are considered by each aspect chapter, and the findings are to be presented in the ES.
- 4.10.2 Climate change projections have been embedded into the future baseline of the technical assessments. Current and future climate baselines are outlined in Chapter 14 Climate for key climate parameters, including winter and summer temperature and precipitation. The projections have been obtained from the Meteorological Office (Met Office) UK Climate Projections 2018 (UKCP18) [32], which provides the most up-to date assessment of how the climate of the UK may change over the 21<sup>st</sup> century.
- 4.10.3 Climate change is considered in both the assessment of the proposed scheme effects and the design of mitigation and enhancement measures. The consideration of the proposed scheme's resilience to climate change has been assessed qualitatively, based on the future climate trends outlined in Chapter 14 Climate of this PEI Report. The assessment of the proposed scheme's contribution to climate change, through release of greenhouse gas emissions, is a quantitative assessment against the UK government's carbon budgets.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 5 Air  
Quality

HE551508-ARP-EAQ-ZZ-RP-LA-000002

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## 5 Air quality

### 5.1 Introduction

- 5.1.1 This chapter assesses the potential air quality impacts from the construction and operation of the A358 Taunton to Southfields Dualling Scheme (the 'proposed scheme') following the methodology set out in the *Design Manual for Roads and Bridges* (DMRB) LA 105 *Air Quality* [1] and the Environmental Impact Assessment (EIA) Scoping Report [2].
- 5.1.2 This chapter details the methodology followed for the air quality assessment, summarises the regulatory and policy framework related to air quality and describes the existing environment in the area surrounding the proposed scheme. The potential effects on human health and designated habitats are assessed. Following this, the mitigation and residual effect of the proposed scheme are discussed, along with limitations of the assessment.

### 5.2 Legislative and policy framework

- 5.2.1 As documented in the Preliminary Environmental Information (PEI) Report Chapter 1 Introduction, the primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the *National Policy Statement for National Networks* (NPSNN) [3], which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered. Table 5-10 identifies the NPSNN policies relevant to air quality and specifies where in this chapter information is provided to address the policy.

**Table 5-10 Relevant NPSNN for applicant's air quality assessment**

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
5.6	<i>Where the impacts of the project (both on and off-scheme) are likely to have significant air quality effects in relation to meeting Environmental Impact Assessment (EIA) requirements and/or affect the UK's ability to comply with the Air Quality Directive, the application should undertake an assessment of the impacts of the proposed project as part of the environmental statement.</i>	The effects of the proposed scheme on compliance are described in section 5.9 Assessment of likely significant effects. There are no significant effects associated with the proposed scheme and there is no risk of affecting the UK's ability to achieve compliance.
5.7	<i>The environmental statement should describe:</i> <ul style="list-style-type: none"> <li>• <i>existing air quality levels;</i></li> <li>• <i>forecasts of air quality at the time of opening, assuming that the scheme is not built (the future baseline) and taking account of the impact of the scheme; and</i></li> <li>• <i>any significant air quality effects, their mitigation and any residual effects, distinguishing between the construction and operation stages and taking account of the impact of road traffic generated by the project.</i></li> </ul>	Existing air quality levels are described in section 5.6 Baseline conditions and Appendix 5.3 Air Quality Baseline Data. Forecasts of air quality at the time of opening are described in section 5.9 Assessment of likely significant effects and full results are provided in Appendix 5.5 Air Quality Operational Phase Impacts. There are no significant effects at human receptors associated with the proposed scheme. The justification of the conclusion is described in section 5.9 Assessment of likely significant effects.

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
		The changes in nitrogen (N) deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 <i>Air quality</i> . Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity of this PEI Report.
5.8	<i>Department for Environment, Food and Rural Affairs (Defra) publishes future national projections of air quality based on evidence of future emissions, traffic and vehicle fleet. Projections are updated as the evidence base changes. Applicant's assessment should be consistent with this but may include more detailed modelling to demonstrate local impacts.</i>	The assessment has used the most recently published version of the DMRB Screening Tool (v8) [4]. The impact of emissions has been assessed using simple modelling as described in section 5.3 Assessment methodology.
5.9	<i>In addition to information on the likely significant effects of a project in relation to EIA, the Secretary of State must be provided with a judgement on the risk as to whether the project would affect the UK's ability to comply with the Air Quality Directive.</i>	The proposed scheme would not affect the UK's ability to comply with the air quality limit values. Results are provided in section 5.9 Assessment of likely significant effects.
5.11	<i>Air quality considerations are likely to be particularly relevant where schemes are proposed:</i> <ul style="list-style-type: none"> <li>• <i>within or adjacent to Air Quality Management Areas (AQMA); roads identified as being above Limit Values or nature conservation sites (including Natura 2000 sites and SSSIs, including those outside England); and</i></li> <li>• <i>where changes are sufficient to bring about the need for a new AQMAs or change the size of an existing AQMA; or bring about changes to exceedances of the Limit Values, or where they may have the potential to impact on nature conservation sites.</i></li> </ul>	Section 5.6 Baseline conditions and Appendix 5.3 Air Quality Baseline Data describe the AQMAs in the study area. There are no significant effects predicted in AQMAs as described in section 5.9 Assessment of likely significant effects. The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 <i>Air quality</i> . Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.
5.12	<i>The Secretary of State must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and/or where they lead to a deterioration in air quality in a zone/agglomeration.</i>	The proposed scheme would not affect the UK's ability to comply with the air quality limit values and would not result in any significant effects at sensitive human receptors. The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 <i>Air quality</i> . Further discussion of the impacts of the proposed scheme on N

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
		deposition at these locations is included in Chapter 8 Biodiversity. Results are provided in section 5.9 Assessment of likely significant effects.
5.13	<p><i>The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will:</i></p> <ul style="list-style-type: none"> <li>• <i>result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or</i></li> <li>• <i>affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.</i></li> </ul>	The proposed scheme would not affect the UK's ability to comply with the air quality limit values. Results are provided in section 5.9 Assessment of likely significant effects.

5.2.2 Details of relevant national and local legislation, policy and guidance are provided in Appendix 5.1 Air Quality Legislation, Policy and Guidance.

5.2.3 A list of relevant national, regional and local policies is set out below.

### **National legislation**

5.2.4 The national legislation of relevance includes:

- *Part IV of the Environment Act 1995* [5]
- *Air Quality Standards Regulations 2010* [6]
- *Environmental Protection Act 1990* [7]

### **National planning policy**

5.2.5 The national policies of relevance include:

- *Clean Air Strategy 2019* [8]
- *National Planning Policy Framework 2019 (NPPF)* [9]
- NPSNN

### **Regional planning policy**

5.2.6 The regional planning policies of relevance include:

- *Greater Exeter Strategic Plan, in particular Policy GESP30 Movement in Exeter* [10]

### **Local planning policy**

5.2.7 The local planning policies of relevance include:

- *East Devon Local Plan 2013 to 2031* [11], in particular *Policy EN14 Control of Pollution*
- *Exeter City Council (ECC) Core Strategy* [12], in particular *Policy CP11*

- *Mid Devon Local Plan 2013 – 2033* [13], in particular *Policy DM 3 Transport and air quality*
- *Sedgemoor Local Plan 2011 – 2032* [14], in particular *Policy D14 Managing the Transport Impacts of Development*
- *South Somerset Local Plan 2006 – 2028* [15], in particular *Policy EQ7 Pollution Control*
- *South Somerset Environment Strategy* [16]
- *Taunton Deane Local Plan 2004* [17], in particular *Policy S1*
- *Taunton Deane Core Strategy 2011 – 2028* [18], in particular *Policy DM 1 General Requirements*

5.2.8 Potential effects on air quality resulting from the proposed scheme have been assessed following the methodology set out in the DMRB LA 105 *Air quality* and the Department for Environment, Food and Rural Affairs' (Defra) *Local Air Quality Management Technical Guidance* (LAQM TG.16) [19].

### 5.3 Assessment methodology

5.3.1 The EIA Scoping Report determined that a 'simple' level of assessment is required for the EIA as the proposed scheme has been defined as low risk and a 'simple' approach is considered proportional. This approach has been agreed in the Planning Inspectorate's (PINS) EIA Scoping Opinion [20]. A 'simple' air quality assessment has therefore been undertaken as it would provide sufficient information to confirm that the project would not result in exceedances of the air quality thresholds. The 'simple' assessment includes construction dust and operational phase impacts.

5.3.2 Potential effects during the construction phase have been assessed following DMRB LA 105 *Air quality* and will feed into the Environmental Management Plan (EMP) attached to the ES.

5.3.3 A regional air quality assessment of total emissions of nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) is no longer assessed under the latest air quality standard (DMRB LA 105 *Air quality*). A regional assessment of total carbon emissions is undertaken in Chapter 14 Climate following DMRB LA 114 *Climate* [21].

5.3.4 An assessment of PM<sub>10</sub> and PM<sub>2.5</sub> has been screened out as there are no AQMAs in the study area declared for any exceedance of the PM<sub>10</sub> or PM<sub>2.5</sub> Air Quality Objectives (AQO) and Defra projected background concentrations have not indicated that there is a risk of exceeding the PM<sub>10</sub> or PM<sub>2.5</sub> AQO or limit value (LV).

#### Construction

5.3.5 Dust emissions arising from construction and demolition activities are likely to be variable in nature and would depend on the type and extent of activity, soil type and moisture, road surface conditions and weather conditions.

5.3.6 Construction, demolition and earthwork activities from the proposed scheme may all have an impact on local air quality. Trackout of material onto local roads where it can be re-suspended may also affect air quality. Trackout refers to the transport of dust and PM<sub>10</sub> from construction areas onto the road network.

5.3.7 A qualitative assessment of the impacts of dust nuisance arising during construction has been undertaken, using standards set out in section 2.56 of

DMRB LA 105 *Air quality*. Properties and ecological receptors within 200 metres (m) of dust producing activities have been identified and appropriate mitigation has been recommended where required.

- 5.3.8 The construction phase of the proposed scheme is expected to last for more than three years. At the time of writing, construction traffic data for the PEI Report is not yet available. A construction traffic assessment has therefore been scoped out of this PEI Report. During production of the Environmental Statement (ES) the construction phase vehicle movements will be made available. These vehicle movements will be screened against the standards outlined in DMRB LA 105 *Air quality* and a 'simple' assessment will be carried out if the thresholds are exceeded.
- 5.3.9 Emissions from site equipment have been scoped out of the assessment due to the temporary nature of the works and minimal impact that the site equipment would have on overall pollutant concentrations. Best practice measures to reduce emissions from site equipment will be included in the EMP, attached to the ES.

### Operation

- 5.3.10 A 'simple' assessment has been carried out using the most recently published version of the DMRB Screening Tool (v8) to determine the potential effects on annual mean NO<sub>2</sub> concentrations at selected sensitive receptors (locations of relevant human health exposure and ecological sites), in accordance with DMRB LA 105 *Air quality*. In particular, modelled concentrations have been compared with the LV for annual mean NO<sub>2</sub> following the method detailed in DMRB LA 105 *Air quality* to provide a clear indication of the risk of delaying compliance with the LV.
- 5.3.11 DMRB LA 105 *Air quality* provides instructions on determining whether an assessment should be 'detailed' or 'simple'. A 'detailed' assessment would usually involve air dispersion modelling to assess the proposed scheme impacts, whereas a simple approach would usually follow a spreadsheet-based assessment to calculate any changes in emissions. At the EIA Scoping stage it was identified that a 'simple' assessment would be carried out as the proposed scheme has been defined as low risk with regard to air quality. A 'simple' approach is considered proportional and will provide sufficient information to confirm that the proposed scheme will not result in exceedances of the air quality thresholds. This chapter provides the results of the 'simple' assessment.

### Assessment scenarios

- 5.3.12 The assessment for local air quality has been undertaken for the following three scenarios:
- 2019 Baseline scenario
  - 2023 Do-Minimum (DM) scenario: the traffic scenario at the modelled opening year without the proposed scheme
  - 2023 Do-Something (DS) scenario: the modelled opening year with the proposed scheme
- 5.3.13 For the PEI Report, the operational air quality assessment is based on an opening year of 2023 using Project Control Framework (PCF) stage 2 traffic data due to the traffic data available at the time of writing which was based on PCF stage 2 (options selection stage). The PCF stage 3 traffic data based on a 2028

opening year was not available at the time of assessment for the PEI Report due to programme constraints. Vehicle emissions and background concentrations used in this assessment to reflect 2023 are higher than those which would be used for 2028 and therefore this reflects a conservative approach. For the ES, the operational air quality assessment will be based on an opening year of 2028. Further detail is provided in paragraph 5.3.19.

- 5.3.14 For local air quality, the modelled opening year of 2023 for the proposed scheme is likely to be the worst-case scenario as vehicle emissions and background pollutant concentrations are anticipated to decrease over time due to improvements in fuel technologies.
- 5.3.15 Evidence from monitoring across the UK has indicated that pollutant concentrations are not reducing as quickly as predicted by Defra despite improvements to engine technology. To account for this, the future baseline projection scenarios were also calculated for 2023 following the methodology in section 2.47 of DMRB LA 105 *Air quality*.
- 5.3.16 The air quality assessment in this chapter uses data provided from the traffic model for the future years which includes future developments. The developments included in the traffic data are detailed in the uncertainty log in the PCF stage 2 Combined Modelling and Appraisal (ComMA) Report [22].

#### DMRB screening tool

- 5.3.17 The inputs to the DMRB Screening Tool include:
- Traffic data
  - Distance from receptor to centre of road
  - Road width
  - Background concentrations

#### Traffic data

- 5.3.18 Traffic data for the air quality assessment has been provided by the transport modelling specialists. The traffic data provided consists of:
- 24-hour annual average daily traffic (AADT)
  - percentage of heavy-duty vehicles (HDV)
  - speed band information for use in calculation of emission factors following DMRB LA 105 *Air quality*
- 5.3.19 The baseline traffic data provided represented a baseline year of 2015. Following advice obtained from the transport modelling specialists a 3% growth factor was applied to this data to scale traffic flows from 2015 to 2019.
- 5.3.20 PCF stage 2 traffic data has been provided by the transport modelling specialists for use in this assessment, with a traffic reliability area (TRA) based on the refined PCF stage 3 assessment extent. This is because PCF stage 3 traffic data was not available at the time of assessment due to programme constraints. The PCF stage 2 traffic data has been screened against the DMRB LA 105 *Air quality* thresholds to define the affected road network (ARN). It is noted that due to the changes in screening criteria between the DMRB approach used at PCF stage 2 and the current DMRB LA 105 *Air quality*, the ARN in the PEI Report has changed compared to the PCF stage 2 assessment.

- 5.3.21 The PCF stage 3 traffic data will be used for the ES. As and when PCF stage 3 traffic data is available for the ES, the study area will be determined and baseline conditions and receiving environment sensitivity reviewed.
- 5.3.22 Emissions from traffic data were calculated within the most recently published DMRB Screening Tool (v8) [4] which contains version 2.3 of the Highways England speed band emissions factors spreadsheet, which are based on the most recently available emission factors from Defra in their emission factor tool kit v10 [23]. Using this methodology allows the effects of reducing or creating congestion to be more effectively assessed within the air quality study area.
- 5.3.23 Geographic information system (GIS) software, ArcMap®, was used to input road link information in the air quality spreadsheet model.

#### Receptors

- 5.3.24 Human and ecological receptors have been identified and included in the assessment.
- 5.3.25 The building usage was determined using the Ordnance Survey (OS) Address Base Plus dataset, and air quality calculations were made at the nearest façade to the busiest road.
- 5.3.26 A total of 44 human receptors were identified for inclusion in the assessment. These were selected using professional judgement based on the following criteria:
- proximity to affected roads
  - representativeness of the maximum effects of the proposed scheme in that region
  - whether they are at risk of exceeding the annual mean NO<sub>2</sub> AQO
- 5.3.27 The list includes dwellings, hospitals and educational establishments and the locations are shown in Figure 5.1 Human Receptors. All locations, referred to as 'receptors' are treated as being equally sensitive.

#### Designated habitat sites

- 5.3.28 To assess the impacts on ecosystems, the study area was reviewed to identify designated ecological habitats within 200m of the ARN, following sections 2.25 to 2.26.1 of DMRB LA 105 *Air quality*. 21 designated habitat sites were identified along the ARN. The designated habitat sites are shown in Figure 5.2 Ecology Receptors. Details of the designated sites are provided in Appendix 5.5 Air Quality Operational Phase Impacts. Additional information is provided in Chapter 8 Biodiversity.
- 5.3.29 Effects at ecological receptors have been assessed in accordance with the method set out in section 2.97 to 2.102 of DMRB LA 105 *Air quality*.
- 5.3.30 As the assessment has followed a 'simple' assessment approach, a single point has been added to the edge of each ecological site closest to the road. Following an initial assessment, any sites which predicted a change in N deposition of over 1%, compared with the lower critical load were identified. For the identified sites, receptor transects (receptor points every 10m away from the roadside) up to 200m from the source were modelled to assess the drop-off in emissions and deposition with increasing distances from the road.

- 5.3.31 Following DMRB LA 105 *Air quality* guidance, the magnitude of change in annual mean N deposition at the designated habitats has been determined. DMRB LA 105 *Air quality* notes that where the magnitude of change is less than 0.4 kilograms of nitrogen per hectare per annum (kg N/ha/yr) it is not considered to result in any loss of species and unlikely to be significant.

#### Background concentrations

- 5.3.32 'Background' air quality is a concept used to enable assessment of the effects of particular emission sources without the need for all sources in the area to be explicitly considered. For the purpose of this assessment, the background air quality represents the contribution of all other relevant sources of air pollutants except those roads specifically included in the air quality model. The pollution due to the modelled roads has been added to the background pollution concentrations.
- 5.3.33 The Defra air quality website [24] provides NO<sub>x</sub> and NO<sub>2</sub> and PM<sub>2.5</sub> for each 1 kilometre by 1 kilometre grid square covering England. These data were abstracted for use in the assessment.
- 5.3.34 The total Defra background concentrations (with no road sector contributions removed) have been used in the modelling. This is because only the roads directly adjacent to the receptor being assessed are included in the model. Therefore, this avoids the risk of double counting road traffic emissions from additional road sources in the grid square.
- 5.3.35 A comparison with local authority background monitoring data showed a small difference in concentrations between the Defra background concentrations and the local monitored background data. At the locations compared, concentrations varied by 2.2 - 8.7 µg/m<sup>3</sup> (micrograms per cubic metre). The monitored background concentrations are well below the national annual mean air quality objective for NO<sub>2</sub>. Due to the limited existing background monitoring data available specifically for the study area, and the geographical spread of the ARN, this assessment has used concentrations from the Defra maps to provide background concentrations. Details of the comparison and details of sites selected are provided in Appendix 5.3 Air Quality Baseline Data.

#### Model verification

- 5.3.36 A comparison of modelled and measured NO<sub>2</sub> concentrations has been undertaken. This process is known as model verification. Verification has been undertaken for the base year, using the principles laid out in Section A3.223 of LAQM TG.16 [25]. Additional receptor points have been included in the baseline modelling to represent the location of diffusion tube sites within 200m of the ARN to provide information for the verification exercise. The locations of selected verification points are shown in Figure 5.3 Verification Points of this PEI Report.
- 5.3.37 The objectives of the model verification are to evaluate model performance, determine whether model adjustment is required, and to provide confidence in the assessment.
- 5.3.38 LAQM TG.16 suggests that if modelled annual mean NO<sub>2</sub> concentrations are within ±25% and preferably within ±10% of the monitored concentration and there is no systematic under or over prediction, then model adjustment is not considered necessary to further improve modelled results.

- 5.3.39 Modelled and monitored results may not compare well at some locations for several reasons including:
- Uncertainties in estimated traffic flow and speed data.
  - Model setup (including street canyons, road widths, receptor locations).
  - Model limitations (treatment of roughness and meteorological data).
  - Uncertainty in monitoring data (notably diffusion tubes, e.g. bias adjustment factors and annualisation of short-term data).
  - Uncertainty in emissions/emission factors.
- 5.3.40 The above factors were investigated as part of the model verification process to reduce the uncertainties as far as practicable.
- 5.3.41 Some monitoring locations are not suitable for model verification purposes as there may be specific local influences or they are located too close to the road, where LAQM TG.16 advises they should not be used. Therefore, each site was examined, and it was considered whether it was suitable for use in the verification study. Some locations were then removed from the verification. For those monitoring sites not used, the justification for their removal is provided in Appendix 5.4 Air Quality Sites Used for Verification.
- 5.3.42 Further detail on the verification process is provided in Appendix 5.4 Air Quality Sites Used for Verification.

#### NO<sub>x</sub> to NO<sub>2</sub> conversion

- 5.3.43 The approach to calculating the conversion of roadside nitrogen oxide (NO<sub>x</sub>) to NO<sub>2</sub> has followed the guidance in LAQM TG.16. This approach allows the calculation of NO<sub>2</sub> from NO<sub>x</sub> concentrations, taking into account the difference between ambient NO<sub>x</sub> concentration with and without the proposed scheme, the concentrations of ozone and the different proportions of primary NO<sub>2</sub> emissions in different years. This approach is available as a spreadsheet calculator [26]; the version released in August 2020 (v8.1) has been used.
- 5.3.44 Emission controls on vehicles have been introduced as a measure to reduce concentrations of NO<sub>2</sub> in the atmosphere. Levels of atmospheric NO<sub>2</sub> have not reduced as quickly as predicted due to ineffective emission controls on some vehicles in real world conditions. Section 2.47 to 2.55 of DMRB LA 105 *Air quality* provides a method to address uncertainty in predicted future roadside NO<sub>2</sub> concentrations. This assessment has followed the method set out in DMRB LA 105 *Air quality* to calculate the projected base year and apply gap factors to the modelled results.

#### Compliance risk assessment

- 5.3.45 DMRB LA 105 *Air quality* provides a method for the assessment of the risk of the proposed scheme being non-compliant with the LVs. The compliance risk assessment is undertaken using the modelling results from the local air quality assessment. To undertake the compliance risk assessment, the following information has been collected:
- local air quality model results
  - Defra's Pollution Climate Mapping (PCM) model outputs for the compliance road network [27]
  - Defra's zones and agglomerations maps [28]

- 5.3.46 Defra uses the PCM model to report against compliance. The current PCM model results have concentrations predicted for each year between 2018 and 2030.
- 5.3.47 To determine the study area for the compliance risk assessment, the local air quality study area is compared to the compliance link locations in the PCM model. Where the two networks intersect these links form the basis of the assessment of compliance risk.
- 5.3.48 A review was carried out to identify any qualifying features as defined in section 2.64 of DMRB LA 105 *Air quality* and receptors added if they are within 15m. Nine receptors have been assessed at qualifying features along the PCM links along with the corresponding local model 4m validation points at each location.
- 5.3.49 To determine the compliance risk of the proposed scheme, the Compliance Risk Flow Chart in Figure 2.79 of DMRB LA 105 *Air quality* has been followed.

#### Operational assessment criteria

- 5.3.50 Evaluation of the significance of the local air quality findings has been undertaken in accordance with DMRB LA 105 *Air quality* (section 2.103). The assessment has assessed the following in order to determine whether the proposed scheme triggers a significant air quality effect:
- the effects on human health
  - the effects on designated habitats
  - the outcomes of the compliance risk assessment
- 5.3.51 A view on the significance for each of the above has been provided along with supporting evidence in section 5.9 Assessment of likely significant effects.

#### Assessment of likely significant effects.

- 5.3.52 For human health, the outcomes of the assessment have been screened following DMRB LA 105 *Air quality* (section 2.89). If a concentration is greater than the AQO and the proposed scheme is predicted to have a greater than 1% change (compared with the relevant objective, e.g. 0.4µg/m<sup>3</sup> for annual mean NO<sub>2</sub>), then the results are assigned to the change criteria shown in Table 5-11.
- 5.3.53 To aid the interpretation of significance of public exposure as a result of the proposed scheme, Table 2.92N in DMRB LA 105 *Air quality* provides the criteria which have been used in this assessment. Where predicted annual mean NO<sub>2</sub> concentrations are below the AQO or the magnitude of change is ≤0.4µg/m<sup>3</sup>, effects are likely to be imperceptible.

**Table 5-11 Guideline for number of properties constituting a significant effect**

Magnitude of change in NO <sub>2</sub> (µg/m <sup>3</sup> )	Number of receptors with:	
	Worsening of AQO already above objective or creation of a new exceedance	Improvement of an AQO already above objective or the removal of an existing exceedance
Large (>4)	1-10	1-10
Medium (>2)	10-30	10-30
Small (≤0.4)	30-60	30-60

- 5.3.54 The evaluation of the significance of N deposition results requires evaluation by an ecologist and therefore the significance of changes in pollutant concentrations

and deposition rates at ecological designations is also discussed in section 8.10 of Chapter 8 Biodiversity where required. The flow chart (Figure 2.98) in DMRB LA 105 *Air quality* has been used to determine significance at ecological sites.

#### Stakeholder engagement

- 5.3.55 Local authorities in the study area were contacted to request monitoring data and to inform them of the proposed scheme and the method of assessment being used. Baseline data for 2019 was provided by all local authorities. The Environmental Health Specialist at Somerset West and Taunton Council (SWTC) has highlighted the main air quality issues to consider in the assessment are around the Henlade and East Reach AQMAs [29], both of which have been assessed as part of the proposed scheme. No issues or concerns were raised by any other local authority.
- 5.3.56 An EIA Scoping Opinion was received from PINS on behalf of the Secretary of State (SoS) in May 2021 [20]. The comments relating to the air quality assessment have been accepted and addressed in this document where information was available for the PEI Report. Any outstanding information will be reviewed during production of the ES.

## **5.4 Assessment assumptions and limitations**

- 5.4.1 Air quality dispersion modelling has inherent areas of uncertainty, including:
- the traffic data used in the model
  - the traffic emissions data
  - simplifications in the DMRB screening tool used to simulate complex physical and chemical processes in the atmosphere
  - the background concentrations
- 5.4.2 To reduce uncertainty, the pollutant concentrations predicted using the DMRB Screening Tool have been carried out using the air quality measurements from local authority data that is within the study area and has suitable data capture. The verification process has been undertaken in line with best practice guidance produced by Defra.
- 5.4.3 Sensitivity testing of emissions data has been carried out using the most recent standard from Highways England, set out in DMRB LA 105 *Air quality*. The methodology used in this assessment is designed to provide a robust assessment, reducing uncertainty caused by the above limitations.
- 5.4.4 The most up to date emission factors and background concentrations have been used to calculate emissions and process results in the assessment.
- 5.4.5 It is not possible to determine the long-term impacts of the Covid-19 pandemic on traffic patterns and the consequential impact this might have on air quality related to the proposed scheme impacts on traffic emissions.
- 5.4.6 The assessment has been carried out based on the best information available at the time of the assessment.
- 5.4.7 Uncertainties or limitations related to transport data are reported in the PCF stage 2 ComMA Report. This report also outlines the forecasting assumptions, modelling assumptions for the development of the base model and reports on the data collection for the traffic model. These limitations have been overcome as far as possible by verifying the modelled concentrations against monitoring results in

appropriate locations. The traffic data used is appropriate for the purposes of this air quality assessment.

- 5.4.8 Road traffic flows and speeds used in the assessment were provided by the transport modelling specialists for all the operational assessment scenarios. The traffic forecasting is in line with the current guidance.
- 5.4.9 The construction dust air quality assessment is based on the best information currently available. As with all construction air quality assessments the exact details of activities will not be known before a specific contractor is appointed to complete the works and determines their exact construction methods and programme.
- 5.4.10 The construction of the proposed scheme would be undertaken in phases. The qualitative assessment of construction dust effects described in this chapter considers the construction of the proposed scheme as a whole, including all phases of the works known at this stage.
- 5.4.11 Construction traffic data was not available at the time of writing the PEI Report. During production of the ES the construction phase vehicle movements will be made available. These vehicle movements will be screened against the standards outlined in DMRB LA 105 *Air quality* and a 'simple' assessment will be carried out if the thresholds are exceeded.
- 5.4.12 Whilst there is the potential for the proposed scheme to open in phases, for the air quality assessment it has been assumed that there would be a single year of opening. The quantitative assessment of road traffic emissions therefore considers the point of full opening, at which the greatest change in road traffic movements would be experienced.

## 5.5 Study area

5.5.1 The air quality assessment comprises two sub-topics:

- A construction dust assessment, which is related to the risk of dust nuisance and dust emissions with potential to affect human health and ecosystems at a local level.
- Operational traffic air quality assessment, which relates to pollutants with the potential to affect human health and designated site at a local level during the operational phase of the proposed scheme.

### Construction dust assessment

- 5.5.2 The study area for the construction dust assessment includes all sensitive receptors within 200m of the proposed scheme boundary. Table 2.58b of DMRB LA 105 *Air quality* was used to identify the predicted dust risk potential based on the number of receptors within 0-50m, 50-100m and 100-200m.
- 5.5.3 Figure 5.4 Construction Dust Buffers shows the construction dust study area. An assessment of construction dust impacts is reported in section 5.9 Assessment of likely significant effects.

### Operational traffic air quality assessment

- 5.5.4 The study area for the assessment of local air quality has been defined following standards in DMRB LA 105 *Air quality*. It comprises:

- worst-case receptors within 200m of the centre line of the existing road, at the proposed scheme location;
- receptors within 200m of the centre line of the proposed scheme; and
- receptors within 200m of the centre line of any other 'affected roads'.

5.5.5 The ARN for the purposes of a local air quality assessment is defined as those roads within a defined TRA (i.e. the area of the traffic model considered to provide reliable estimates of traffic when the base traffic model is compared to observed traffic) that meet any of the following traffic change criteria (based on the two-way flow on all roads). A road is included in the ARN if one or more of the following criteria are met:

- road alignment would change by 5m or more
- daily traffic flows would change by  $\geq 1,000$  AADT
- HDV flows would change by  $\geq 200$  AADT
- a change in speed band

5.5.6 Figure 5.5 Affected Road Network shows the operational traffic study area.

5.5.7 The operational traffic study area is the affected local ARN and was defined using traffic data provided by the traffic consultants. It covers the following areas:

- the proposed scheme alignment
- A358 between Taunton to Axmouth
- M5 J22-J30
- A303 between Marsh and Blackford
- A372 between Langport and Podimore
- local roads joining the highways outlined above

## 5.6 Baseline conditions

### Current baseline

5.6.1 In order to provide an assessment of the significance of any new development proposal (in terms of air quality), it is necessary to identify and understand the baseline air quality conditions in and around the study area. This provides a reference level against which any potential changes in air quality can be assessed. Since the baseline air quality is predicted to change in the future (mainly because vehicle emissions are changing), the baseline situation has also been predicted for the modelled opening year. The DM scenario is the predicted baseline for the modelled opening year and includes any other proposed schemes with a high level of certainty of being built.

5.6.2 Baseline air quality data has been gathered from the following sources for the air quality study area:

- Defra UK-Air website [30]
- Defra PCM data for relevant years [31]
- Data from local authority monitoring
- GIS locations of sensitive receptors (residential properties, schools, hospitals and care homes) from OS Address Base Plus mapping
- GIS boundaries of designated ecological sites from Natural England [32]

## Local air quality management summary

5.6.3 Comparing baseline conditions for relevant pollutants against the AQOs detailed in the *UK Government's Air Quality Strategy (AQS)* [33] and the LV, the following has been concluded:

- National assessments have demonstrated that there is no risk of carbon monoxide, 1,3-butadiene or benzene concentrations exceeding relevant UK AQOs and LV thresholds due to emissions from traffic anywhere in the UK. As such, concentrations of these pollutants have not been modelled as it is unlikely these pollutants would be a cause for concern in terms of potential exceedances as a result of the proposed scheme.
- For particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), there are no AQMAs designated for an exceedance of UK AQOs and LV thresholds in the study area. Impacts from PM<sub>10</sub> and PM<sub>2.5</sub> are scoped out of further assessment.
- Exceedances of the annual mean NO<sub>2</sub> AQO and LV threshold of 40µg/m<sup>3</sup> have been identified in the air quality study area. On this basis, NO<sub>2</sub> is the focus of the air quality assessment for the proposed scheme.

## Air quality management areas (AQMA)

5.6.4 There are four AQMAs within 200m of the ARN:

- Cullompton AQMA in Mid Devon District Council (MDDC)
- Yeovil AQMA in South Somerset District Council (SSDC)
- East Reach AQMA in SWTC
- Henlade AQMA in SWTC

Cullompton AQMA encompasses the entire built-up area of the town of Cullompton and was declared in 2006. Yeovil AQMA comprises the whole of the built-up area of Yeovil and was declared in 2002. East Reach AQMA encompasses the properties and street frontage on the north side of East Reach, Taunton, between the junctions with Tancred Street and Eastbourne Road, and was declared in 2003. The Henlade AQMA is located just outside of the proposed scheme boundary and comprises the properties fronting the A358, west of the bus shelter at Henlade Crossway and extending 100m further west to Greylands. Henlade AQMA was declared in 2003. All AQMAs listed have been declared for exceedances of the annual mean NO<sub>2</sub> objective.

5.6.5 The AQMAs are shown in Figure 5.6 AQMAs. A summary of Air Quality Action Plans (AQAP) created to address air quality issues in these AQMAs is shown in Appendix 5.1 Air Quality Legislation Policy and Guidance. The SWTC AQAP inside the 2020 ASR discusses working with *“Highways England to ensure that the implementation of the A358 scheme fits with the Council’s existing development policies and leads to improvements in the local environment”*.

## Monitoring data

5.6.6 Local authorities have conducted air quality monitoring along the ARN. The location of the local authority monitoring sites within 200m of the ARN are shown in Figure 5.7 Monitoring locations. Information from the monitoring has been used to establish baseline air quality conditions.

5.6.7 The study area extends into six local authorities (East Devon District Council (EDDC), ECC, MDDC, Sedgemoor District Council (SDC), SWTC, SSDC).

Among these six local authorities, EDDC, ECC, MDDC, SDC and SWTC carry out diffusion tube NO<sub>2</sub> monitoring within the study area. There were exceedances of the AQO of 40µg/m<sup>3</sup> at roadside locations recorded in Sedgemoor and inside both Henlade and East Reach AQMAs in SWTC. Exceedances of the AQO inside Henlade AQMA were recorded between 2016-2018, with a maximum monitored concentration of 54.0µg/m<sup>3</sup> in 2018, which is well above the AQO of 40µg/m<sup>3</sup>. There were no exceedances of the annual mean NO<sub>2</sub> objective measured in the study area in 2019; however, NO<sub>2</sub> concentrations were very close to the AQO inside Henlade and East Reach AQMA with a maximum measured concentration of 39.0µg/m<sup>3</sup>. The monitored concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> in the study area were well below the relevant AQOs.

- 5.6.8 The results of local authority monitoring at the sites in the study area are presented in Appendix 5.3 Air Quality Baseline Data. The location of the monitoring sites are shown in Figure 5.7 Monitoring locations.

### **Defra Pollution Climate Mapping modelling**

- 5.6.9 Predicted roadside NO<sub>2</sub> concentrations were obtained from Defra's PCM model [27] for the years 2019 (2018 reference year baseline projection) and 2023 (2018 reference year). In the study area Defra PCM mapping indicates no exceedances in 2019 at road links in the ARN. In 2023, Defra PCM mapping indicates all links would still comply with LV.

### **Modelled baseline concentrations**

- 5.6.10 In addition to the air quality monitoring information, baseline concentrations have also been predicted at relevant human and ecological receptor locations across the study area and results of the baseline modelling are included in section 5.9.

### **Future baseline**

- 5.6.11 The DM and DS scenarios have been set out, with the DM scenario representing the future baseline without the proposed scheme.

## **5.7 Potential impacts**

- 5.7.1 Mitigation measures incorporated in the design and construction of the proposed scheme are set out in section 5.8 Design, mitigation and enhancement measures. Prior to implementation of the mitigation, the proposed scheme has the potential to affect air quality (positively or negatively), both during construction and operation.

### **Construction impacts**

- 5.7.2 During construction, potential air quality effects arise from emissions of construction dust and particulate matter (PM). These emissions occur as a result of construction activities such as demolition, earthworks, construction and trackout. The quantities of each depend on the scale and intensity of the construction works.
- 5.7.3 Dust has the potential to cause nuisance to property, and very high levels of soiling can affect plants and ecosystems. There is the potential for dust nuisance on receptors within 200m of construction and haulage routes associated with the proposed scheme. This nuisance, which is separate from adverse effects on health, can arise through annoyance caused by the soiling of windows, cars,

washing and other property. Potential air quality effects arising from dust emissions due to earthworks and construction activities are assessed in section 5.9 Assessment of likely significant effects.

- 5.7.4 There are a number of receptors which could be directly affected by dust nuisance associated with the proposed scheme works, and there is therefore potential for adverse impacts. Best practice construction dust control measures and standard mitigation measures will be presented in the Environmental Management Plan attached to the ES. Any potential impacts would be temporary in nature.

### **Operational impacts**

- 5.7.5 During the operational phase, potential air quality effects arise from emissions from vehicles using the road network. These impacts are discussed in section 5.9 Assessment of likely significant effects. On the basis of the available information, including existing monitored concentrations in the wider study area and the results from PCF stage 2, exceedances of the annual mean NO<sub>2</sub> objective are unlikely to occur within 200m of the ARN. Reductions in pollutant concentrations are predicted within Henlade AQMA as a result of the proposed scheme. The new alignment of the A358 would be approximately 300m south from Henlade. This would improve air quality in Henlade by reducing vehicle movements along the existing A358 which goes through the Henlade AQMA.

## **5.8 Design, mitigation and enhancement measures**

### **Construction mitigation**

- 5.8.1 During construction there is the potential for changes in air quality due to dust emissions from construction activity.
- 5.8.2 Best practice mitigation measures to reduce effects from construction dust will be incorporated into the Environmental Management Plan and ES.

### **Operational mitigation**

- 5.8.3 No significant adverse effects on local air quality concentrations are predicted at human receptors as a result of the proposed scheme. In some locations, the proposed scheme would have a positive impact due to relieving congestion and moving the road away from receptors. Therefore, no specific mitigation or AQAPs are required for the operation of the proposed scheme.
- 5.8.4 Further discussion of the impacts and mitigation relating to N deposition is included in Chapter 8 Biodiversity.

### **Enhancement**

- 5.8.5 There are several enhancement measures included in the preliminary scheme design which are known to improve air quality emissions. The proposed scheme has been designed to reduce congestion. The realignment of the A358 away from the Henlade AQMA would reduce pollutant concentrations at the receptor locations in Henlade.

## 5.9 Assessment of likely significant effects

### Construction effects

- 5.9.1 The construction phase could affect local air quality through the generation and subsequent deposition of construction dust arising from construction.

#### Construction dust

- 5.9.2 The proposed scheme comprises the upgrade and realignment of the A358 to a high-quality dual carriageway between Southfields Roundabout on the A303 and the M5 at Taunton to address the traffic issues and long delays currently experienced along the route. Therefore, the construction dust risk potential for the proposed scheme has been categorised as large.
- 5.9.3 Following the method set out in DMRB LA 105 *Air quality*, sensitive human receptors and designated habitats within 200m of the proposed scheme boundary have been identified. The sensitive human receptors identified include those located along Blackbrook Way, Taunton, Ruishton, and near the existing A358 including receptors along Greenway Lane, Stoke Road, Lipe Lane, A378, Hatch Green, Ashill, Kenny and Horton Cross. Committed developments have also been reviewed and included in the assessment. The number of human receptors is set out in Table 5-12.

**Table 5-12 Number of human receptors within 200 metres of construction and demolition activities**

Distance	Count at distance	Cumulative count <sup>(a)</sup>
0-50m	374	374
50-100m	47	421
100-200m	339	760
<sup>(a)</sup> Cumulative count comprises all receptors from 0m to the maximum distance in each distance band.		

- 5.9.4 In addition to human receptors there are three ancient woodland sites (Bickenhall Wood, Huish Coppice and Ashill Wood/Every's Copse) that are within 0-200m of the proposed scheme boundary. The human receptors and designated habitats within 200m of the proposed scheme boundary are shown in Figure 5.4 Construction Dust Buffers.
- 5.9.5 The receiving environment's sensitivity to construction dust has been categorised as high for the 421 human receptors and all designated habitats between 0-100m from the proposed scheme boundary. For human receptors and designated habitats between 100-200m from the proposed scheme boundary the sensitivity is low as defined in DMRB LA 105 *Air quality*.
- 5.9.6 There will be less than 20,000m<sup>3</sup> of buildings and structures demolished as part of the proposed scheme, comprising a mixture of concrete, timber, metal masonry. This includes the demolition of properties, bridges and roads. There will also be over 1,000m<sup>2</sup> of earthworks, comprising clay, sand and gravels with 100,000 tonnes of material to be moved. The volume of material to be constructed would be less than 25,000m<sup>3</sup>. The exact number of HDV movements is not known at the time of writing, however there are expected to be more than 50 daily HDV trips to the site. HDVs would access the site via unpaved haul roads. Access to the haul roads will be from the existing A303 (Southfields

roundabout) and junction 25 of the M5. Further construction information, including construction and earthwork activities will be available and reported on in the ES.

- 5.9.7 Overall, it is identified that the proposed scheme could impact receptors during the construction phase and mitigation is required to reduce the frequency and intensity of dust impacts. The proposed scheme is considered to have a large construction dust risk potential.
- 5.9.8 Mitigation to reduce impacts to a negligible level will be included within the EMP attached to the ES based on the standards outlined in DMRB LA 105 *Air quality*. This will include the development of dust management plan with measures to monitor effectiveness of mitigation, daily on-site and off-site inspections and recording of complaints/exceptional dust events.
- 5.9.9 With best practice mitigation measures in place the impacts are considered to be temporary, neutral and not significant.

### Operational effects

#### Affected road network

- 5.9.10 Following DMRB LA 105 *Air quality* screening criteria, the ARN was identified for the area around the proposed scheme for the 2023 modelled opening year scenario. The 2023 ARN is shown in Figure 5.5 Affected Road Network and is described in more detail in section 5.5 Study area.
- 5.9.11 Roads have been included in the ARN mainly based on changes to the total AADT (total AADT changes by more than plus or minus 1,000 vehicles per day) and on changes to HDV volumes. A smaller number of links have also been screened in based on changes in speed. A summary table of traffic changes along the main roads identified in the ARN is provided in Table 5-13.

**Table 5-13 Summary of ARN traffic changes in modelled opening year (two-way traffic flow changes AADT)**

Road section	DS – DM
Existing A358 alignment at Henlade AQMA (replaced by new offline portion)	-24,002
New A358 alignment south of Henlade AQMA (offline portion)	38,468
A358 at Kenny/Woodstock (Online portion)	13,613
M5 between junction 24 and 25	6,596
M5 between junction 25 and 26	5,889
A303 at Horton Cross	6,044
A372 at Podimore	1,262

#### Compliance links

- 5.9.12 Where the ARN overlaps with Defra PCM links, these have been selected and used to determine the risk of delaying compliance with the LV. In this assessment, the PCM model overlaps with the ARN around Taunton, Chard, the M5 (near Exeter) and Hamp as shown in Figure 5.8 Compliance Risk Road Network.

#### Model verification

- 5.9.13 The modelled results at existing monitoring locations were used for model verification based on the method set out in paragraphs 5.3.36 to 5.3.42. Details of

the verification process and results are provided in Appendix 5.4 Air Quality Sites Used for Verification.

- 5.9.14 The verification factors used for each receptor are shown in Figure 5.9 Verification Factors.
- 5.9.15 Model verification will be reviewed and updated for the ES when PCF stage 3 traffic data is available.

#### Human receptors

- 5.9.16 This section describes the predicted concentrations at human receptor locations as a result of the proposed scheme in the baseline year (2019) and modelled opening year (2023) when there would be a change in vehicle flows which meet the DMRB LA 105 *Air quality* screening criteria.
- 5.9.17 The modelled NO<sub>2</sub> concentrations and magnitude of change for all 44 human receptors modelled are presented in Appendix 5.5 Air Quality Operational Phase Impacts. There were no predicted exceedances of the AQO at any human receptor locations assessed.
- 5.9.18 Results have been presented in geographic areas known as ‘discussion regions’. Selected receptors have been chosen in each discussion region to summarise the changes in air quality as a result of the proposed scheme. The receptors were selected to show the largest changes in concentrations in the region and the highest total concentrations predicted. Three discussion regions have been used and are as follows:
- discussion region 1: Offline portion of the proposed scheme
  - discussion region 2: Online portion of the proposed scheme
  - discussion region 3: Wider ARN
- 5.9.19 Figure 5.10 Annual Mean NO<sub>2</sub> Concentrations shows the predicted DS annual mean NO<sub>2</sub> concentrations in 2023.

#### *Discussion region 1 – Offline portion of the proposed scheme*

- 5.9.20 In this discussion region seven receptors (see Table 5-14) have been selected to represent the scale of impacts associated with the proposed scheme. Local authority monitoring showed that roadside concentrations of annual mean NO<sub>2</sub> in the offline portion of the proposed scheme were below the AQO in 2019, however the NO<sub>2</sub> concentrations monitored in Henlade AQMA were very close to the objective with a maximum monitored concentration of 39µg/m<sup>3</sup>. Modelled baseline concentrations at all receptor locations have been predicted to be below the NO<sub>2</sub> AQO.

**Table 5-14 NO<sub>2</sub> concentrations at selected receptors – discussion region 1**

Receptor	Grid reference (m)		Annual mean NO <sub>2</sub> (µg/m <sup>3</sup> )			Change (DS – DM) (µg/m <sup>3</sup> )	AADT change (DS - DM)
	X	Y	2019 Base	2023 DM	2023 DS		
4	328844	122092	10.8	9.8	13.2	3.4	13,852
5	326852	124103	36.3	33.1	12.4	-20.7	-24,002
10	326515	124298	22.8	20.8	11.1	-9.7	-24,026
18	326975	123651	6.9	6.1	9.9	3.8	38,468
19	327930	123276	21.2	19.6	13.9	-5.7	-23,580

Receptor	Grid reference (m)		Annual mean NO <sub>2</sub> (µg/m <sup>3</sup> )			Change (DS – DM) (µg/m <sup>3</sup> )	AADT change (DS – DM)
	X	Y	2019 Base	2023 DM	2023 DS		
24	328607	122816	14.6	13.5	10.1	-3.4	544
35	328211	123022	16.3	15.0	10.0	-5.0	-23,580

- 5.9.21 The assessment shows that there are no predicted exceedances of the annual mean NO<sub>2</sub> objective in 2023 as a result of the proposed scheme.
- 5.9.22 Traffic will be moved away from sensitive receptors located close to the existing A358 and at the Henlade AQMA as a result of the new alignment of the A358, and hence concentrations in this location reduce by 20.7µg/m<sup>3</sup> and 9.7µg/m<sup>3</sup> (receptors 5 and 10 respectively). These are the largest reductions in NO<sub>2</sub> concentration predicted within the ARN. The overall traffic flow on the A378, which joins with the new A358 alignment, increases but there is a reduction in congestion. For example, at receptor 24 located on the A378 at Mattock's Tree Green, AADT increases by 544 vehicles but concentrations reduce by 3.4µg/m<sup>3</sup> as the speed band changes from heavy congestion to free flow.
- 5.9.23 Where the proposed scheme moves traffic closer to existing receptors, there are increases in NO<sub>2</sub> concentrations, however the total annual mean NO<sub>2</sub> concentrations remain well below the AQO. For example, at receptor 4 which is located at Bath Cottage, the DS concentration is 13.2µg/m<sup>3</sup> and the increase between DM and DS is 3.4µg/m<sup>3</sup>. Receptor 18 is located at Stoke Road, approximately 30m south of where the new alignment of the A358 will cut through the existing Stoke Road. At this receptor location the DS concentration is 9.9µg/m<sup>3</sup> and the increase is 3.8µg/m<sup>3</sup> the largest increase in this discussion region.

#### *Discussion region 2 – Online portion of the proposed scheme*

- 5.9.24 In this discussion region five receptors (see Table 5-16) have been selected to represent the scale of impacts associated with the proposed scheme. Local authority monitoring showed that roadside concentrations of annual mean NO<sub>2</sub> across the online portion of the proposed scheme were below the AQO. Modelled baseline concentrations at all receptor locations have been predicted to be below the NO<sub>2</sub> AQO.

**Table 5-15 NO<sub>2</sub> concentrations at selected receptors – discussion region 2**

Receptor	Grid reference (m)		Annual mean NO <sub>2</sub> (µg/m <sup>3</sup> )			Change (DS – DM) (µg/m <sup>3</sup> )	AADT change (DS – DM)
	X	Y	2019 Base	2023 DM	2023 DS		
8	330307	118772	9.5	8.6	13.0	4.4	11,806
12	330520	118563	18.7	17.1	12.6	-4.5	-21,303
37	331649	117914	8.9	7.9	10.6	2.7	12,663
38	333221	116696	9.2	8.4	11.5	3.1	12,650
43	334317	115274	23.9	22.2	24.5	2.3	6,059

- 5.9.25 The results show that there are no predicted exceedances of the annual mean NO<sub>2</sub> objective in 2023 as a result of the proposed scheme.
- 5.9.26 There is a general increase in traffic flows predicted on the A358 in this area leading to increases in NO<sub>2</sub> concentrations. This includes receptor 43, located at Southfields roundabout, where an increase in NO<sub>2</sub> concentration between the DM

and DS is  $2.3\mu\text{g}/\text{m}^3$ , resulting in a predicted DS concentration of  $24.5\mu\text{g}/\text{m}^3$ , the highest DS concentration in this discussion region.

- 5.9.27 However, the change in AADT traffic flow is not the sole determinant in the resulting change in  $\text{NO}_2$  concentration. The distance from road also determines how much a change in traffic flow may affect the concentrations at any given receptor. Due to the widening and realignments of the A358, the carriageway is moved closer to some receptors in discussion region 2. There is an increase in AADT predicted along the roads adjacent to receptor 8 (located at Hatch Beauchamp) and receptor 37 (located at Ashill) of 11,806 and 12,663 AADT respectively. Although there would be more traffic adjacent to receptor 37, the increase in concentrations at receptor 8 ( $4.4\mu\text{g}/\text{m}^3$ ) is higher than the change at receptor 37 ( $2.7\mu\text{g}/\text{m}^3$ ). This difference is because the road is closer to receptor 8 by approximately 5m. Receptor 8 is predicted to have the largest increase in  $\text{NO}_2$  concentrations in this discussion region.
- 5.9.28 There are also small realignments to the A358 in this section of the proposed scheme which moves traffic away from some receptors, resulting in a predicted decrease in  $\text{NO}_2$  concentrations. For example, at receptor 12 located at Capland Lane, the DS concentration is  $12.6\mu\text{g}/\text{m}^3$  and the reduction between DM and DS is  $4.5\mu\text{g}/\text{m}^3$ , the largest reduction in this discussion region. Receptor 12 is located 5m from the existing alignment of the A358 which would continue to be operational in the DS scenario. Between the DM and DS scenario, the traffic flows on the existing A358 alignment decreases by 21,303 AADT. This is because the traffic is shifted onto the new A358 alignment which is located 20m north of receptor 12 and has a traffic flow of 35,912 AADT in the DS scenario.

#### *Discussion region 3 – Wider ARN*

- 5.9.29 In this discussion region eight receptors (see Table 5-16) have been selected to represent the scale of impacts associated with the proposed scheme. Local authority monitoring showed that roadside concentrations of annual mean  $\text{NO}_2$  across the wider ARN were below the AQO, however the  $\text{NO}_2$  concentrations monitored in East Reach AQMA were close to the objective with a maximum monitored concentration of  $38\mu\text{g}/\text{m}^3$ . Modelled baseline concentrations at all receptor locations have been predicted to be below the  $\text{NO}_2$  annual mean objective.

**Table 5-16  $\text{NO}_2$  concentrations at selected receptors – discussion region 3**

Receptor	Grid reference (m)		Annual mean $\text{NO}_2$ ( $\mu\text{g}/\text{m}^3$ )			Change (DS – DM) ( $\mu\text{g}/\text{m}^3$ )	AADT change (DS – DM)
	X	Y	2019 Base	2023 DM	2023 DS		
16	326900	115509	8.2	7.7	6.4	-1.3	-2,330
20	324438	123017	15.5	14.4	14.7	0.3	5,889
26	352349	116016	-*	11.6	11.8	0.2	1,422
32	330238	134390	22.1	18.8	19.1	0.3	1,020
39	332842	108795	18.4	16.8	19.5	2.7	1,708
40	349443	125943	11.4	10.9	10.3	-0.6	-1,182
41	302890	107483	17.5	15.8	15.9	0.1	295
44	323271	124555	30.9	27.6	28.5	0.9	1,204

Notes: \* Base traffic data was not available for the road link that the receptor is on

- 5.9.30 There are no predicted exceedances of the annual mean NO<sub>2</sub> objective in 2023 as a result of the proposed scheme. For the majority of modelled sensitive receptors across the wider ARN, there is a slight increase in AADT traffic flows which is reflected in the increase in concentrations between the DM and DS scenarios. The speed band also determines the change in concentrations at some receptor locations, as a result of a change in congestion in the area.
- 5.9.31 The maximum DS concentration predicted in this discussion region is at receptor 44, located 2.5m from the edge of the road in East Reach, where an increase in AADT of 1,204 is predicted to increase NO<sub>2</sub> concentrations by 0.9µg/m<sup>3</sup> to 28.5µg/m<sup>3</sup>. The DS concentration remains lower than the 2019 baseline concentration of 30.9µg/m<sup>3</sup>.
- 5.9.32 At receptor 39, located at Victoria Avenue, the combination of a 1,708 increase in AADT, and a change in speedband from free flow to light congestion are predicted to increase NO<sub>2</sub> concentrations by 2.7µg/m<sup>3</sup>. This is the maximum increase in NO<sub>2</sub> concentrations in this wider discussion region, resulting in a DS concentration 19.5µg/m<sup>3</sup>.
- 5.9.33 There are some locations where decreases in AADT are predicted, away from the proposed scheme, leading to a predicted decrease in NO<sub>2</sub> concentrations. This includes at receptor 16 located at Blackwater, where the change in concentration is predicted to be -1.3µg/m<sup>3</sup> resulting in a DS concentration of 6.4µg/m<sup>3</sup>.

#### Air quality management areas

- 5.9.34 A summary of the proposed scheme's impact on local AQMAs is provided in Table 5-17.

**Table 5-17 Summary of AQMA modelled results**

AQMA	2023 modelled results
Cullompton	The maximum predicted annual mean NO <sub>2</sub> concentration in the DS scenario in this AQMA occurs at receptor 41 (15.9µg/m <sup>3</sup> ). This is well below the AQO. The predicted change as a result of the proposed scheme is 0.1µg/m <sup>3</sup> .
Yeovil	The maximum predicted annual mean NO <sub>2</sub> concentration in the DS scenario in this AQMA occurs at receptor 26 (11.8µg/m <sup>3</sup> ). This is well below the AQO. The predicted change as a result of the proposed scheme is 0.2µg/m <sup>3</sup> .
East Reach	The maximum predicted annual mean NO <sub>2</sub> concentration in the DS scenario in this AQMA occurs at receptor 44 (28.5µg/m <sup>3</sup> ). This is well below the AQO. The predicted change as a result of the proposed scheme is 0.9µg/m <sup>3</sup> .
Henlade	The maximum predicted annual mean NO <sub>2</sub> concentration in the DS scenario in this AQMA occurs at receptor 5 (12.4µg/m <sup>3</sup> ). This is well below the AQO. The predicted change as a result of the proposed scheme is an improvement of 20.7µg/m <sup>3</sup> . This significant improvement is a result of the new offline section of the A358 being added.

#### Ecological receptors

- 5.9.35 The change in nutrient N deposition as a result of the proposed scheme has been predicted at 21 ecological sites (with 189 modelled receptor locations, including transect points).
- 5.9.36 The nutrient N deposition in the baseline year and modelled opening year, and the magnitude of change between DM and DS scenarios for all ecological receptors modelled are presented in Appendix 5.5 Air Quality Operational Phase Impacts. The change in N deposition can be seen in Figure 5.11 Nitrogen deposition results.

- 5.9.37 The maximum increase in nutrient N deposition as a result of the proposed scheme in 2023 is predicted to be 0.5kg N/ha/year at receptor 15 at Bickenhall Wood Ancient Woodland (AW). At this location there is a 5.0% increase in N deposition as a percentage of the lower critical load for the relevant habitat (10 kg N/ha/yr). This receptor experiences an increase as the road will be dualled, bringing the carriageway closer to the site, along with an increase in AADT flows.
- 5.9.38 There is also an increase of 0.4kg N/ha/year predicted at receptor 8, Children's Wood/Riverside Park Local Nature Reserve (LNR). This site is located along the A38 north of Taunton and the increase is as a result of a 3,853 increase in AADT and a 339 increase in HDVs.
- 5.9.39 The significance of this change has been considered within section 8.1 of Chapter 8 Biodiversity.
- 5.9.40 The maximum reduction in nutrient N deposition of -0.2kg N/ha/year has been predicted at two sites. Deadman Sites of Special Scientific Interest (SSSI), is located west of the proposed scheme and is predicted to improve due to the realignment of the carriageway, moving traffic away from the designated habitat and improving traffic congestion. Parsonage Wood AW is located north of Bulford. A reduction in N deposition in this area is predicted due to a reduction of 1,557 AADT.
- 5.9.41 Increases in nutrient N deposition are predicted to be above 1% of the lower critical load at the following receptors:
- Maiden Down SSSI
  - Huntspill River National Nature Reserve (NNR)
  - Children's Wood/Riverside Park LNR
  - Unnamed AW 1/2/3/4
  - Unnamed AW 5
  - Unnamed AW 6
  - Bickenhall Wood AW
  - Knights Wood AW
  - Warren Hill AW
- 5.9.42 These changes cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.

### **Compliance with the Air Quality Directive**

- 5.9.43 DMRB LA 105 *Air quality* sets the method which has been followed to assess compliance with the air quality directive based on PCM data provided by Defra.
- 5.9.44 There are no exceedances of the NO<sub>2</sub> AQO as a result of the proposed scheme at PCM receptors.
- 5.9.45 Six locations (C1, C2, C3, C4, C5, and C6), shown in Figure 5.8, are predicted to have an increase in concentration greater than 0.4µg/m<sup>3</sup> with a maximum increase of 2.2µg/m<sup>3</sup> 4m from the edge of the road at receptor C6. The maximum DS concentration is also at C6 with a predicted concentration of 36.5µg/m<sup>3</sup>. Therefore, none of the PCM receptors are at risk of exceeding, or delaying compliance with the LV in the Directive.

- 5.9.46 All other increases in concentrations at qualifying features close to PCM links and locations 4m from PCM links are imperceptible (<0.4µg/m<sup>3</sup>).
- 5.9.47 Based on the results of this assessment, the compliance testing indicates that the proposed scheme is low risk as defined in DMRB LA 105 *Air quality* (Figure 2.79). None of the links are at risk of becoming non-compliant as a result of the proposed scheme, the date for achieving compliance would not be affected, and there would be no increase in the length of roads in exceedance in the zones.

### **Compliance with local planning policies**

- 5.9.48 The impacts predicted due to the proposed scheme have been considered against the local planning policies listed in Appendix 5.1 Air Quality Legislation, Policy and Guidance and the actions and measures in the Councils' AQAPs.
- 5.9.49 The *SWTC AQAP* inside the *2020 ASR* [34] discusses working with "*Highways England to ensure that the implementation of the A358 scheme fits with the Council's existing development policies and leads to improvements in the local environment*". It also states that "*to be able to meet air quality objectives the Council is likely to have to rely on the support of other agencies, for example, Highways England to ensure the proposed re-routing of the A358 can reduce traffic levels in the Henlade AQMA*".
- 5.9.50 The proposed scheme is predicted to have no significant impacts in 2023 and therefore does not act against the objectives of local planning policies.
- 5.9.51 The proposed scheme does not result in any exceedances of the AQOs, it moves traffic away from a number of properties that are currently located within an AQMA and does not act against the objectives of local planning policies. The results of this assessment show that the operation of the proposed scheme would reduce traffic levels in the Henlade AQMA as discussed in the *SWTC AQAP* inside the *2020 ASR* which would support an argument to revoke the Henlade AQMA.

### **Assessment of construction phase significance**

- 5.9.52 The overall assessment of construction phase significance takes into account the proposed scheme's effect on human health and designated habitats arising from construction dust. The effects from the construction phase are assessed as being temporary, neutral and not significant.

#### Human health effects

- 5.9.53 The proposed scheme is considered to have a large construction dust risk potential. Impacts from construction dust would be managed through best practice mitigation measures, to be outlined in the EMP. With best practice construction mitigation measures the impact of construction dust would be reduced to a negligible level.

#### Designated habitats effects

- 5.9.54 With best practice construction mitigation measures being implemented the impact of construction dust would be reduced to a negligible level.

### Overall construction phase significance

- 5.9.55 The assessment of effects from the construction phase are assessed as being temporary, neutral and not significant.

### **Assessment of operational phase significance**

- 5.9.56 The overall assessment of operational phase significance takes into account the proposed scheme's effect on human health, designated habitats and the outcomes of the compliance risk assessment.

### Human health effects

- 5.9.57 The assessment has predicted no exceedances of the AQOs at human receptors in the DS scenario. All concentrations of annual mean NO<sub>2</sub> are predicted to remain below the AQOs.
- 5.9.58 At the Henlade AQMA the concentrations of annual mean NO<sub>2</sub> reduce from 33.1µg/m<sup>3</sup> to 12.4 µg/m<sup>3</sup> in 2023. This is due to the proposed scheme moving traffic away from receptor locations in the AQMA and a reduction in congestion.
- 5.9.59 With no exceedances of the AQOs at human receptor locations and improvements in the Henlade AQMA it is considered the proposed scheme would have no significant effects on air quality. Overall, the proposed scheme is considered to have a beneficial impact on local air quality due to the reductions in NO<sub>2</sub> concentrations within the AQMA.

### Designated habitats effects

- 5.9.60 The assessment of effects at designated habitats has identified locations where the proposed scheme would result in an increase in N deposition greater than 1% of the lower critical load. An assessment to determine the effect upon ecological habitats are reported in Chapter 8 Biodiversity.

### Compliance risk assessment

- 5.9.61 The proposed scheme is not predicted to impact compliance with the LVs.

### Overall operational phase significance

- 5.9.62 The assessment of effects from the operational phase human health effects are assessed as being permanent, neutral and not significant.
- 5.9.63 The assessment of effects at designated habitats cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.

### **Assessment of overall significance**

- 5.9.64 The significance of the construction phase and operational phase effects on human health effects are both predicted to be not significant. Therefore, it is predicted the effects on air quality at human receptors would not be significant.
- 5.9.65 The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.

- 5.9.66 The proposed scheme is not predicted to have an effect on the UK's ability to comply with the LVs.

## 5.10 Monitoring

- 5.10.1 To aid the efficacy of dust mitigation measures during the construction phase, visual inspections or dust monitoring could be carried out to check where dust soiling is occurring and where appropriate mitigation measures can be enhanced to reduce soiling. This would be secured under the DCO via the EMP in the ES for the DCO application.
- 5.10.2 No significant impacts have been identified at human receptor locations and therefore there is no requirement for future monitoring of air quality during the operational phase as a result of the proposed scheme.
- 5.10.3 Further discussion of the impacts and mitigation relating to N deposition is included in Chapter 8 Biodiversity.

## 5.11 Summary

- 5.11.1 The assessment has examined the potential effects of the proposed scheme on local air quality during the modelled opening year 2023 using the current traffic data.
- 5.11.2 A review of the current air quality legislation and planning policies relevant to the proposed scheme has been undertaken. This assessment covers each of the main areas highlighted as being essential for an air quality assessment in the NPSNN.
- 5.11.3 The baseline assessment demonstrates that there are existing air quality issues in the study area, with exceedances of the NO<sub>2</sub> annual mean AQO being observed at roadside monitoring locations in Sedgemoor, and both Henlade and East Reach AQMAs in SWTC.

### Construction assessment

- 5.11.4 Assessment of construction phase impacts from construction dust showed that the proposed scheme effect is considered to be temporary, neutral and not significant.

### Operational assessment

- 5.11.5 Assessment of annual mean NO<sub>2</sub> concentrations in 2023 (modelled opening year) on human health effects indicated that the proposed scheme is considered to be not significant.
- 5.11.6 An assessment of LV compliance concluded that the proposed scheme is not likely to impact the predicted date for compliance with the LV.
- 5.11.7 The changes in N deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 *Air quality*. Further discussion of the impacts of the proposed scheme on N deposition at these locations is included in Chapter 8 Biodiversity.
- 5.11.8 Based on the professional judgement of suitably qualified and experienced specialists, it is concluded that the proposed scheme's impact in the study area on air quality concentrations in relation to human health effects is not significant.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

## References

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 6  
Cultural Heritage

HE551508-ARP-EHR-ZZ-RP-LH-000002

27/09/21

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## 6 Cultural heritage

### 6.1 Introduction

- 6.1.1 This chapter assesses the potential cultural heritage effects of the construction and operation of the A358 Taunton to Southfields Dualling Scheme (the proposed scheme), following the methodology set out in the *Design Manual for Roads and Bridges* (DMRB) *LA 104 Environmental assessment and monitoring* [1] and *LA 106 Cultural heritage assessment* [2].
- 6.1.2 The chapter details the methodology followed for the assessment, summarises the regulatory and policy framework related to cultural heritage and describes the existing environment in the area surrounding the proposed scheme. Following this, the design, mitigation and residual effects of the proposed scheme are discussed, along with the limitations of the assessment. The assessment within this chapter is supported by Appendices 6.1 to 6.5.

### 6.2 Legislative and policy framework

#### Legislation

- 6.2.1 The legislation presented below is relevant to the assessment of effects on the cultural heritage resource for the proposed scheme. However, the grant of development consent will obviate the need for these separate consents:
- *Ancient Monuments and Archaeological Areas (AMAA) Act 1979* [3]
  - *Planning (Listed Buildings and Conservation Areas) Act 1990* [4]
  - *The Hedgerows Regulations 1997* [5]

- 6.2.2 The AMAA Act largely relates to scheduled monuments and section 61(12) defines sites that warrant protection due to their being of public interest as 'ancient monuments'. A monument is defined by the Act as:

*"any building, structure or work above or below the surface of the land, any cave or excavation; any site comprising the remains of any such building, structure or work or any cave or excavation; and any site comprising or comprising the remains of any vehicle, vessel or aircraft or other movable structure or part thereof."*

#### National planning policy

##### National Policy Statement for National Networks

- 6.2.3 As documented in Chapter 1 the primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the *National Policy Statement for National Networks* (NPSNN), which, sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered [6]. The policies within the NPSNN for the conservation of the historic environment state that:

*"Those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest are called 'heritage assets'. Heritage assets may be buildings, monuments, sites, places, areas or landscapes. The sum of the heritage interests that a heritage asset holds, or its value, is referred to as its significance."*

*Significance derives not only from a heritage asset's physical presence, but also from its setting. Non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets. The absence of designation for such heritage assets does not indicate lower significance."*

6.2.4 The NPSNN advises:

*"the Secretary of State should also consider the impacts on other non-designated heritage assets (as identified either through the development plan process by local authorities, including 'local listing', or through the nationally significant infrastructure project examination and decision-making process) on the basis of clear evidence that the assets have a significance that merit consideration in that process, even though those assets are of lesser value than designated heritage assets."*

6.2.5 Table 6-1 identifies the NPSNN policies relevant to the cultural heritage assessment and then specifies where in the chapter information is provided to address the policy.

**Table 6-1 Relevant NPSNN policies for the cultural heritage assessment**

<b>Relevant NPSNN paragraph reference</b>	<b>Summary of requirement of the NPSNN</b>	<b>Where in the PEI Chapter is information provided to address this policy</b>
5.124	<i>Non-designated heritage resources of archaeological interest that are demonstrably of equivalent significance to scheduled monuments should be considered subject to the policies for designated heritage assets</i>	Section 6.4 Assessment methodology, Table 6-2
5.126	<i>Where the development is subject to EIA the applicant should undertake an assessment of any likely significant heritage impacts of the proposed project as part of the Environmental Impact Assessment and describe these in the environmental statement.</i>	The assessment of impacts is considered in section 6.10 Assessment of likely significant effects
5.127	<i>The applicant should describe the significance of any heritage resources affected, including any contribution made by their setting. The level of detail should be proportionate to the resource's importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant Historic Environment Record should have been consulted and the heritage resources assessed using appropriate expertise. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation.</i>	Appendices 6.1 to 6.4
5.131	<i>When considering the impact of a proposed development on the significance (or value, according to DMRB terminology) of a designated heritage resource, the Secretary of State should give great weight to the asset's conservation. The more important the resource, the greater the weight should be.</i>	The impact of the proposed scheme on the value of heritage resources is considered in section 6.10 Assessment of likely significant effects

Relevant NPSNN paragraph reference	Summary of requirement of the NPSNN	Where in the PEI Chapter is information provided to address this policy
5.133	<i>Where the proposed development will lead to substantial harm to or total loss of significance (value) of a designated heritage resource, the Secretary of State should refuse consent unless it can be demonstrated that the substantial harm or loss of significance is necessary in order to deliver substantial public benefits which outweigh that loss or harm.</i>	The assessment does not identify any instance of 'substantial harm' or total loss of value to any designated resource.
5.134	<i>Where the proposed development will lead to less than substantial harm to the significance (value) of a designated heritage resource, this harm should be weighed against the public benefits of the proposal, including securing its optimum viable use.</i>	The impact of the proposed scheme on the value of heritage resources is considered in section 6.10 Assessment of likely significant effects.
5.135	<i>Not all elements of a World Heritage Site or conservation area will necessarily contribute to its significance (value). The Secretary of State should treat the loss of a building (or other element) that makes a positive contribution to the site's significance (value) either as substantial harm or less than substantial harm, as appropriate, taking into account the relative significance (value) of the elements affected and their contribution to the significance of the conservation area or World Heritage Site as a whole.</i>	The assessment does not identify any instance of 'substantial harm' or total loss of value to any designated resource.
5.140	<i>Requirement to record and advance understanding of a heritage resource's significance (value) prior to it being lost if this loss is justified</i>	Section 6.9 Design, mitigation and enhancement measures, sets out the requirement for archaeological fieldwork and recording.
5.142	<i>Consider requirements to ensure that appropriate procedures are in place for the identification and treatment of yet undiscovered heritage assets with archaeological interest discovered during construction.</i>	See section 6.9 and the Detailed Archaeological Mitigation Strategy and Overarching Written Scheme of Investigation (which will be submitted as an Annex to the Environmental Management Plan (EMP) for the DCO submission).
5.144-5.146	<i>The applicant should undertake an assessment of any likely significant landscape and visual impacts in the EIA... The applicant's assessment should include significant effects during construction of the project and/or its operation on landscape components and landscape character (including historic landscape characterisation).</i>	The assessment has regard to historic landscape character and the impact of the proposed scheme upon it. See section 6.10 and Historic Landscape Characterisation Assessment (Appendix 6.3 Gazetteer of Heritage Resources).

### National Planning Policy Framework

6.2.6 National Planning policies on the conservation of the historic environment are set out in the *National Planning Policy Framework* (NPPF) and should be adhered to in conjunction with NPSNN, where the NPSNN does not cover a specific issue.

The NPPF [7] was updated in 2021, replacing all previous Planning Policy Statements. Guidance to help practitioners implement this policy, including the legislative requirements that underpin it, is provided in *National Planning Practice Guidance (PPG): Historic Environment* [8].

6.2.7 Non-designated heritage assets as well as those designated under the above legislation are given protection under the NPPF. Policies dealing with the conservation and enhancement of the historic environment is set out principally in Section 16 of the NPPF [7], which states that heritage assets:

*"are an irreplaceable resource, and should be conserved in a manner appropriate to their significance"* (paragraph 189).

6.2.8 Paragraph 197, states that plans should set out a positive strategy for conservation, taking into account:

*"a) the desirability of sustaining and enhancing the significance of heritage assets, and putting them to viable uses consistent with their conservation;*

*b) the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring;*

*c) the desirability of new development making a positive contribution to local character and distinctiveness; and*

*d) opportunities to draw on the contribution made by the historic environment to the character of a place."* (paragraph 190)

6.2.9 Paragraph 199-200, states that:

*"When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance. Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of:*

*a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional;*

*b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II\* listed buildings, grade I and II\* registered parks and gardens, and World Heritage Sites, should be wholly exceptional.*

6.2.10 Paragraph 203, states:

*"The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset."*

6.2.11 Footnote 68, which follows from paragraph 200, states:

*"Non-designated heritage assets of archaeological interest, which are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets."*

### **Local planning policy**

- 6.2.12 Local planning policy relevant to cultural heritage is found within the *South Somerset District Council Local Plan* [9] and the *Taunton and Deane Core Strategy* [10] and *Site Allocations and Development Management Plan* [11].

#### South Somerset planning policy and strategy

- 6.2.13 The *South Somerset Local Plan* comments on the rich industrial heritage of the area, which includes links to the tanning, rope, glove and lace-making industries, as well as on the contribution made by the use of local stone in the area's building. Sustainable development should include the conservation and, where possible, enhancement of heritage assets and their settings. Specific cultural heritage policy is contained within Policy EQ3: Historic Environment:

*"Heritage assets will be conserved and where appropriate enhanced for their historic significance and important contribution to local distinctiveness, character and sense of place. Their potential to contribute towards the economy, tourism, education and local identity will be exploited. All new development proposals relating to the historic environment will be expected to:*

- *Safeguard or where appropriate enhance the significance, character, setting and local distinctiveness of heritage assets.*
- *Make a positive contribution to its character through high standards of design which reflect and complement it and through the use of appropriate materials and techniques.*
- *Ensure alterations, including those for energy efficiency and renewable energy, are balanced alongside the need to retain the integrity of the historic environment and to respect the character and performance of buildings, adopting principles of minimum intervention and reversibility."*

- 6.2.14 The *South Somerset Local Plan* is supported by the *South Somerset Heritage Strategy* [12]. This strategy states that the Council will always seek to be consistent with the national principles and guidance published by Historic England, notably *Conservation Principles* [13]. Planning decisions made by South Somerset District Council are to be made against a set of objectives:

- *"1. Safeguard or enhance the significance of heritage assets and their settings.*
- *2. Reduce or remove risks to heritage assets.*
- *3. Secure the optimum viable use of heritage assets in support of their long term conservation.*
- *4. Ensure development is appropriate in design and materials for its context and makes a positive contribution to the appearance, character, quality and local distinctiveness of the historic environment.*
- *5. Better reveal the significance of heritage assets wherever possible and*
- *6. Make a positive contribution to economic vitality and sustainable communities" [12].*

- 6.2.15 While the whole strategy is relevant to this assessment, it is worth noting that the Council will particularly seek to protect listed buildings and their settings from

developments which would have an adverse effect on their character and significance. In addition, they would expect development proposals affecting locally important archaeological remains to ensure appropriate recording is carried out and that measures are taken to enhance awareness of impacted archaeological remains, and will also expect development proposals to take into account any impacts on the historic landscape. Hedgerows and trees of value are also a particular concern.

#### Somerset West and Taunton planning policy

- 6.2.16 The *Taunton and Deane Core Strategy* states that heritage assets are an irreplaceable resource, emphasising that they should be conserved in a manner appropriate to their significance. Strategic Objective 8: Environment, is:

*“To maintain and enhance biodiversity, the natural and man-made environment, minimising the need to travel, waste, pollution and the use of non-renewable resources and to promote good design and materials which respect and enhance local distinctiveness.”*

- 6.2.17 Specific policy is contained within CP 8: Environment, the relevant portion of which states that:

*“The Borough Council will conserve and enhance the natural and historic environment, and will not permit development proposals that would harm these interests or the settings of the towns and rural centres unless other material factors are sufficient to override their importance” [10].*

- 6.2.18 In addition to the *Core Strategy*, the *Taunton and Deane Adopted Site Allocations and Development Management Plan* includes Policy ENV4: Archaeology, which states that:

*“Where a development proposal affects a site of archaeological importance, Area of High Archaeological Potential, or it is known or suspected that the development could affect archaeological remains, developers must provide for satisfactory evaluation of the archaeological value of the site, and the likely effects on it as part of the planning process. Development affecting sites or the setting of designated archaeological heritage assets, and non-designated archaeological sites or settings which have been demonstrated to have a similar level of importance, will not be permitted unless their archaeological and historic interest, character and setting would be preserved. Designated heritage assets of archaeological importance should be preserved in situ. Proposals which do not provide for this will not be permitted unless:*

*A. The development would make preservation in situ physically impossible and the remains are not of sufficient importance to outweigh the need for development; and*

*B. Developers would make adequate provision for excavation and recording of remains affected.*

*Where evaluation does not justify designation as a site of national or county importance and development is to be allowed, developers must provide for an adequate programme of works” [11].*

## Standards and guidance

6.2.19 In addition to compliance with the NPSNN and NPPF, this assessment has been compiled in accordance with appropriate professional standards and guidance. The standards and guidance which relate to this assessment are:

- Chartered Institute for Archaeologists (CIfA), *Standard and guidance for historic environment desk-based assessment*. [14]
- CIfA, *Code of Conduct*. [15]
- Highways England, *DMRB LA 104 Environmental assessment and monitoring*. [1]
- Highways England, *DMRB LA 106 Cultural heritage assessment*. [2]
- Historic England, *Good Practice Advice in Planning (GPA2) Managing significance in decision-taking in the historic environment* – this advice note provides information to support the NPPF and PPG, such as aiding in assessing the significance/value of heritage resources. [16]
- Historic England, *Good Practice Advice in Planning (GPA3): the setting of heritage assets* – this advice note sets out a staged approach for assessing the impact of development on heritage resources due to changes in their setting. Step 1 is to identify which heritage resources and their settings are affected. This, along with Step 2, which considers the contribution made by a resource's setting to its significance, are included in Appendix 6.3 Gazetteer of Heritage Resources. Step 3 is an assessment of the effect of the proposed scheme on that significance or the ability to appreciate it, which is included in both Appendix 6.4 Preliminary Impact Assessment and this chapter (section 6.8-6.10), where effects are significant. Step 4 is to explore ways to maximise enhancement and minimise harm, which is contained in this chapter (section 6.9) and the process for documenting the decision and monitoring the outcome is in section 6.11 [17]. Where heritage resources are unlikely to be impacted (i.e. not identified in step 1), then the stage 2 assessment of the contribution made by the resource's setting has been scoped out.
- Historic England, *Statements of Heritage Significance: Analysing Significance in Heritage Assets*, recommends a staged approach to decision making in applications affecting heritage resources. To do this it is important to understand the nature of a heritage resource or archaeological remains – their form, materials and history, and then to understand their significance, the impact of the proposal on that significance and then to look at how to avoid harm and reveal or enhance significance [18]. While this chapter presents a summary of the assessment, the majority of these stages are contained within the appendices. Appendix 6.1 Archaeological and Historic Background gives the overarching narrative assessment which forms the first stage of understanding the nature of the historic environment potentially impacted by the proposed scheme, with the detail of this for individual heritage resources and their significance contained in Appendix 6.3 Gazetteer of Heritage Resources. The assessment of impacts is contained in Appendix 6.4 Preliminary Impact Assessment, with significant effects discussed further in this chapter. Further discussion of mitigation and/or enhancement will be added for the DCO submission.
- English Heritage (now Historic England), *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* – this document sets out the approach to making decisions and offering guidance about all aspects of England historic environment. [13]
- South Somerset District Council *Historic Environment Strategy*. [12]

- South West Heritage Trust, *Somerset Archaeological Handbook*, which provides the framework and guidance for archaeological research carried out within Somerset. [19]

6.2.20 Further, this assessment will be supported by geophysical survey, trial trenching and building analysis. Specific standards relevant to these will be included in the detailed reports which will be submitted as part of the DCO application.

### 6.3 Assessment methodology

6.3.1 The assessment methodology is based on DMRB LA 104 *Environmental assessment and monitoring* [1] and DMRB LA 106 *Cultural heritage assessment* [2] and other guidance and advice produced by Historic England, ClfA and South West Heritage Trust (see section 6.2 Legislative and Policy Framework). The same approach will be used for both construction and operational effects.

#### Assessment of value

6.3.2 The methodology for assessing effects is based on the principle that the environmental effects of the proposed scheme, in relation to a single heritage resource (asset), should be determined by identifying the resource's value, assessing the magnitude of change the proposed scheme would have on the resource's significance (where significance is defined as the attributes that give the resource its value) and then combining these two elements to identify the significance of effect. While the value of resources and, subsequently, the impact of the proposed scheme upon that value, are reported individually, a holistic approach will be taken to the assessment which considers the setting and, where relevant, group context of heritage resources. The following tables (6-2 to 6-4) provide further detail on the process for assessing effects.

6.3.3 The importance or value of each heritage resource within the study area was determined according to the DMRB criteria set out in Table 6-2, which is a factor specific adaptation of DMRB LA 104 *Environmental assessment and monitoring* Table 3.2N [1].

**Table 6-2 Environmental value and descriptions with examples within the study area**

Value of resource	Typical description	Examples within the study area
Very High	Very high importance and rarity, international scale and very limited potential for substitution. Includes World Heritage Sites and nominated sites.	None identified within the study area.
High	High importance and rarity, national scale, and limited potential for substitution. Includes scheduled monuments, listed buildings, Grade I and II* registered parks and gardens, conservation areas containing very important buildings, undesignated structures of clear national importance, undesignated resources of schedulable quality and importance.	There are scheduled monuments, listed buildings and a Grade I registered park and garden identified within the study area.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution. Includes Grade II registered	There are conservation areas, a Grade II registered park and garden and non-designated heritage resources including

Value of resource	Typical description	Examples within the study area
	parks and gardens, conservation areas not otherwise considered to be high value, and some non-designated archaeological remains.	post-medieval designed landscapes and evidence for below ground archaeological remains of prehistoric and medieval date.
Low	Low or medium importance and rarity, local scale, including non-designated archaeological remains.	A large number of non-designated heritage resources of low value have been identified.
Negligible	Very low importance and rarity, local scale. This includes features which contribute to an understanding of the wider historic landscape but which have little individual interest, such as the remains of former field boundaries and quarries of post-medieval date and isolated findspots where there is no indication of associated buried remains.	A large number of non-designated heritage resources identified, mostly the earthwork and below-ground remains of post-medieval field boundaries and quarry pits. Findspots and other records of buildings or archaeological remains no longer present (either through excavation or demolition) are also included as negligible, although they contribute to the archaeological and historical baseline and assessment of archaeological potential.

### Magnitude of impact

6.3.4 The approach used to assess magnitude of impacts on heritage resources considers the change upon the receptor. This takes into account the severity of impact of the proposed scheme, together with the vulnerability of the receptor to change. The approach used is based on professional judgment and experience. It also reflects guidance on 'substantial harm' and 'less than substantial harm' in the NPPF and established methodologies in the DMRB. Table 6-3 summarises the types of impact and magnitude used in the assessment, adapted from DMRB LA 104 *Environmental assessment and monitoring* Table 3.4N [1].

**Table 6-3 Magnitude of impact and typical descriptions**

Magnitude of impact (change)		Typical description
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality or setting.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Magnitude of impact (change)	Typical description
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

### Significance of effect

- 6.3.5 By combining the magnitude of impact (or change) and the importance of each heritage resource, an assessment has been made of the significance of effect, taking into account the possibility and nature of mitigation. The resultant effects may be either negative (adverse) or positive (beneficial) or neutral, depending on the nature of the impact.
- 6.3.6 In accordance with DMRB LA 104 *Environmental assessment and monitoring* Table 3.8.1, significance of effect upon the heritage resource is assessed using the matrix in Chapter 4 Environmental Assessment Methodology, Table 4-2.
- 6.3.7 Where the matrix suggests more than one likely outcome, for instance slight or moderate, professional judgement has been used in conjunction with the descriptors in Table 6-4 to arrive at a robust conclusion.
- 6.3.8 Table 6-4 is based upon DMRB LA 104 *Environmental assessment and monitoring* Table 3.7 [1], with factor-specific examples of effect replacing the generic statement contained in DMRB LA 104 *Environmental assessment and monitoring*. Effects are defined on a nine-point scale (very large beneficial, large beneficial, moderate beneficial, slight beneficial, neutral, slight adverse, moderate adverse, large adverse or very large adverse).

**Table 6-4 Assessment criteria**

Significance of effect	Descriptor
Very large adverse	Partial or total loss of a resource of Very High Importance. Effects at this level are material in the decision-making process
Large adverse	Result in the total, or almost total, loss of heritage resources. Be highly intrusive and would seriously damage the setting of the heritage resource such that its significance is totally or almost totally degraded. Be in conflict with national policies for the protection of the heritage resource. Effects at this level are likely to be material in the decision-making process
Moderate adverse	Be highly intrusive in the setting and as a result adversely affect the significance of the resource. Result in loss of features such that their integrity of the heritage resource is compromised, but not destroyed. Effects at this level can be considered to be material decision-making factors.
Slight adverse	Have a detrimental impact on the setting of a heritage resource such that its significance is diminished. Be in conflict with local policies for the protection of the local character of the heritage resource. Effects at this level are not material in the decision-making process.
Neutral	Maintain existing historic features in the townscape. Have no appreciable impacts either beneficial or adverse on any known or potential heritage resources. Result in a balance of beneficial and adverse impacts. Not result in severance or loss of integrity context or understanding within a historic landscape.

Significance of effect	Descriptor
	<p>Not be in conflict with and do not contribute to policies for the protection or enhancement of the heritage.</p> <p>No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.</p>
Slight beneficial	<p>Restore or enhance the sense of place of a heritage feature through good design and mitigation.</p> <p>Remove or mitigate visual intrusion (or other indirect impacts) into the setting of heritage features such as that appreciation and understanding of them is improved.</p> <p>Marginally enhance the integrity understanding and sense of place of a site or group of sites.</p> <p>Effects at this level are not material in the decision-making process.</p>
Moderate beneficial	<p>Provide potential for significant restoration of characteristic features or their setting through the removal, relocation or mitigation of existing damaging or discordant impacts on the heritage resource.</p> <p>Contribute to regional or local policies for the protection or enhancement of the heritage resource.</p> <p>Enhance the integrity, understanding and sense of place of a site or group.</p> <p>Effects at this level can be considered to be material decision-making factors.</p>
Large beneficial	<p>Result in the removal, relocation or substantial mitigation of very damaging or discordant existing impacts (direct or indirect) on the heritage.</p> <p>Result in extensive restoration or enhancement of characteristic features or their setting.</p> <p>Form a major contribution to government policies for the protection or enhancement of the heritage resource.</p> <p>Remove or successfully mitigate existing visual intrusion such as that the integrity, understanding and sense of place of a site or group of sites is re-established.</p> <p>Effects at this level are likely to be material in the decision-making process.</p>
Very large beneficial	<p>As 'large beneficial' where the effect would be upon a site of Very High Importance, Effects at this level are material in the decision-making process.</p>

6.3.9 Adverse effects of moderate significance or above represent a significant effect that require mitigation, and function as means for the decision maker to take account of the likely significant effects of the proposed scheme.

### Stakeholder engagement

6.3.10 Consultation is being undertaken with Historic England, South West Heritage Trust and advisors representing South Somerset District and Somerset West and Taunton Councils to inform the proposed scheme design. Engagement is ongoing and will be documented in a Statement of Common Ground which will accompany the DCO application.

## 6.4 Assessment assumptions and limitations

6.4.1 Geophysical surveys are currently being undertaken and will be followed by trial trenching. There will also be a historic buildings assessment of Bath Cottage, a non-designated building which may have heritage interest. The results of the surveys will be included in the Environmental Statement (ES).

6.4.2 A number of assumptions have been made regarding the severity and nature of impacts that may change following the completion of further surveys and modelling being undertaken to support other topics. This includes the habitat

surveys which will inform greater discussion around important hedgerows and ground investigations, which will provide greater baseline data to inform discussion about potential impacts from dewatering to buried archaeological remains. There is no detailed construction plan available at this stage which shows haul routes or potential vehicle movements on the surrounding roads. It is possible that construction traffic could have a temporary adverse effect on heritage resources. Noise monitoring and modelling and air quality data will inform revision of the assessment of impacts arising from noise and visual change altering the setting of heritage resources. Further, photomontages will also be produced as part of the landscape assessment (Chapter 7 Landscape).

- 6.4.3 All assessed effects in this chapter are preliminary and will be revisited within the DCO submission in light of data available at that time.

## 6.5 Study area

- 6.5.1 The study area is defined according to the sensitivity of the receiving environment and the potential impacts of the proposed scheme.

### Designated resources

- 6.5.2 The main study area used for the consideration of designated resources in the assessment comprises a buffer that extends one kilometre (km) from the proposed scheme boundary. This buffer has been selected on the basis of professional judgement and experience. This reflects that, by the nature of the way that linear road schemes sit within a landscape they are likely to be visible for short stretches of their overall length rather than as a whole; and as such they highly unlikely to alter the setting of heritage resources to a degree that would result in either a significant adverse or beneficial effect where those resources lie beyond 1km. The design of the proposed scheme and the surrounding topography was reviewed and it was concluded that it shared these characteristics, and therefore fitted within the expectations of professional judgement. All designated resources within this study area have been considered by the assessment.
- 6.5.3 It is recognised, however, that impacts could potentially occur beyond 1km, either from indirect impacts arising from changing road use beyond the A358 corridor or from changes to the setting of particularly sensitive heritage resources, such as those where distant views are an important contributor to their value. To ensure that both a rigorous and holistic approach has been taken, the noise model and Zone of Theoretical Visibility (ZTV) have been used to scope into the assessment a number of heritage resources located beyond the main study area.
- 6.5.4 The ZTV (refer to Chapter 7 Landscape) which illustrates the theoretical extent of visibility for the proposed scheme. Designated heritage resources with theoretically high visibility have been reviewed and assessed for any potential impacts. Where there are gaps in the ZTV, due to the availability of digital surface model (DSM) data predominantly to the south and south-west of the proposed scheme boundary, heritage resources within the gaps have been individually reviewed. As the southern part of the proposed scheme would be constructed on-line, only the scheduled monument of Castle Neroche has been added to the assessment due to its potential sensitivity to change.
- 6.5.5 The preliminary noise impact assessment (Chapter 11 Noise and vibration) has been used to identify heritage resources where there is a potential significant, in

noise assessment terms, adverse or beneficial effect. Heritage resources located beyond 1km but included within the assessment have been and are detailed within Appendix 6.3 Gazetteer of Heritage Resources and Appendix 6.4 Preliminary Impact Assessment, although some have been grouped in recognition of shared setting and the nature of the potential impact. Further, where designated resources, such as registered parks and gardens (RPG), straddle the limit of the study area, any designated heritage resource that are associated within them, that could experience effects have also been included in the assessment. This applies to two listed buildings located within the Hatch (Beauchamp) Court RPG.

### **Non-designated heritage resources**

- 6.5.6 The assessment considers non-designated heritage resources within 250m of the proposed scheme boundary. This study area is based upon professional judgement and experience that indicates that non-designated resources are less likely to experience significant adverse effects as a result of changes to their settings beyond this distance, following the reasoning described in 6.5.2. This does not preclude non-designated resources being of greater than local importance. For further details of how the importance of resources is determined, refer to Table 6-2 in section 6.3 Table 6-2.

## **6.6 Baseline conditions**

- 6.6.1 This assessment has considered the known heritage resources within the proposed scheme boundary and study areas (1km for designated heritage resources, 250m for non-designated heritage resources with additional heritage resources included where there is the potential for high visibility or significant noise change). Further detail on the baseline conditions can be found in Appendix 6.1 Archaeological and Historical Background and Appendix 6.2 Historic Landscape Characterisation Assessment. A gazetteer of all heritage resources included in this assessment can be found in Appendix 6.3 Gazetteer of Heritage Resources and are shown on Figure 6.1 Designated Heritage Resources and Figure 6.2 Non-Designated Heritage Resources. Historic landscape character areas are shown on Figure 6.3 Historic Landscape Characterisation.

### **Designated heritage resources**

- 6.6.2 There is one scheduled monument within 1km of the proposed scheme: the Cross in St Aldhelm and St Eadburgha churchyard (NHLE 1017250) which is located approximately 270m to the south-west of the proposed scheme in Broadway at the south-eastern end of the route. This is also a Grade II\* listed building (NHLE 1057005).
- 6.6.3 Located approximately 4km from the proposed scheme boundary is a second scheduled monument included within this assessment due to its potential sensitivity to change – this is Castle Neroche: a motte and bailey castle and earlier defences above Castle Plantation (NHLE 1008252).
- 6.6.4 196 listed buildings have been considered within this assessment, including one which is also designated as a scheduled monument. This includes 143 listed buildings within 1km of the proposed scheme boundary, two further listed buildings included as they are part of a group within a RPG which spans the edge of the study area boundary, and 51 considered as they are potentially impacted due to high visibility or significant noise change, based on the ZTV and noise

modelling. The additional listed buildings include six individual buildings and four groups – buildings along Stoke Road, Slough Lane and Stathe Road between North Curry and Burrow Bridge, group of listed buildings in Broadway, Staple Fitzpaine group and the South Road group.

6.6.5 Of the listed buildings assessed, there are six Grade I listed buildings, 12 Grade II\* listed buildings and 178 Grade II listed buildings. The Grade I listed buildings are:

- The Church of St John the Baptist (NHLE: 1060442), located approximately 970m east of the proposed scheme within the parkland at Hatch Beauchamp.
- The Church of St George (NHLE 1177015), located approximately 720m east of the proposed scheme at its northern end at Ruishton.
- The Church of the Holy Cross (NHLE 1177251), located approximately 720m east at Thornfalcon.
- The Church of St Aldhelm and Eadburgha (NHLE 1248912) which is located north-east of the village of Broadway, approximately 270m west.
- Hatch Court (NHLE 1060405), located approximately 1035m east of the proposed scheme, but included as it is part of a group of buildings within the Hatch (Beauchamp) Court RPG (NHLE 1001146) which straddles the 1km study area boundary.
- Church of St Peter (NHLE 1060274), located approximately 2.9km west of the proposed scheme in Staple Fitzpaine, included in the assessment due to potential significant change in noise levels.

6.6.6 The Grade II\* listed buildings are:

- The Remains of churchyard cross in churchyard about 7m south of porch Church of St George (NHLE 1060396), approximately 735m east of the proposed scheme at Ruishton.
- Outbuilding with wall adjoining south-east corner of Haydon House (NHLE 1177118), approximately 460m west at Haydon.
- Musgrave Farmhouse (NHLE 1177045), approximately 30m south at Henlade.
- Henlade House (NHLE 1060397), approximately 430m west of the proposed scheme, south of Henlade.
- The Old Rectory, with boundary wall attached to south-east corner (NHLE 1295733), approximately 215m west of the proposed scheme at Ashill.
- The Church of the Blessed Virgin Mary (NHLE 1057100), approximately 390m west of the proposed scheme at Ashill.
- Churchyard Cross, about 5m south of nave, Church of St Aldhelm and Eadburgha, Broadway, (NHLE 1057005), approximately 270m west of the proposed scheme (also a Scheduled Monument).
- The Grotto at Jordans NGR ST 3388 1601 (NHLE 1057070), approximately 290m east of the proposed scheme, north-east of Horton Cross.
- Rowland's farm house, and attached outbuildings around the north side of a courtyard, including well (NHLE 1057097), approximately 800m east of the proposed scheme, north-east of Horton Cross.
- Rowland's Mill (NHLE 1345847), approximately 520m east of the proposed scheme, north-east of Horton Cross.
- Tudor Cottage (NHLE 1057044), located approximately 1.3km west of the proposed scheme in Broadway, included in the assessment due to potential significant change in noise levels.

- Almshouses (NHLE 1060273) located approximately 2.9km west of the proposed scheme in Staple Fitzpaine, included in the assessment due to potential significant change in noise levels.

6.6.7 There are 178 Grade II listed buildings within 1km of the proposed scheme or within a wider area but potentially impacted by high visibility of the proposed scheme or potential change to noise levels. The full list can be found in Appendix 6.3 Gazetteer of Heritage Resources, but particularly worthy of note due to their proximity to the proposed scheme are:

- Potmans (NHLE 1060398), located approximately 15m south of the proposed scheme boundary at Henlade.
- Battlements (NHLE 1307513), located approximately 75m east of the proposed scheme boundary west of Thornfalcon.
- The Thatch (NHLE 1060368), located on the proposed scheme boundary north of Ashe Farm.
- Road Bridge at NGR ST 2815 2249 (NHLE 1177245), located approximately 30m south of the proposed scheme boundary north of Ashe Farm.
- Park Farmhouse (NHLE 1253346), located on the proposed scheme boundary east of West Hatch.
- Capland Farmhouse (NHLE 1344540), located on the proposed scheme boundary north of Capland Lane.
- Thickthorn House with north boundary wall and gateway (NHLE 1057073), approximately 55m west of the proposed scheme boundary south of Hastings Cross.
- Bow Bridge (NHLE 1345848), located on the proposed scheme boundary south of White House Farm.
- Jordans Bridge (NHLE 1057081), located on the proposed scheme boundary, north of Horton Cross.
- Greenings (NHLE: 1177358), located on the proposed scheme boundary east of West Hatch.
- Ruishton House (NHLE: 1176921) located approximately 180m north of the proposed scheme boundary, but with views across the proposed scheme.

6.6.8 There is one Grade II RPG: Hatch (Beauchamp) Court within the 1km study area, located approximately 490m east (NHLE: 1001146) near Hatch Beauchamp. A second RPG, the Grade I Hestercombe, is located approximately 3.2km north of the proposed scheme and has been included due to theoretical visibility.

6.6.9 There are two conservation areas located within 1km: those at Hatch Beauchamp and Thornfalcon. Additionally, Staple Fitzpaine and South Road conservation areas are included as there is the potential for impacts relating to changing traffic noise levels.

6.6.10 There are no World Heritage Sites or registered battlefields within the study area.

6.6.11 A full description, including an assessment of value, for each designated resource within the study area can be found within Appendix 6.3 Gazetteer of Heritage Resources. This also includes an assessment of setting for all designated resources where there is the potential for an impact from visual change or noise. Designated heritage resources are shown on Figure 6.1 Designated Heritage Resources.

## Non-designated heritage resources

- 6.6.12 An assessment of the archaeological and historical background (Appendix 6.1 Archaeological and Historic Background) has identified 189 non-designated heritage resources and one possible building of historic or architectural interest requiring further research prior to the submission of the DCO. These are shown on Figure 6.2 Non-Designated Heritage Resources. It should be noted that the summary of archaeological resources by period totals slightly more than the overall number of non-designated heritage resources as some reflect multi-period records.
- 6.6.13 There are eight non-designated heritage resources of prehistoric date within the study area. The earliest archaeological evidence from the study area dates to the Neolithic, obtained from small quantities of worked flint found during archaeological investigations at the Taunton Park & Ride site and during the construction of the Ashill bypass. There is evidence of Bronze Age settlement at both the western and eastern ends of the proposed scheme, with several roundhouses excavated at the Taunton Park & Ride site and Bronze Age burnt mounds identified near Hort Bridge, approximately 270m south of the proposed scheme boundary, north of Ilminster. Additional evidence comes from use of the area during the Iron Age, again from the excavations at the Park & Ride site and at the neighbouring Nexus 25 development site. This includes several further round houses alongside evidence of a more extensive agricultural field system.
- 6.6.14 There are nine heritage resources of Roman date within the study area, with several records relating to the remains of a small Romano-British settlement just south of J25 of the M5. While limited structural evidence has been found of the core of the settlement, there is extensive evidence of field enclosures, small-scale industry being present. Of more significance, an inhumation cemetery of 30 burials was discovered. Elsewhere, evidence of the Romans is limited to finds of pottery sherds.
- 6.6.15 Evidence from the early medieval period is very limited, with one heritage resource of this date, although there is place name and documentary evidence of settlement in the study area at this time. The single record is of a rectangular building found at the Taunton Park & Ride site, tentatively dated from a single sherd of early medieval pottery.
- 6.6.16 From the medieval period there is substantially more archaeological evidence of settlement and agriculture in the study area, and it is from this period that here are marked traces of past land use in the historic landscape character of the study area. There are 47 non-designated heritage resources of medieval date within the study area, including traces of former field boundaries, earthworks potentially indicating areas of shrunken or deserted settlement, finds of medieval pottery and a small number of non-designated buildings thought to have medieval origin.
- 6.6.17 The majority of non-designated heritage resources within the study area date to the post-medieval period, from which there are 145 heritage resources. These include traces of former field boundaries, planting ridges from former orchards, depressions and cropmarks from small-scale quarrying, estate parklands and the remains of the bold transformations brought about by 18<sup>th</sup> and 19<sup>th</sup> century infrastructure, including canal, railway and turnpike road networks.

- 6.6.18 There are a small number of modern heritage resources, mostly dating from the Second World War. There are 14 in total, and include features from the Taunton Stop Line, part of the defences of Britain in the 1940s, as well as the site of a large military camp, possibly used during the staging for D-Day. There are also several early reinforced concrete bridges.
- 6.6.19 Finally, there are seven heritage resources of unknown date, including cropmarks, earthworks and documentary records which suggest the presence of archaeological remains, yet to be further examined.
- 6.6.20 Potential archaeological survival within the proposed scheme boundary is broadly likely to be high across all areas south of the Nexus 25 development and outside of the footprint of existing roads. Further investigation into the archaeological potential within the proposed scheme boundary will be undertaken prior to the DCO submission, including geophysical survey and trial trenching. From the desk-based study undertaken to date, however, it is likely that there will be remains of prehistoric, Roman, medieval and post-medieval date, with a lower potential for early medieval remains or modern features of archaeological interest. There may also be paleoenvironmental remains if survival conditions in the soil are right.

### **Historic landscape character**

- 6.6.21 The proposed scheme crosses an area of gently rolling fields with a historic landscape character dominated by a mixture of anciently and recently enclosed land, interspersed with historic settlements and ancient woodland. Eight Historic Landscape Character Areas (HLCA) have been created to inform the assessment of impacts on the historic landscape (Appendix 6.2 Historic Landscape Characterisation). The HLCA are shown on Figure 6.3 Historic Landscape Characterisation. They are:
- HLCA\_001: Taunton and Bathpool
  - HLCA\_002: Post-medieval fields around Ruishton
  - HLCA\_003: Ancient and post-medieval fields north of Ashill
  - HLCA\_004: Post-medieval fields north of Ashill
  - HLCA\_005: Ancient and post-medieval fields north of Ilminster
  - HLCA\_006: Ilminster
  - HLCA\_007: Ancient fields north of Creech St Michael
  - HLCA\_008: Military airfield

### **Value**

- 6.6.22 In line with the methodology laid out in section 6.3 Assessment methodology, all heritage resources identified within the baseline have been assessed for their value. This allows the assessment of potential impacts to be weighed against their value relative to each other and the historic environment in the UK generally. The value of a heritage resource is derived from its heritage interest, which may be archaeological, architectural, artistic or historic. A full assessment of the detail of each resource's value can be found in Appendix 6.2 Historic Landscape Characterisation and Appendix 6.3 Gazetteer of Heritage Resources.
- 6.6.23 In summary, with the exception of the conservation areas and RPGs, all designated heritage resources are considered to be of high value. Hestercombe, a Grade I RPG, is assessed as being of high value, while Hatch (Beauchamp)

Court, which is Grade II, is considered to be of medium value. The conservation areas are assessed as being of medium value.

- 6.6.24 The majority of non-designated heritage resources have been assessed as being of either low or negligible value, based on their likely local or more limited importance. Features including the earthwork remains of former post-medieval field boundaries and the traces of orchard planting banks have been given a negligible value, although they may contribute to a wider historic landscape character of greater value. Findspots and records of archaeological excavations, where all traces of the archaeological features or artefacts are understood to have been removed, are also assessed as negligible, as there is no physical feature which the proposed scheme could potentially impact. Features where there is the potential for archaeological remains of regional or greater interest, such as deserted medieval villages and churchyards, have been given a medium or high value. Further, non-designated but historic landscape features such as post-medieval parkland, have also been given a medium value.
- 6.6.25 Historic Landscape Character Areas are not, themselves, heritage resources, but they reflect legible areas where time depth and historic land use is visible and this character has heritage value and can be impacted by development. As a proxy for this, the HLCAs have been assessed as having value on the same scale as the other heritage resources. The majority have low value, reflecting fairly commonly preserved patterns of development and post-medieval agriculture but, where extensive traces of medieval activity survives, an assessment of medium value has been made.

### **Future baseline**

- 6.6.26 As set out in Chapter 4, the 'Do-Minimum' and 'Do-Something' scenarios have been set out, with the 'Do-Minimum' scenario representing the future baseline with minimal interventions and without new infrastructure. Potential changes to heritage resources in the future would not be noticeable as it is a 'fixed' resource (being the material remains of past human activity), and with the exception of new discoveries that may come to light, no 'new' receptors would be expected to enter the baseline. Therefore, the future baseline would remain the same as set out in above.

## **6.7 Potential impacts**

- 6.7.1 Mitigation measures incorporated in the design and construction of the proposed scheme are set out in section 6.8 Design, mitigation and enhancement measures. Prior to implementation of the mitigation, the proposed scheme has the potential to impact cultural heritage resources either beneficially or adversely, both during construction and once in operation.
- 6.7.2 For the purposes of the cultural heritage assessment, the construction phase is defined as the temporary activities involved in building the proposed scheme, and the subsequent permanent presence of the proposed scheme once constructed. This includes the permanent impact of the proposed scheme on buried archaeological remains, including changes arising from altered hydrological conditions affecting preservation.
- 6.7.3 The operational phase comprises the situation when the proposed scheme is being used by traffic, including the impact arising from changes to the setting of heritage resources from the sight of moving traffic and changes to noise levels.

Operational vibration has been scoped out of the noise topic assessment and so is not anticipated to have any significant adverse effects on cultural heritage.

- 6.7.4 As listed below, physical impacts upon resources would only occur during the construction phase; impacts upon resources' setting would arise during both the construction and operation phases. Impacts upon setting may be either beneficial or adverse.
- 6.7.5 All preliminary effects are reported after an assessment of the effectiveness of the design and mitigation measures (the residual effect).

### **Construction impacts**

- 6.7.6 Where the proposed scheme is contained within the existing A358 corridor and alongside areas of prior disturbance, the potential for the presence of as-yet unknown archaeological remains is low as buried features would have been previously removed. However, where the proposed scheme requires excavation below existing ground surface within areas of fields, including compound areas, possible remains may exist.
- 6.7.7 Construction of the proposed scheme has the potential for adverse impacts upon cultural heritage resources, including:
- Partial or total removal of heritage resources, including archaeological remains, within the proposed scheme footprint (a 'worst-case' approach has been taken for the preliminary impact assessments, and will be updated for the DCO application).
  - Compaction of archaeological deposits by construction traffic and structures.
  - Temporary impacts upon the settings of heritage resources during construction.
  - Permanent impacts upon the setting of heritage resources from the completed scheme.
  - Change to the historic landscape, including loss of attributes which contribute to the historic landscape character.
  - Changes to key views and sight lines to/from heritage resources, particularly churches and secular properties with designed landscapes.
  - Impacts to paleoenvironmental deposits, buried archaeological remains and buildings as a result of hydrological changes which could lead to changing below-ground preservation conditions or subsidence.
- 6.7.8 Construction activity, including movements of plant, temporary lighting and temporary compounds, would take place within the wider setting of listed buildings and upstanding non-designated heritage resources within the study area. Temporary works may also bring traffic into closer proximity to heritage resources. These works would be temporary, of limited duration and reversible. Consequently, such activities are not typically considered to result in a significant effect on any designated resource, but this will be considered for each individual case.
- 6.7.9 Views from heritage resources towards permanent works such as new road, cuttings, embankments and other structures are considered to be permanent construction impacts for the purposes of the assessment. Likewise, removal of elements of the existing A358, such as lighting of junctions, are considered to be construction effects.

## Operational impacts

- 6.7.10 The operational phase of the proposed scheme has the potential to result in both beneficial and adverse impacts on the setting of cultural heritage resources due to traffic noise and the visibility of moving vehicles on the road. Impacts could include:
- changes to the settings of heritage resources
  - changes to key views and sight lines
  - changes to the perception of traffic noise
- 6.7.11 There would be no physical impacts on below-ground archaeology during operation, as these would have occurred during the construction phase and are, therefore, considered as construction impacts.

## 6.8 Design, mitigation and enhancement measures

### Construction mitigation

- 6.8.1 Mitigation of construction impacts would take the form of measures to reduce direct impacts (physical damage), and indirect impacts (changes to setting that affect the significance of the resources).

#### *Archaeological remains*

- 6.8.2 In the majority of cases, mitigation of direct impacts on archaeological remains would be essential mitigation and would take the form of 'preservation by record', that is, the investigation of archaeological remains prior to construction, and the analysis of artefacts and publication of results following the construction of the proposed scheme.
- 6.8.3 Preservation by record can involve a number of levels of detail, commensurate with the significance of the resources being impacted directly by the proposed scheme. These may include detailed archaeological excavation of high value buried archaeological remains, strip-map-sample where archaeological remains are expected to be present dispersed over a wide area, or archaeological watching brief in areas of lower archaeological potential. The type and location of mitigation required will be agreed with stakeholders by means of a Detailed Archaeological Mitigation Strategy and Overarching Written Scheme of Investigation, to be submitted as an Annex to the EMP to be submitted with the DCO application.
- 6.8.4 Depending on the extent and survival of remains it may be possible to reduce this to less than significant levels through excavation and recording. This will be reviewed and further assessed in the ES.
- 6.8.5 Where remains are located beyond the engineering footprint of the proposed scheme, such as within areas of environmental mitigation, it may be possible to preserve archaeological remains, if present, within the development (often referred to as 'preservation in situ'). This would be embedded mitigation and would be considered in detail following the completion of geophysics and trial trenching and will be incorporated within the Overarching Written Scheme of Investigation.

### *Historic landscape features*

- 6.8.6 Where likely significant adverse effects to historic landscape features, including estate parkland, have been identified, mitigation measures will be considered and where possible incorporated into the ES.

### *Milestones and mileposts*

- 6.8.7 There are three historic milestones which are likely to need to be removed during construction of the proposed scheme, although it has not been possible to confirm that all three are still extant at this stage. Where present, these will be removed under archaeological supervision, stored, and replaced as close as possible to its original location at the end of the construction phase.

### *Designated resources*

- 6.8.8 Where likely significant effects have been identified on listed buildings as a result of permanent changes to their settings during construction, mitigation measures to potentially reduce the significance of these effects will be considered and reported in the ES.

### **Operational mitigation**

- 6.8.9 At this stage there is outstanding data required to understand the changes to noise levels, which is likely to be the primary source of significant operational effects. Operational mitigation will be discussed in the ES.
- 6.8.10 It is not currently understood that any designated heritage resources would be situated within Highways England owned land, therefore there is no requirement for Cultural Heritage Resource Management Plans to be produced. This will be reviewed for the ES.

### **Enhancement**

- 6.8.11 There is potential for enhancement. This will be fully discussed within the ES submitted alongside the DCO submission.

## **6.9 Assessment of likely significant effects**

### **Construction effects**

- 6.9.1 The likely significant construction impacts on heritage resources are presented in Table 6-5. These assessments are based on the best understanding of the baseline and the potential impacts for this stage. All assessments will be reviewed and, where necessary, revised prior to the submission of the DCO. While only significant effects are presented in this chapter, a preliminary assessment of all impacts and effects on heritage resources can be found in Appendix 6.4 Preliminary Impact Assessment.

**Table 6-5 Significant construction effects**

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
1060397	Henlade House	High	<p>The proposed scheme would be constructed approximately 530m north-east of Henlade House, although the proposed scheme boundary extends as close as Granary Lane for access, approximately 270m north-east of the building. At this point, the proposed scheme would be constructed off-line, introducing a major new infrastructure corridor into the main views from Henlade House's front façade. Although over 500m away and views would be partially screened by the existing scattered trees present in views north and east of the house, this would be a notable change, constituting a moderate adverse magnitude of change during construction and the initial years of operation resulting in a temporary construction effect of moderate adverse significance. This is because, although there would be no alteration to the former parkland around Henlade House, the road would be visible within views directly from the front of the building and its setting contributes to its value as part of its architectural interest.</p> <p>The proposed environmental mitigation would include new hedgerows, hedgerows with trees, woodland and environmental earthworks along the new road corridor, which will soften its visual impact within the landscape reducing it to a minor adverse magnitude of impact, resulting in a slight adverse significance.</p>	The proposed environmental mitigation, once established, will reduce the permanent construction effect to slight adverse.	Moderate adverse	Slight adverse

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
1177045	Musgrave Farmhouse	High	<p>The mainline of the proposed scheme would be constructed in cutting approximately 95m north of Musgrave Farmhouse, but with an associated realignment of Stoke Road to the east of the building which would bring the road approximately 15m away from the building and would require construction within the existing farmyard of the property.</p> <p>Musgrave Farmhouse faces the narrow country lane to its south. Its setting is formed by the lane, by the more recent farm buildings which surround it to the north and by the farmland beyond to the north-west. Construction activity will alter the setting of the farmhouse through the movement of vehicles, noise, and lighting. This would be a minor adverse magnitude of impact, experienced throughout the construction period, resulting in a temporary construction effect of moderate adverse significance.</p> <p>The proposed scheme would be constructed in a cutting, with the top of the cutting approximately 95m north of the listed building. This would not result in an adverse impact through visual change, as the use cutting and proposed environmental mitigation woodland and hedgerow planting would mean that the road would not be visible from the farm. The proposed alterations to Stoke Road, north of Musgrave Farm would elevate it slightly on an embankment to allow it to cross the new off-line section of the A358 on an overbridge. As the road is in cutting, the overbridge would not be a visually</p>	Further assessment of Musgrave Farmhouse is proposed prior to the submission of the ES. This will be used to inform more detailed discussion of potential mitigation and residual effect.	Moderate adverse	Moderate adverse

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
			dominant structure from Musgrave Farmhouse and views towards it would be screened by the (non-listed) farm buildings to the north of the building. However, the loss of part of the farmyard complex to the realignment of Stoke Road, while only altering the more recent hardstanding and walls of the farmyard, would be at least a permanent construction magnitude of minor adverse due to the clearly measurable change of its farmyard setting, resulting in a moderate adverse significance of effect.			
1060367	Ashe Farmhouse	High	<p>The building is located less than 5m from the proposed scheme boundary although the closest permanent earthwork would be approximately 50m north. From the farmhouse there would be a notable change in the alignment of the existing narrow, treelined lane, which would instead veer to the south on a new embankment. During construction there is the potential for noise to exceed 75db (Chapter 11 Noise and vibration).</p> <p>Given the current rural lane setting of the farmhouse, the increase in noise levels during construction is likely to constitute a moderate adverse magnitude of impact as a temporary construction impact resulting in a temporary construction effect of moderate adverse. The visual change to the setting is more limited as, although the road layout would be altered and modernised on the approach to the Mattock's Tree junction, the majority of the farmhouse's rural setting would be unaltered. This would be a potential permanent construction magnitude of</p>	Further assessment of Ashe Farmhouse is proposed prior to the submission of the ES. This will be used to inform more detailed discussion of potential mitigation and residual effect.	Moderate adverse	Moderate adverse

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
			impact of minor adverse, resulting in a permanent significance of effect of moderate adverse.			
1060368	The Thatch	High	The Thatch is located immediately west of the proposed scheme boundary although the area within the boundary closest to the listed building is proposed as an area of environmental mitigation with species rich grassland and hedgerows. The new alignment of Ash Road would be constructed approximately 50m south-east of the Thatch. There are currently very limited views towards the new road due to the height of the existing hedgerow along Ash Lane so this, despite proximity, would be no worse than a minor adverse permanent construction impact, resulting in a permanent significance of effect of slight adverse. However, it is likely that there would be construction noise of over 75db experienced at the Thatch (Chapter 11: Noise). Given the scale of difference this would create in what is currently a quiet, rural setting, this would be a moderate adverse temporary construction magnitude of change, resulting in a moderate adverse significance of effect.	The construction noise modelling will be developed further prior to the ES and options to reduce the significant temporary effect will be explored and reported on within the ES alongside a re-evaluation of residual effect.	Moderate adverse	Slight adverse
1176921	Ruishton House	High	The proposed scheme would be constructed approximately 225m south of Ruishton House. While there is some screening through existing tree planting along the boundary of the property and along the Black Brook and further wet woodland and grassland mosaic is proposed as part of the environmental mitigation plan, it is likely that the proposed scheme would be visible from at least the upper storey of the house when looking south. The views over the surrounding countryside do contribute to the value of the building, which	Further assessment of Ruishton House is proposed prior to the submission of the ES. This will be used to inform more detailed discussion of potential mitigation and residual effect.	Slight adverse	Moderate adverse

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
			was built at the end of the 19 <sup>th</sup> century as a grand home for a local industrial family. The architectural interest of the house would not be impacted, and its immediate garden setting and the fields to the south would not be altered by the proposed scheme. As a result, there would be a temporary and permanent minor adverse construction impact. The temporary effect would be slight adverse significance, while the permanent effect would be moderate adverse significance.			
1177245	Road bridge at NGR ST 2815 2249	High	The bridge is located within the proposed scheme boundary and the current version of the design would involve constructing the embankment for the new alignment of Ash Road into the bridge arch. This would, at the minimum, result in a complete alteration of the way that the bridge is appreciated, with a loss of views of the bridge from the current roadway. There are also potential physical impacts that will require further survey to assess prior to the submission of the ES. Due to the nature of the impact, there is no temporary effect as depending on the extent of the physical impact this would be permanent construction magnitude of impact of moderate to major adverse, likely to result in a large adverse significance of effect.	The design of the embankment will be developed to consider how harm to the bridge can be minimised. Mitigation and residual effect will be reported on within the ES.	No change	Large adverse
43250	Prehistoric finds, High Bridge, Hatch Beauchamp	Medium	The estimated location for the finds is within the proposed scheme boundary and it is possible that associated surviving remains would, if present, be removed by construction. It is likely that this would result in a permanent major adverse magnitude of impact, resulting in a moderate to large adverse significance of effect.	Further archaeological investigation is needed to inform this, but a programme of archaeological excavation and recording would be put in place, potentially reducing the residual effect to a less than significant	Neutral	Moderate to large adverse

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
				effect. This will be reported on in the ES.		
55322	Medieval village, Jordans, N of Horton Cross	Medium	The majority of the resource lies within the proposed scheme boundary and would be removed by construction. While further investigation through geophysical survey and trial trenching will be undertaken for inclusion within the DCO, this is likely to be a permanent major adverse magnitude of impact resulting in a moderate to large adverse significance of effect.	Further archaeological investigation is needed to inform this, but a programme of archaeological excavation and recording would be put in place, potentially reducing the residual effect to a less than significant effect. This will be reported on in the ES.	Neutral	Moderate to large adverse
13929	Hatch Park, Hatch Beauchamp	Medium	<p>Construction activity in the western part of the park and visible in views to the north and south would alter the setting of the parkland, although the presence of the current A358 in these views means that this is not a substantial change, and would likely only be a temporary minor adverse magnitude of impact, resulting in a slight adverse significance of effect.</p> <p>The north-west corner of the park, and a small area in the south-west are within the proposed scheme boundary and it is likely that some areas of historic planting would be removed. While the majority of the park's area would not be physically impacted, there would also be a change to its setting with the widening of the existing course of the A358. In combination with the physical impacts, construction would likely have a permanent moderate adverse impact, resulting in a moderate adverse significance of effect.</p>	It is unlikely that direct mitigation will be possible, as a part of the historic parkland would be permanently lost. Wider enhancement may be possible, which will be considered and reported on within the ES.	Slight adverse	Moderate adverse
19872	Milestone, Capland	Low	It has not yet been possible to confirm if this milestone is extant – it is not visible from the road	Relocation of the milestone (as described in section 6.8.7) would	Neutral	Slight adverse

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
	Spa, Hatch Beauchamp		but may be obscured within the hedgerow. For the preliminary assessment it is assumed that it does remain extant. It is possible that it would be removed during construction, although this is dependent on the further development of the proposed scheme design. This will be further assessed prior to the ES but it is assumed that, at a worst case, it would be removed which would be a major adverse construction magnitude of impact, resulting in a moderate adverse significance of effect.	reduce the residual significance of effect to slight adverse.		
19936	Milepost, Ash Cross, Thornfalcon	Low	It has not yet been possible to confirm if this milestone is extant – it is located on a high-speed section of road and survey was not possible. For the preliminary assessment it is assumed that it does remain extant. The milestone would be removed by the construction of the connection from the existing A358 and Henlade to the Mattock's Tree Green Junction roundabout (north). This would likely be a major adverse construction magnitude of impact, resulting in a moderate adverse significance of effect.	Relocation of the milestone (as described in section 6.8.7) would reduce the residual significance of effect to slight adverse	Neutral	Slight adverse
29068	Milestone, Three Oaks Cross, Ashill	Low	This milestone is located in the hedgerow on the western side of the road. It would be removed by the construction of the Ashill Junction Westbound off slip, which would likely be a major adverse magnitude of impact, resulting in a moderate adverse significance of effect.	Relocation of the milestone (as described in section 6.8.7) would reduce the residual significance of effect to slight adverse	Neutral	Slight adverse
38976	Jordans park, Ashill	Medium	Construction activity in the southern part of the park and visible in views to the north and south would alter the setting of the parkland, although the presence of the current A358 in these views means that this is not a substantial change, and	It is not likely that direct mitigation will be possible as a part of the historic parkland would be permanently lost. Wider enhancement may be	Slight adverse	Moderate adverse

NHLE/ HER ID	Name	Value	Preliminary description of effect	Mitigation	Likely residual significance of effect	
					Construction (temporary)	Construction (permanent)
			<p>would likely be a temporary minor adverse magnitude of impact, which would result in a slight adverse significance of effect.</p> <p>The south-western part of the park lies within the proposed scheme boundary and features banks of planting and an ornamental gateway, which includes stone gate posts and decorative wrought iron gates. While the majority of the park's area would not be physically impacted, there would be a change to the park's setting with the widening of the existing course of the A358. The combination of permanent physical impacts and permanent impacts arising from changes to the setting would likely be a moderate adverse significance of effect.</p>	possible, which will be examined and reported on within the ES.		
HLCA_003	Ancient and post-medieval fields, Somerset Hills	Medium	<p>The proposed scheme would predominantly be constructed on-line through approximately 3.3 miles (5.25km) of this HLCA. Although there would be some localised impacts along the on-line sections this would not have an impact on the historic landscape character of the wider HLCA. There would, however, be impacts from the construction of the Mattock's Tree Green and Hatch Beauchamp Junction Overbridge junctions, which would collectively lead to the loss of seven fields or parts of fields from areas of anciently enclosed land within the HLCA. The anciently enclosed land is of particular importance to the landscape within the HLCA's heritage value, and the loss of these fields would likely be a moderate adverse magnitude of impact.</p>	Further assessment will be carried out for the ES to provide greater understanding of the nature of the hedgerows and to explore potential landscape mitigation which may reduce the impact to less than significant.	Neutral	Moderate adverse

## Operational effects

- 6.9.2 At this stage there is outstanding data required to understand the changes to noise, which is likely to be the primary source of significant operational effects. A preliminary impact assessment has been carried out, reported in full in Appendix 6.4, but this will be fully reviewed for the ES with more detailed consideration of the way in which changing noise levels might impact the significance of heritage resources. Based on the initial assessment, two potential operational effects have been identified:
- Ashe Farmhouse (NHLE: 1060367), a Grade II listed building of high value, is located immediately north of the proposed scheme boundary. There would be an increase in operational noise, which has been assessed by the noise topic (Chapter 11: Noise) as major adverse in both the short- and long-term. Given the current rural setting of the farmhouse, the increase in noise levels during operation is likely to constitute a moderate adverse operational significance of effect.
  - The Thatch (NHLE: 10603668), a Grade II listed building of high value, is located immediately west of the proposed scheme boundary. There would be an increased operational traffic noise, which has been assessed by the noise topic (Chapter 11: Noise) as being major adverse in the short-term, decreasing to moderate in the long-term. Given the scale of difference this would create in what is currently a quiet, rural setting, this would be a moderate adverse operational magnitude of change, resulting in a moderate adverse significance of effect.
- 6.9.3 In both cases, this assessment is based on a provisional assessment of potential changing noise levels. The assessment will be revised for the ES and a discussion of potential mitigation will be included at that time.

## 6.10 Monitoring

- 6.10.1 The archaeological mitigation works would be undertaken during the preliminary works (the majority of the archaeological fieldwork and recording) and construction works stages. The archaeological mitigation works would be monitored to ensure compliance with the Detailed Archaeological Mitigation Strategy and Overarching Written Scheme of Investigation, as part of the EMP, to ensure the works are undertaken to the appropriate standards. This will be produced to support the DCO following the completion of additional archaeological surveys (geophysics and trial trenching).
- 6.10.2 The Detailed Archaeological Mitigation Strategy and Overarching Written Scheme of Investigation will set out appropriate measures to be undertaken during the preliminary works and construction stages to ensure that the mitigation measures embedded in the proposed scheme design are appropriately implemented.
- 6.10.3 Mitigation measures will be monitored in the field and also during the post-excavation analysis and publication stages, to ensure that the mitigation is achieving the aims of reducing the significant effects identified on heritage resources.

## 6.11 Summary

### Preliminary construction assessment

- 6.11.1 The assessment of impacts of the proposed scheme on the historic environment has identified 14 significant adverse effects upon heritage resources during construction.
- 6.11.2 Direct impacts would occur on both known and unknown buried archaeological deposits resulting in a likely permanent moderate adverse significance of effect; this effect would be significant. Depending on the extent and survival of remains it may be possible to reduce this to less than significant levels through excavation and recording.
- 6.11.3 There would be significant adverse effects arising as a result of the change of the setting of five listed buildings: Henlade House, Musgrave Farmhouse, Ashe Farmhouse, The Thatch and Ruishton House.
- 6.11.4 There is likely to be a direct impact on the listed Road Bridge at NGR ST 2815 2449 through the construction of an embankment under its arch. The design of the embankment will be developed to consider how harm to the bridge can be minimised. Mitigation and residual effect will be reported on within the ES.
- 6.11.5 There would be direct impacts to parts of the non-designated historic parkland at Hatch Park and Jordans, as well as on the historic landscape character of the central part of the proposed scheme, where there would be the loss of several anciently enclosed fields.
- 6.11.6 Three non-designated historic milestones would be removed. It may be possible to reduce the significance of effect through relocation as close to their original location as possible.

### Preliminary operational assessment

- 6.11.7 Two potential significant operational effects have been identified, both resulting from changes to operational noise levels. Further assessment of this will be carried out for the ES once the noise modelling and assessment is refined.

### Further work

- 6.11.8 Archaeological geophysical survey, trial trenching and building assessment are being undertaken to inform the ES.
- 6.11.9 Further assessments are also being carried out to support other topics which will inform this chapter, including habitats assessment which will add insight into discussion of important hedgerows and historic landscape, ground investigation which will provide better context on ground conditions and noise surveys which will provide clearer input into assessment of change from the baseline. Photomontages will also be produced for the landscape topic which will provide more insight into the assessment of impacts arising from changes to setting.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

## References

- [1] Highways England, "DMRB LA104 Environmental assessment and monitoring," HE, 2020.
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- [4] Secretary of State, "Planning (Listed Buildings and Conservation Areas) Act 1990," HMSO, London, 1990.
- [5] Secretary of State, "The Hedgerows Regulations 1990," HMSO, London, 1990 .
- [6] Department for Transport, "National Policy Statement for National Networks," HMSO, London, 2014.
- [7] Ministry of Housing, Communities and Local Government, "National Planning Policy Framework," HMSO, London, 2021.
- [8] Ministry of Housing, Communities and Local Government, "Guidance: Historic Environment," 24 June 2021. [Online]. Available: <https://www.gov.uk/guidance/conserving-and-enhancing-the-historic-environment>. [Accessed 2 August 2021].
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- [10] Taunton Deane Borough Council, "Adopted Core Strategy 2011-2028," 2012.
- [11] Taunton Deane Borough Council, "Taunton Deane Adopted Site Allocations and Development Management Plan," 2016.
- [12] South Somerset District Council, "Historic Environment Strategy," 2017.
- [13] Historic England, "Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment," 2008.
- [14] ClfA, "Standard and guidance for historic environment desk-based assessment," ClfA, Reading, 2020.
- [15] ClfA, "Code of Conduct," ClfA, Reading, 2019.
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- [18] Historic England, "Statements of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12," Historic England, 2019.
- [19] South West Heritage Trust, "Somerset Archaeological Handbook," 2017.



# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 7  
Landscape

HE551508-ARP-ELS-ZZ-RP-LS-000002

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## 7 Landscape

### 7.1 Introduction

- 7.1.1 This chapter sets out the preliminary environmental information relating to the potential landscape and visual effects likely to arise from the construction and future use of A358 Taunton to Southfields Dualling Scheme (the proposed scheme), following the methodology set out in Design Manual for Roads and Bridges (DMRB) LA 107 *Landscape and visual effects*, revision two) [1].
- 7.1.2 This chapter sets the legislative and policy framework related to landscape character and visual amenity, introduces the methodology to be used for the assessment of effects in the landscape and visual impact assessment, then describes the baseline characteristics and visual resource in the area surrounding the proposed scheme (the study area). Following this, the design, potential mitigation and likely residual effects of the proposed scheme are discussed, along with the limitations of the assessment. Finally, the report sets out suggested monitoring for all likely residual significant effects.
- 7.1.3 Although closely related, landscape and visual effects have been assessed separately. The landscape assessment assesses the likely changes to the features and characteristics of the landscape, while the visual assessment assesses changes to views and the visual amenity experienced by people.
- 7.1.4 The landscape and visual impact assessment (LVIA) have been undertaken in the context of Highways England's scheme vision as set out in section 2.2, Chapter 2.

### 7.2 Legislative and policy framework

- 7.2.1 As documented in the Preliminary Environmental Information (PEI) Report Chapter 1 Introduction, the primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the *National Policy Statement for National Networks* (NPSNN) [2], which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered.
- 7.2.2 Table 7-1 identifies the NPSNN policies relevant to the landscape and visual assessment and then specifies where in the chapter information is provided to address the policy.

**Table 7-1 Relevant NPSNN policies for the landscape and visual assessment**

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
Paragraph 3.5	<i>“Outside the nationally significant infrastructure project regime, Government policy is to bring forward targeted works to address existing environmental problems on the Strategic Road Network and improve the performance of the network. This includes [...] respecting and enhancing landscape character”.</i>	Throughout landscape assessment and mitigation measures described in this chapter, and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 4.15	<i>The EIA Directive specifically requires an EIA to identify, describe and assess effects on the landscape.</i>	Throughout the landscape baseline and assessment within this chapter.

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
Paragraph 4.34	<i>“...there may be opportunities [...] to demonstrate good design in terms of siting and design measures relative to existing landscape and historical character and function, landscape permeability, landform and vegetation”.</i>	Mitigation measures are described in Chapter 2 ‘The Project’ and this chapter, with specific landscape mitigation described in 7.8.5 below and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 5.36	<i>“...the applicant should demonstrate that [...] developments will be designed and landscaped to provide green corridors and minimise habitat fragmentation where reasonable”.</i>	Within mitigation measures described within Chapter 2 The Project and this chapter in 7.8.8 and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 5.87	<i>“The Secretary of State should be satisfied that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact on amenity from emissions of [...] artificial light. This includes the impact of light pollution from artificial light on local amenity [and] intrinsically dark landscapes”.</i>	Night light data is presented on Figure 7.6 CPRE Night lights. Night photography from representative viewpoints is presented on Figure 7.9 Viewpoint Photographs. The consideration of light is considered throughout the baseline and assessment within this chapter.
Paragraph 5.144	<i>“The landscape and visual assessment should include reference to any landscape character assessment and associated studies, as a means of assessing landscape impacts relevant to the proposed project. The applicant’s assessment should also take account of any relevant policies based on these assessments in local development documents in England”.</i>	Existing studies at National and local scale have been used to inform the landscape baseline and assessment. Appendix 7.1 LVIA Policy and Guidance considers relevant policies.
Paragraph 5.145	<i>“The applicant’s assessment should include any significant effects during construction of the project and/or the significant effects of the completed development and its operation on landscape components and landscape character (including historic landscape characterisation)”.</i>	Significant effects are included within this chapter where appropriate for landscape receptors at construction, year 1, and year 15 in section 7.9 below. Chapter 6 has regard to historic landscape character and the impact of the proposed scheme upon it.
Paragraph 5.146	<i>“The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation”.</i>	Significant effects are included within this chapter where appropriate for visual receptors at construction, year 1, and year 15 in section 7.9 below. Tranquillity mapping is presented on Figure 7.5 CPRE Tranquillity. Nature conservation effects are included within Chapter 8 Biodiversity and noise effects

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
		are included within Chapter 11 Noise and vibration.
Paragraph 5.149	<i>“Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints, the aim should be to avoid or minimise harm to the landscape, providing reasonable mitigation where possible and appropriate”.</i>	Within mitigation measures described within Chapter 2 The Project and this chapter in section 7.8. below, and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 5.150	<i>“Great weight should be given to conserving landscape and scenic beauty in nationally designated areas. National Parks, the Broads and Areas of Outstanding Natural Beauty have the highest status of protection in relation to landscape and scenic beauty”.</i>	Impacts on the landscape character of the Blackdown Hills Area of Outstanding Natural Beauty (AONB) were scoped out within the Scoping Report. The baseline and impacts on views from the Blackdown Hills AONB are described within this chapter.
Paragraph 5.154	<i>“The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries of these areas which may have impacts within them. The aim should be to avoid compromising the purposes of designation and such projects should be designed sensitively given the various siting, operational, and other relevant constraints”.</i>	Impacts on the landscape character of the Blackdown Hills AONB were scoped out within the Scoping Report. The baseline and impacts on views from the Blackdown Hills AONB are described within this chapter.
Paragraph 5.155	<i>“The fact that a proposed project will be visible from within a designated area should not in itself be a reason for refusing consent”.</i>	The baseline and impacts on views from the Blackdown Hills AONB are described within this chapter.
Paragraph 5.160	<i>“Adverse landscape and visual effects may be minimised through appropriate siting of infrastructure, design (including choice of materials), and landscaping schemes, depending on the size and type of proposed project. Materials and designs for infrastructure should always be given careful consideration”.</i>	Within mitigation measures described within Chapter 2 The Project and this chapter in section 7.8 and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 5.161	<i>“Depending on the topography of the surrounding terrain and areas of population it may be appropriate to undertake landscaping off-site, although if such landscaping was proposed to be consented by the development consent order, it would have to be included within the order limits for the application. For example, filling in gaps in existing tree and hedge lines would mitigate the impact when viewed from a more distant vista”.</i>	Off-site landscaping has been considered, it is described under mitigation measures within this chapter (7.8) and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 5.175	<i>“Where networks of green infrastructure have been identified in development plans, they should normally be protected from development, and, where possible, strengthened by or integrated within it. The value of linear infrastructure and its footprint in supporting biodiversity and ecosystems</i>	Published green infrastructure strategies have been considered within Appendix 7.1 LVIA Policy and Guidance, and, where appropriate, the proposed scheme has

Relevant NPSNN paragraph reference	Requirements of the NPSNN	Where in the PEI Report chapter is information provided to address this policy
	<i>should also be taken into account when assessing the impact on green infrastructure”.</i>	considered these within Chapter 2 The Project and this chapter (see 7.8.3; 7.8.10; 7.9.49 and 54) and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 5.180	<i>“Where green infrastructure is affected, applicants should aim to ensure the functionality and connectivity of the green infrastructure network is maintained and any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network and other areas of open space, including appropriate access to new coastal access routes, National Trails and other public rights of way”.</i>	Within mitigation measures described within Chapter 2 The Project and this chapter (see 7.8.3; 7.8.10; 7.9.49 and 54), and presented on the Environmental Mitigation Plans (Figure 7.8).
Paragraph 5.183	<i>“Where a project has a sterilising effect on land use there may be scope for this to be mitigated through, for example, using the land for nature conservation or wildlife corridors”.</i>	Within mitigation measures described within Chapter 2 The Project and this chapter (7.8), Chapter 8, and presented on the Environmental Mitigation Plans (Figure 7.8).

## Legislation

7.2.3 There is no legislation of direct relevance to the landscape and visual assessment scope and methodology.

## National planning policy

7.2.4 Other relevant national policy, local policy, and supplementary and further guidance has been considered in relation to the landscape and visual impacts and informing proposed mitigation measures.

7.2.5 A summary of relevant aspects is provided with in Appendix 7.1 LVIA Policy and Guidance and considers the following documentation:

- National Planning Policy Framework. [3]
- South Somerset District Council: Local Plan. [4]
- Taunton and Deane: Core Strategy. [5]
- National Design Guide. [6]
- Highways England: The road to good design. [7]
- National Infrastructure Commission: The value of design in infrastructure delivery. [8]
- National Infrastructure Commission: Design Principles for National Infrastructure. [9]
- Campaign for Better Transport: Roads and the environment. (2018) [10]
- Landscape Institute: Infrastructure Technical Guidance Note (TGN 04/2020). [11]
- Taunton and Deane: Green Infrastructure Strategy. [12]
- South Somerset: Environment strategy. [13]

- Natural England National Character Area (NCA) Profiles. [14]
- Blackdown Hills AONB 2019 – 2024 Management Plan. [15]

## 7.3 Assessment methodology

7.3.1 A preliminary LVIA has been undertaken as part of this PEI Report and is described in this chapter to identify and assess the significance of and the effects of change arising from the proposed scheme upon the landscape as a resource, people's views, and visual. Further assessment will be undertaken as the design develops which will be reported on in the Environmental Statement (ES) which will support the DCO application.

7.3.2 The LVIA has followed established national guidance for such assessments identified below:

- DMRB LA 101 *Introduction to environmental assessment*. [16]
- DMRB LA 104 *Environmental assessment and monitoring*. [17]
- DMRB LA 107 *Landscape and visual effects*. [1]
- *Guidelines for Landscape and Visual Impact Assessments (GLVIA)*. [18]
- Technical Guidance Note 06/19 *Visual Representation of development proposals*, Landscape Institute, 2019. [19]

7.3.3 GLVIA defines:

- landscape as a resource: *“landscape receptors, including the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape in different areas.”*
- visual amenity: *“visual receptors, that is, the people who would be affected by changes in views or visual amenity at different places.”*

7.3.4 DMRB LA 107 *Landscape and visual effects* defines landscape character and visual amenity as:

- Landscape character as *“a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse”*.
- Visual amenity as *“overall enjoyment of a particular area, surroundings, or views in terms of people's activities - living, recreating, travelling through, visiting, or working”*.

7.3.5 A summary of the assessment methodology is as follows:

- Define the purpose and scope of assessment, including the study area.
- Establish the baseline
  - undertaking a desk-based study
  - undertaking a field study to support the assessment
  - undertaking a Zone of Theoretical Visibility analysis (see section 7.3.17)
- Identify the receptors - classification/description of landscape character types/areas, establishing the visual amenity and view as experienced by people.
- Identify the potential impacts and assess the identified receptors sensitivity and magnitude of effect to the proposals.
- Identify and describe the likely significant effects on the receptors (landscape character, visual amenity and views).

- Identify essential mitigation required for landscape integration and visual impact (as set out in Figure 7.8 Environment Mitigation Plan).
- Combine the essential mitigation with the proposed scheme proposals to systematically and transparently assess the level (and significance) of residual landscape and visual effects, by combining the receptor's sensitivity (its susceptibility and value) and the magnitude of effect (a combination of the scale of effect, geographical extent, duration and reversibility).
- Assess the likely significance of residual effects identifying them as either adverse or beneficial.

## Baseline

- 7.3.6 Baseline studies have been undertaken to identify important characteristics and receptors for landscape and visual amenity as described in DMRB LA 107 *Landscape and visual effects* [1]. The landscape and visual baseline have been informed through a combination of desk study, digital analysis, preparation of a Zone of Theoretical Visibility (ZTV), site visits (at winter, day, and night) and discussions with stakeholders including Somerset West and Taunton Council (SWTC), South Somerset District Council (SSDC), Somerset County Council (SCC), Blackdown Hills AONB and Natural England (NE).
- 7.3.7 Third party data sources include local planning policy and landscape guidance, published character studies, designations and datasets from Historic England, NE, Environment Agency (EA), The Countryside Charity (CPRE), Sustrans, and relevant local District authorities.
- 7.3.8 Plans have been produced that illustrate topography and drainage, landscape character and features, visual receptors and visual barriers, tranquillity, and night light. These include maps of:
- Figure 7.1 Landscape Character and Features
  - Figure 7.2 Topography and Drainage
  - Figure 7.3 Visual Receptors and Visual Barriers
  - Figure 7.4 ZTV and Proposed Viewpoints
  - Figure 7.5 CPRE Tranquillity
  - Figure 7.6 CPRE Night lights
  - Figure 7.7 Initial Tree Constraints
  - Figure 7.9 Viewpoint Photographs

## Assessment

- 7.3.9 Reporting the significance of the landscape's sensitivity to change has included an evaluation of each key landscape element/characteristic affected by the proposed scheme. The significance of the landscape's sensitivity to change shall be informed by its: importance; quality/condition; rarity; value; scale of contribution to the landscape character; and degree to which it can be protected, mitigated, replaced, or substituted. The landscape sensitivity of receptors/resource in the assessment is reported in accordance with the criteria provided in Table 7-2 as adapted from DMRB LA 107 *Landscape and visual effects* [1].

**Table 7-2 Landscape sensitivity**

<b>Landscape sensitivity (susceptibility and value) of receptor / resource</b>	<b>Typical descriptions</b>
Very high	<p>Landscapes of very high international/national importance and rarity or value with no or very limited ability to accommodate change without substantial loss/gain (i.e. national parks, internationally acclaimed landscapes - UNESCO World Heritage Sites).</p> <p>Landscapes are of a national value contributing to a strong sense of place.</p> <p>Landscapes of national value very susceptible to large scale road infrastructure projects such as road widening, dual carriageway, overbridges, and junctions without incurring substantial loss/gain.</p>
High	<p>Landscapes of high national value containing distinctive and characteristic features/elements with limited ability to accommodate change without incurring substantial loss/gain (i.e. designated areas, areas of strong sense of place - registered parks and gardens, country parks).</p> <p>Landscapes with a limited ability to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for landscape character.</p> <p>Landscapes of a local or regional value very susceptible to large scale road infrastructure such as road widening, dual carriageway, overbridges, and junctions without incurring substantial loss/gain.</p>
Medium	<p>Landscapes of high local or regional value which are able to accommodate some change (i.e. features worthy of conservation, some sense of place or value through use/perception). Some ability to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for landscape character.</p> <p>Are of national value but able to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for landscape character.</p>
Low	<p>Local landscape areas or receptors of low value with ability to accommodate change (i.e. non-designated or designated areas of local recognition or areas of little sense of place).</p> <p>Landscapes are of high local or regional value but able to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for landscape character.</p>
Negligible	<p>Landscapes of very low importance and rarity.</p> <p>Landscape is more able to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for landscape character.</p>

7.3.10 Assessment of the magnitude of effects on the landscape is reported on a combined judgement of the:

- size and scale of effect
- effects at year 1 (opening year) and year 15 (design year) including summer and winter views
- geographical extent of the area to be affected (ZTV)

- duration of the effect and its reversibility

7.3.11 The magnitude of effect (change) has been reported in the assessment in accordance with the criteria provided in Table 7-3 as adapted from DMRB LA 107 *Landscape and visual effects* [1].

**Table 7-3 Landscape magnitude**

<b>Magnitude of effect (change)</b>	<b>Typical descriptions</b>
Major adverse	Total loss or large-scale damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, conspicuous features or elements (i.e. road infrastructure).
Moderate adverse	Partial loss or noticeable damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, noticeable features or elements (i.e. road infrastructure).
Minor adverse	Slight loss or damage to existing landscape character of one (maybe more) key features and elements; and/or addition of new uncharacteristic features and elements.
Negligible adverse	Very minor loss, damage, or alteration to existing landscape character of one or more features and elements.
No change	No noticeable alteration or improvement, temporary or permanent, of landscape character of existing features and elements.
Negligible beneficial	Very minor noticeable improvement of character by the restoration of one or more existing features and elements.
Minor beneficial	Slight improvement of landscape character by the restoration of one (maybe more) key existing features and elements; and/or the addition of new characteristic features.
Moderate beneficial	Partial or noticeable improvement of landscape character by restoration of existing features or elements; or addition of new characteristic features or elements or removal of noticeable features or elements.
Major beneficial	Large scale improvement of landscape character to features and elements; and/or addition of new distinctive features or elements, or removal of conspicuous road infrastructure elements.

7.3.12 The visual sensitivity of receptors/resource in the assessment is reported in accordance with the criteria provided in Table 7-4 as adapted from DMRB LA 107 *Landscape and visual effects* [1].

**Table 7-4 Visual sensitivity**

<b>Visual sensitivity (susceptibility and value)</b>	<b>Typical descriptions</b>
Very high	Static views from and to major tourist attractions. Views from and of very important national/international landscapes, cultural/historical sites (e.g. National Parks, UNESCO World Heritage sites). Receptors engaged in specific activities for enjoyment of dark skies.
High	Views by users of nationally important public rights of way (PRoW) / recreational trails (e.g. national trails, long distance footpaths). Views by users of public open spaces for enjoyment of the countryside (e.g. country parks).

Visual sensitivity (susceptibility and value)	Typical descriptions
	<p>Static views from dense residential areas, longer transient views from designated public open space, greens and recreational areas.</p> <p>Views from and of rare designated landscapes of national importance.</p> <p>Visual receptors very susceptible to large scale road infrastructure such as road widening, dual carriageway, overbridges, and junctions without incurring substantial loss/gain of visual amenity.</p>
Medium	<p>Static views from less populated residential areas, schools and other institutional buildings and their outdoor areas.</p> <p>Views by outdoor workers.</p> <p>Transient views from local/regional areas such as public open space, scenic roads, railways or waterways, users of local/regional designated tourist routes of moderate importance.</p> <p>Views from and of landscapes of regional importance, or from users of local PRow.</p> <p>Visual receptors with a limited ability to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for visual amenity.</p> <p>Views with high value but able to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for visual amenity.</p>
Low	<p>Views by users of main roads or passengers in public transport on main arterial routes.</p> <p>Views by indoor workers.</p> <p>Views by users of recreational/formal sports facilities where the landscape is secondary to enjoyment of the sport.</p> <p>Views by users of local public open spaces of limited importance with limited variety or distinctiveness.</p> <p>Views of a medium value but able to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for visual amenity.</p>
Negligible	<p>Transient views such as from fast moving vehicles.</p> <p>Views from industrial area, land awaiting re-development.</p> <p>Views from landscapes of no importance with no variety or distinctiveness.</p> <p>Views are more able to accommodate large scale road infrastructure, such as road widening, dual carriageway, overbridges, and junctions without undue adverse consequences for visual amenity.</p>

### 7.3.13 Reporting on the magnitude of visual effects is informed by the following:

- Scale, nature, and duration of change.
- Distance, screening, direction, and focus of the view.
- Assessment at year 1 (opening year) and year 15 (design year) including summer and winter views.
- Removal of previously implemented mitigation or existing vegetation.
- Whether the receptor is static or moving.

### 7.3.14 The magnitude of visual effect has been reported in the assessment in accordance with the criteria provided in Table 7-5 as adapted from DMRB LA 107 *Landscape and visual effects* [1].

**Table 7-5 Visual magnitude**

Magnitude of effect (change)	Typical descriptions
Major adverse/beneficial	The project, or a part of it, would become the dominant feature or focal point of the view.
Moderate adverse/beneficial	The project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor adverse/beneficial	The project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible adverse/beneficial	Only a very small part of the project work or activity would be discernible or being at such a distance it would form a barely noticeable feature or element of the view.
No change	No part of the project work or activity would be discernible.

7.3.15 The descriptions for significance as outlined in Table 7-6, as adapted from DMRB LA 104 Environmental Assessment and Monitoring [17], has been applied within the LVIA.

**Table 7-6 Significance categories and typical descriptions**

Significance category	Typical descriptions
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

7.3.16 The significance of effect matrix that has been applied within the LVIA assessment is provided in Table 7-7 as adapted from DMRB LA 104 *Environmental Assessment and Monitoring* [17]. Where the table includes two significance categories, evidence has been provided to support the reporting of a single significance category.

**Table 7-7 Significance matrix**

Sensitivity	Magnitude				
	No change	Negligible	Minor	Moderate	Major
Very high	Neutral	Slight	Moderate or Large	Large or Very large	Very large
High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very large
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate

<b>Negligible</b>	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight
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### Zone of theoretical visibility

- 7.3.17 As recommended in the GLVIA [18] (section 6.8), a ZTV has been prepared to illustrate the area from which the proposed scheme will theoretically be visual to inform assessment and site work. The ZTV has been calculated on the current vertical alignment of the proposed scheme and associated structures. This illustrates the theoretical extent within which, subject to localised features and characteristics, there may be a visual relationship between landscape and visual receptors and the proposed scheme. Field visits were used to verify the ZTV analysis, assess the visual baseline and identify the optimum location for viewpoints to assess impacts.
- 7.3.18 To prepare the ZTV, topographic data in the form of a digital surface model (DSM) was used at a 2m resolution (one height point captured for each 2m distance) and obtained from Defra [20]. The DSM is produced from the latest survey data and includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface. It has a vertical accuracy of +/-15cm root-mean-square error.
- 7.3.19 Equally-spaced 3D points have been created based on the 3D model of the proposed scheme from which visibility analysis has been conducted. In order to calculate whether a high-sided vehicle on the proposed scheme will be theoretically visible for someone located in the wider landscape, the following parameters were used:
- 4.5m height added to points generated from the 3D model to represent high-sided vehicles.
  - 1.6m height added to surface to represent eye height of the visual receptor (in line with GLVIA guidance [18]).
- 7.3.20 There are some gaps within the DSM data across the study area as shown in Figure 7.4 ZTV and Proposed Viewpoints. Where the DSM data is unavailable (and therefore not part of the ZTV analysis) site walkovers enabled the most appropriate viewpoint locations to be identified (all viewpoints are shown in Figure 7.4 ZTV and Proposed Viewpoints).

### Photography and visualisation

- 7.3.21 Viewpoints have been proposed at 45 representative locations (Figure 7.4 ZTV and Proposed Viewpoints) based on the output of the ZTV, initial site visits to the study area, and initial discussions with Officers at SWTC, SSDC, NE, and the Blackdown Hills AONB.
- 7.3.22 The viewpoints were agreed in principle individually with Officers at SWTC, NE, and the Blackdown Hills AONB management team through teleconferences and email exchanges. Feedback and suggestions have been incorporated into the assessment resulting from these discussions. Following a teleconference to discuss the findings of our initial site visit and proposed viewpoint locations, no feedback on proposed viewpoints has been received from SSDC at the time of writing, although they noted to us that there is not a Landscape Officer in post.
- 7.3.23 All photography has been taken using a Full Frame Sensor camera with 50 mm Fixed Focal Length Lens mounted on a tripod at a standard consistent height of

1.5 m, regardless of visualisation type, to provide consistency between all viewpoints and visualisations. Photographs have been captured as a single-shot unless the view and position of the proposed scheme is panoramic in nature – in which case multiple single-shot images have been captured in different directions.

- 7.3.24 A proportionate number of representative viewpoints have been identified to undertake during the hours of darkness and for visualisations. Where appropriate, these visualisations will be prepared in the ES to show the year 1 and year 15 scenarios in both summer and winter.
- 7.3.25 Visualisations will be prepared for the ES using verified photography and based on the digital proposed scheme design information. The Accurate Visual Representation Methodology is provided within Appendix 7.4, and will be followed for visualisations produced for the ES. Where photographs have been taken to date from representative viewpoints (during summer, winter, and night) they have followed the methodology in Appendix 7.4 Accurate Visual Representation Methodology according to the proposed visualisation type for that location, in order that they are appropriate for use in the ES.
- 7.3.26 The visualisation and night-photography locations proposed below, were informed by discussions with stakeholders including SWTC, SSDC, SCC, Blackdown Hills AONB, and NE:
- Viewpoint 2 (Stoke Hill)
  - Viewpoint 5 (Thorn Hill)
  - Viewpoint 7 (south-west of Mattocks Tree Green)
  - Viewpoint 13 (Hatch Green)
  - Viewpoint 27 (Park Barn Lane)
  - Viewpoint 23 (Ashill)
  - Viewpoint 36 (Staple Hill)

### **Tree survey and Arboricultural Impact Assessment**

- 7.3.27 A Tree Survey to British Standard (BS) 5837:2012 is currently being undertaken, this will describe the qualitative and quantitative characteristics of trees within and around the proposed scheme. It will identify the quality of trees within or adjacent to the proposed scheme and set-out the root protection areas of such trees to determine where impacts on trees (particularly high-quality/ancient/veteran) can be avoided or reduced. This report will be published as part of the ES supporting the submission of the DCO.
- 7.3.28 An Arboricultural Impact Assessment will be undertaken to determine which trees can be retained or need to be removed as a result of the proposed scheme, and provide an overview of the quality and value of those trees to be removed, alongside quantitative calculations using the National Tree Map dataset [21].
- 7.3.29 The Tree Survey and Arboricultural Impact Assessment are useful tools which inform the LVIA and appropriate landscape mitigation measures and will be reported in the ES supporting the DCO application.

## **7.4 Assessment assumptions and limitations**

- 7.4.1 All photography completed and summer photography site survey work has been and will be undertaken from publicly accessible locations and not from private

land or property. Where required, professional judgement has been made to identify impacts for receptors that are not accessible by public means.

- 7.4.2 It would be disproportionate to visit all public right of ways (PRoWs) and visual receptors within the study area. Therefore, the locations for site work and representative viewpoints have been informed by a combination of desk study, ZTV, discussions with stakeholders and site visits. Representative views are used where large numbers of viewpoints cannot be included individually, with similar significance of effect.
- 7.4.3 It is assumed that not all trees within and immediately surrounding the proposed scheme corridor will require individual and fully detailed tree surveys. Tree surveys will:
- identify trees of high quality and value to assist in design development to avoid impacts
  - inform mitigation by understanding the nature of high-quality specimens that are to be removed
  - provide written descriptions of trees in groups of no distinguishable quality, noting their species, quality, and value
  - provide a quantitative assessment of trees to be removed using the National Tree Map dataset
- 7.4.4 Visualisations will be prepared for the ES using verified photography and based on the digital proposed scheme design information.
- 7.4.5 Field work will be carried out during daylight for summer and winter, with trees in and out of leaf, with a selection of locations visited hours of darkness. The assessment has, therefore, been carried out with a robust understanding of the landscape through the seasons and at different times of the day. Winter viewpoint photography figures present a complete set of baseline views, available for all viewpoints, refer to Figure 7.9 Viewpoint Photographs. Ten viewpoint locations were selected as suitable locations for visualisations of the proposed scheme. From these ten locations verified photography and surveys were carried out to enable visualisation production in assisting the design and mitigation and communicating the appearance of the proposed scheme in those viewpoints within the ES.
- 7.4.6 The preliminary LVIA has been informed by quantitative analysis of tree loss using the National Tree Map dataset [21]. In addition, an understanding of the landscape through field work and the use of Google Earth [22] has enabled a robust assessment to be carried out on the effects on existing vegetation.
- 7.4.7 The construction assumptions are set out in Chapter 2 The Project, with additional LVIA assumptions of:
- Topsoil stockpiles are up to 2m in height, subsoil and geological stockpiles are 10-15m in height, the main office compounds and site offices are one storey in height.
  - Cranes and piling rigs would be used for the construction and, implementation of the over bridges.
  - Temporary construction lighting would be intermittently used throughout the construction phase for select operations in isolated locations only.
- 7.4.8 At year 1 of operation and with the implementation of the new planting:

- New tree planting would range in height between 0.6m to 0.8m for whips/transplants and hedgerow planting, 3-5m for feathered and standard trees, and 7-10m for extra-heavy standard and semi-mature trees.
- In locations where visual screening is critical, woodland mixes would contain a high percentage of feathered trees with a percentage of larger species to boost this function. Faster growing locally indigenous species would also be included in some mixes that can provide earlier visual screening. These species would then be managed out as the dominant climax species develop in height.
- Species rich grassland/marshy grazing grassland areas would be in the establishment phase, and some areas may not yet have full grassland coverage.
- Areas returned to agriculture would consist of agricultural topsoil.
- Materiality and design of structures would reflect local character where possible.

7.4.9 At year 15 of operation and with the establishment of the new planting:

- With an approximate annual tree and shrub growth likely to be between 0.3-0.5m per year (although this would vary from species to species), trees are likely to range in height between 5m to 9m with the potential for some faster growing species to be taller. The size of growth would vary and is dependent on the size of tree at planting.
- Hedgerows would reach heights between 1.2m and 2m, to appear a similar height to existing hedges and form that would complement the character of existing field boundaries within the AONB landscape.
- The species rich grassland and marshy grazing grassland would have established such that, overall, the sward would be successfully integrated. The exception may be where the design intention for specific areas of ecological management would retain exposed limestone or support a thinner sward to create habitat diversity.

7.4.10 Areas returned to agriculture would be fully established and in regular use. The worst-case scenarios have been considered for the Landscape and Visual Impact assessment. All Limits of Deviation (LoD) are within the Rochdale Envelope approach. The proposed LoD might lead to negligible changes to the composition of views or incrementally increase or decrease the loss or retention of landscape features immediately adjacent to the proposed scheme within the scope of change. These potential changes are not considered to give rise to any new effects, or to any materially worse adverse or better beneficial landscape or visual effects, from those predicted in the assessment.

7.4.11 The assessments will, therefore, take into consideration what can be regarded as a realistic 'worst case' assessment of the impacts associated with the proposed scheme.

## 7.5 Study area

7.5.1 DMRB LA 107 *Landscape and visual effects* [1] notes that the study area should be proportionate to the following factors for landscape effects:

- The project boundary/construction activity (including compounds and temporary land take).

- The wider landscape setting within which the project/its works has the potential to influence.
- The extent of the area visible by the project.
- The full extent of adjacent or affected landscape receptors of special value (i.e. conservation areas, designated areas) whose setting can be influenced by the project.

7.5.2 DMRB LA 107 *Landscape and visual effects* [1] notes that the study area should be proportionate to the following factors for visual effects:

- The proposed scheme/construction visual footprint (including compounds and temporary land take).
- The wider visual envelope within which the proposed scheme/ has the potential to influence.
- The extent of representative viewpoints visible of the proposed scheme/.
- The extent of adjacent or affected visual receptors and the visual amenity of the area that can be influenced by the proposed scheme/.

7.5.3 The study area for both landscape and visual effects is illustrated by the ZTV (see Figure 7.4 ZTV and Proposed Viewpoints).

7.5.4 Although the landscape study area covers a wide geographic area, the physical changes to the landscape will take place within the engineering footprint of the proposed scheme only, with the potential to influence the landscape character areas it physically passes through. For any parts of character areas or features beyond the engineering footprint but within the landscape study area, only perceptual changes to landscape character will be considered as there will be no change to the pattern, landform, scale and/or vegetation.

## 7.6 Baseline conditions

### Current baseline

7.6.1 The baseline conditions have been considered separately for landscape and visual aspects; the conditions described have been informed through the following methods:

- Review of reports from previous stages of the proposed scheme
- Review of national and local planning policy
- Review of published landscape character assessments
- Digital mapping and analysis
- Site visits in January 2021 and March to April 2021
- Consultation with Officers at SWTC, SSDC, NE, and Blackdown Hills AONB

7.6.2 The following figures illustrate the landscape and visual baseline context of the study area:

- Figure 7.1 Landscape Character and Features
- Figure 7.2 Topography and Drainage
- Figure 7.3 Visual Receptors and Visual Barriers
- Figure 7.4 ZTV and Proposed Viewpoints
- Figure 7.5 CPRE Tranquillity
- Figure 7.6 CPRE Night lights
- Figure 7.7 Initial Tree Constraints
- Figure 7.9 Viewpoint Photographs

## Landscape

- 7.6.3 The proposed scheme passes through three NCAs and near another:
- NCA 140, Yeovil Scarplands [23], for approximately 1.8km at the southern end of the proposed scheme.
  - NCA 143, Mid Somerset Hills [24], for the majority of the proposed scheme length.
  - NCA 146, Vale of Taunton and Quantock Fringes [25], for approximately 1.6km at the northern end of the proposed scheme.
  - NCA 147, Blackdowns [26], is located outside the proposed scheme engineering footprint, but lies within the study area, situated approximately 1.5km to the south-west at its nearest point.
- 7.6.4 As set out within the A358 Taunton to Southfields Scoping Report in relation to NCAs, the impact of the proposed scheme has been assessed against NCA 143 only. Other NCAs are referenced here to provide wider context on the landscape character of the area.
- 7.6.5 NCA 140 (Yeovill Scarplands) is characterised by a contrast between the scarps and vales present with the flatter Somerset “Levels”, with scattered woodlands, small villages. The proposed scheme is located at the south-western tip of the NCA and it is noted within the NCA profile that there are relict open fields in the south-west, contrasting with extensive thick hedgerows with frequent mature to veteran trees elsewhere at this location. Both the A30 and A303 cross the NCA, while the A37 forms the western boundary with NCA 140 (Mid Somerset Hills). The existing A358, as it heads north-west from Southfields Roundabout, lies within this NCA.
- 7.6.6 NCA 143 (Mid Somerset Hills) is formed by several low hills and raised ridges rising out of the Somerset Levels and Moors. They lie between the Blackdowns NCA to the south and the Mendip Hills NCA further to the north and outside the study area. The hills have a distinctive, predominantly pastoral character rich in hedgerows, farms, and small villages, and often with expansive views over the adjacent flat Somerset Levels and Moors. The Blackdown Hills AONB to the south dips into this NCA near Staple Fitzpaine. Ancient woodlands, species-rich hedgerows with trees, and veteran trees create a wooded feel despite there being little woodland cover present. Ash and maple woodlands are present on ridgetops and some of the steeper side slopes. Most settlements present retain a uniformity of building style and material, notably the use of Blue Lias limestone, still being quarried near Somerton, which adds to its sense of place. Disturbance to the NCA includes the A39 and A37 road corridors, with the A358 and A378 running east-west through the southern end of NCA 143.
- 7.6.7 NCA 146 (Vale of Taunton and Quantock Fringes) lies between the Brendon Hills on the edge of Exmoor to the west and the Somerset Levels and Moors to the east. It overlooks the Bristol Channel to the north and the Blackdown Hills AONB to the south and encircles the Quantock Hills AONB. The area is densely settled with a largely dispersed pattern of hamlets and scattered farmsteads often linked by sunken winding lanes. The exceptions to this are the larger towns of Taunton, Wellington, Minehead, Williton and Watchet. Taunton and Wellington lie along the M5 corridor and distant from the proposed scheme; these towns are currently undergoing considerable expansion and development owing to access to, and proximity to, this main transport route, with associated development along the M5 itself.

7.6.8 NCA 147 (Blackdowns) extends from south of the M5 at its northern point to the English Channel in the south. Long, dark ridges, deep valleys and dynamic cliffs are the essence of the Blackdowns. The ridges create prominent backdrops when viewed from the wider landscape and offer far-reaching views. Woodland, much of which is of semi-natural origin, dominates the steep valley tops, creating sinuous dark edges to the ridges; some conifer plantations also exist and intrude onto the plateaux. Below the wooded edge, pastoral valleys feature with a medieval field pattern of small, irregular fields bounded by dense species-rich hedgebanks and hedgerow trees, creating an enclosed, tranquil setting. Approximately 78% of NCA 147 is designated as AONB, with 45% of the NCA within the Blackdown Hills AONB situated at the northern end of the area (other AONBs within the NCA, but outside the study area, include East Devon AONB and Dorset AONB). The special qualities of the AONB are described in the Management Plan [15] and include (but not limited to):

- the elevation and long, panoramic views out from the Blackdown Hills create a sense of detachment from surrounding towns and transport corridors
- areas of high tranquillity spared many of the intrusions of modern life
- dark night-time star-filled skies contrasting with the light pollution of the surrounding towns
- the presence of straight, uninterrupted ridges are evident as a visual backdrop over a wide area

7.6.9 In relation to the proposed scheme, the steep slope and wooded ridge at the northern edge of NCA 147 and Blackdown Hills AONB, feature in many distant views looking south from landscape to the north, but result in a limited quantity of views north from the AONB due to the enclosed nature of the woodland. However, the sudden revealing of open panoramic and distant views to the north (from locations such as Staple Hill and Castle Neroche) provide a dramatic change of character and assist with a wider sense of place. The Blackdown Hills is the fifth darkest AONB in England, and allows “*dark, star-filled skies contrasting with the brightness of the surrounding towns is one of the qualities that make the Blackdown Hills AONB such a special place*” [27]. Views of vehicles travelling along the A358 and M5, and Taunton to the north, on lower ground are a feature of distant views to the north and north-east. The elevation of the ridgeline from which they are seen provides a sense of separation and remoteness, although there is some disturbance from background road noise in the area.

7.6.10 There are two published local landscape character assessments that provide a baseline for the study area. These are:

- Taunton Deane Landscape Character Assessment, Taunton Deane Borough Council (now SWTC), 2011 [28].
- The Landscape of South Somerset, SSDC, 1993 [29].

#### Taunton Deane Landscape Character Assessment

7.6.11 The proposed scheme will pass through the following local landscape character areas (LLCAs) from the Taunton Deane Landscape Character Assessment: 1a, Vale of Taunton Deane; 4a, Fivehead Farmed and Wooded Vale; and 5a, North Curry.

*Vale of Taunton Deane LLCA*

- 7.6.12 The LLCA defines much of the central area of the Borough. It stretches from the edges of Wellington in the southwest to the outskirts of the Clay and Peat Moors in the northeast. The low vale is frequently interspersed by the waters of the River Tone and its tributaries and merges seamlessly with the higher landscape of the Farmed and Settled High Vale that surrounds it to the north, south and west. Woodland cover is limited but hedgerow trees (typically oak), punctuating the relatively dense and lush hedgerows, make a valuable contribution to tree cover and character overall. The hedgerows make a significant contribution to the vale by defining the field pattern. Usually occurring on low hedgebanks, the hedges are dominated by elm but also contain a range of woody species including hazel, field maple, holly and blackthorn, hedgerow trees are mainly oak. The mixed hedges give way to hawthorn hedges in areas of more recent field enclosure.
- 7.6.13 Within the vale itself there is a definite sense of separation from the towns. This is largely due to the strong hedgerow network that limits views across the low-lying land. The Quantock Hills AONB (to the north-west of Taunton) and Blackdown Hills AONB (to the south) form a backdrop and sense of containment and enclosure to the vale. Building materials vary across the vale. In the north and west red sandstone is seen in several villages – relating to the underlying sandstone geology of the surrounding Quantock Hills and High Vale. In the south and east, stone-built properties are often of Blue or White Lias, reflecting the changing underlying geology moving east towards the Farmed and Wooded (Lias) Vale.
- 7.6.14 Although low-lying and relatively flat in places, the Vale contains (and is adjacent to) several small natural ridges and hills that have a significant influence on the character of the landscape at the local level.
- 7.6.15 Both the A38 and M5 motorway have a visual and aural influence on many parts of the vale and the A358 passes through the area between M5 J25 and West Hatch. The lighting associated with the Taunton Gateway Park & Ride is visible across the landscape to the south. The Nexus 25 development near the Park & Ride and M5 J25 will also influence the future baseline of the local landscape character in proximity to the proposed scheme.
- 7.6.16 The presence of the M5 and major highway infrastructure within the LLCA, and the relatively flat landscape limiting distant views, results in some ability to accommodate further development of this nature. However, the rural qualities away from these routes means it remains susceptible due to the potential change associated with tranquillity and perception of landscape character.
- 7.6.17 The condition of the Vale of Taunton Deane LLCA is described in the published assessment as moderate, with the strength of landscape character varying across the vale and judged to be moderate to strong overall.
- 7.6.18 The LLCA within the study area is assessed as being of medium sensitivity for the purpose of this LVIA. It includes landscape features worthy of conservation which contribute to a sense of place and has some ability to accommodate large scale road infrastructure.

*North Curry Sandstone Ridge LLCA*

- 7.6.19 The LLCA is a relatively prominent landscape – an undulating, clearly defined ridge that raises out of the surrounding Clay and Peat Moors. It is the ridge

landform and its juxtaposition with the contrasting, flat Moors that defines the character of this landscape.

- 7.6.20 It is a relatively narrow ridge extending from the edge of the hamlet of Ash, in the southwest, to the edge of Stathe in the northeast. Although relatively low-lying (the highest point being 57m AOD at Borough Post) there is a notable sense of elevation from the ridge top and from the sloping sides – both of which offer views to the much lower, and dramatically flat Clay and Peat Moors and beyond to the Vale of Taunton Deane, to the Quantock Hills AONB and to the Polden Hills.
- 7.6.21 A simple setting of undeveloped agricultural land offers clear and uninterrupted views of this distinctive feature, which is clearly pronounced on the skyline and identifiable over a very wide area of the wider landscape. In many places however, views are highly restricted by high hedge banks and sunken rural lanes. The mixed native species hedgerows form clearly defined irregular-shaped field boundaries. Hedgerow trees, where they occur, make an important contribution due to a landscape absent of woodland cover.
- 7.6.22 The North Curry Sandstone (a green-grey stone) is a consistent building material found in buildings and structures across the ridge, as is red brick, render and clay pan tiles. The A358 and the A378 both cross this landscape but their influence is limited to the south-west corner of the ridge, between Mattock's Tree Hill and Stonyhead Hill. The existing road corridors broadly follow the existing contours, with the A358 rising and falling to the junction with A378 at the top of Mattock's Tree Hill.
- 7.6.23 Mattock's Tree Hill consists of large agricultural fields with a hedgerow and a few hedgerow trees located on higher ground forming the horizon line in distant views from the east and west. There are a number of local cultural associations with Mattock's Tree Hill, described on the Stoke St Mary and District History Group [30].
- 7.6.24 Thorn Hill is a dome-shaped hillock at the south-west end of the ridge, topped by mature broadleaved trees that are bounded by a stone wall, and is a prominent landmark from surrounding areas to the north, west, and south-west. A beacon on the top of Thorn Hill was installed to commemorate the Queen's Golden Jubilee.
- 7.6.25 Thorn Hill (Clump) was identified as Special Landscape Feature under Policy EN11 of the Taunton Deane Local Plan 2004 [31] (currently being updated). This is due to it being particularly important in the wider landscape, and particularly important to the local landscape or setting of a settlement.
- 7.6.26 There are extensive views across the wider landscape from PRow as they cross Mattock's Tree Hill and Thorn Hill, the nature of existing views are described within the visual baseline of this chapter.
- 7.6.27 The 'Landscape Strategy' section of the published assessment states that "*the strategy for this area is to conserve and enhance the simple, small-scale nature, and largely uninterrupted, character of the ridge. The dramatic juxtaposition between the ridge and adjacent Moors should be protected.*"
- 7.6.28 The presence of the A358 and A378 corridors within the south-west of the LLCA results in some ability to accommodate further development of this nature. However, the nature of the landform and its prominence in the wider landscape means it remains susceptible due to the potential change associated with structures, earthworks, and landscape character.

- 7.6.29 The condition of the North Curry Sandstone Ridge LLCA is described within the published assessment as moderate with the strength of landscape character varying across the vale and judged to be strong overall.
- 7.6.30 The LLCA within the study area is assessed as being of medium sensitivity, with Mattock's Tree Hill and Thorn Hill being places of local landscape or cultural importance, the area evidencing attributes which offer a sense of place and history, and some susceptibility to major highways infrastructure.

*Fivehead Farmed and Wooded Vale LLCA*

- 7.6.31 The LLCA has a varied elevation – from 35m AOD in the east to approximately 200m AOD in the west. The lower lying area of the vale extends beyond the Taunton Deane borough boundary – merging with the wider Fivehead Vale landscape, primarily occurring within South Somerset and through which the Fivehead River runs. The area has some notable undulations throughout which change the context and experience throughout the area.
- 7.6.32 The higher area of the vale in the west has a marked sense of elevation and a well-treed character as it gradually merges with the band of adjacent wooded escarpments. Wooded scarps that ascend to the Blackdown Hills AONB form a strong visual backdrop in views looking west from within the LLCA. The higher, western, half of the Vale contains several woodlands – containing a mix of broadleaf and coniferous trees, including some semi-natural, and replanted, ancient woodland sites. Hedgerow trees and trees within fields also contribute to a strong impression of a well-treed landscape although in some lower lying areas there are fewer hedgerow trees, creating a more open character.
- 7.6.33 The Blackdown Hills Forest Plan [32] covers the woodlands within and on the boundary this LLCA, describing the area to the south-west on the Blackdown Hills wooded scarp as the 'Neroche complex'. This rich historic landscape was an ancient hunting forest and as a result contain a large proportion of oak dominated Lowland Mixed Deciduous Forest and large amounts of historic wood pasture. The woodlands also contain a large number of significant and veteran trees. The management processes will result in a gradual removal of non-native trees in favour of native species. The overall woodland coverage of the area is therefore assumed to remain equivalent to existing in the future.
- 7.6.34 Blue Lias is widely used as a building material to the east of Taunton and the blue-grey and sometimes honey-coloured (White Lias) stone is prevalent throughout this landscape. There are individual dwellings and farms dispersed across the Vale with settlement clusters at the villages of Staple Fitzpaine and Hatch Beauchamp (both Conservation Areas) as well as hamlets such as West Hatch and Curland. Agricultural land use is predominantly defined by pasture (dairying and stock rearing) with some winter cereals on areas of higher (sometimes flatter) and drier ground.
- 7.6.35 With many hedges embanked, views are often channelled, creating a sense of enclosure when passing through the vale along the rural lanes. Formal, designed landscape character includes the Grade I Listed Building Hatch Court and its Grade II Listed Parks and Gardens to the north-east of Hatch Beauchamp. The park is described as being situated to *"the east, south, and west of the house and is today (2000) in mixed use, with areas in agricultural cultivation being situated to the north-west of the house beyond a footpath and C20 hedge. The park is predominantly pasture and retains scattered specimen trees and ornamental*

*groups of trees arranged to frame and emphasise long views to the south and west. There is extensive late C20 planting to the north-west of the house forming an arboretum, with mown grass paths passing between groups of trees” [33]. Part of Hatch Beauchamp is designated as a conservation area [34], with Hatch Park to the west also noted on the Somerset Historic Environment Record [35].*

- 7.6.36 Bickenhall Wood is an ancient replanted woodland located to the west of the A358 and north of Bickenhall Lane. Tree Preservation Order (TPO) TD629 Hatch Beauchamp is located in a parcel of land to the north of the A358 and west of Bickenhall Lane. It comprises of two oaks (TD629T1 and TD629T2), for which further detail is provided within Appendix 7.3 Initial Tree Constraints.
- 7.6.37 The A358 passes through the LLCA from just north of Griffin Lane to between Capland Lane and Fivehead River Main Channel 2. The road corridor has a limited influence on the wider character of the LLCA through a combination of woodland, topography, and established roadside planting.
- 7.6.38 The condition of the Fivehead Farmed and Wooded Vale LLCA is described within the published assessment as moderate with the strength of landscape character varying across the vale and judged to be strong overall.
- 7.6.39 The LLCA within the study area is assessed as being of medium sensitivity. It contains some areas and landscape features of national value but has an ability to accommodate large scale road infrastructure due to the nature of topography and presence of wooded areas, subject to the location and design.

#### *Other LLCAs*

- 7.6.40 A number of LLCAs from the Taunton Deane Landscape Character Assessment have been scoped out of the landscape assessment due to their position outside of the proposed scheme boundary, the limited intervisibility and in consideration of the existing A358 within the wider landscape context, despite being in the vicinity of the A358 corridor:
- 2a, The Tone, located to the north of the existing A358 at a lower elevation than the proposed scheme which will be situated to the south of the existing A358. There is little to no landscape relationship with the proposed scheme.
  - 10c, Blackdown Hills Limestone, the northernmost tip of this local landscape character area has some perceptual landscape relationship with the proposed scheme. Much of the character area is situated further south and has no landscape relationship with the proposed scheme. The baseline views and impact upon them from this character area will be considered as part of the visual study where appropriate.
  - 10d, Wrantage, located to the north of the existing A358 at a higher elevation than the existing A358 with inter-visibility reduced and enclosed by woodland, hedgerows, and topographic features. There is little to no landscape relationship with the proposed scheme.

#### Landscape of South Somerset

- 7.6.41 The proposed scheme passes through the Lower Lias Foothills and Lowland LLCA within Region 2 (Blackdown Hills Plateau Foothills and Valleys) of the Landscape of South Somerset Character Assessment [29].

### *Lower Lias Foothills and Lowland LLCA*

- 7.6.42 The LLCA is described as the Lowland Forest, is a rolling low-lying landform derived from the Lower Lias clays and shales. It is cut through by several winding streams, the courses of which are easily picked out in the landscape because of their tree-lined banks of alder, ash, willow, and black poplar. The landform shallows towards the north-east and is more undulating to the south-west.
- 7.6.43 Agricultural fields are predominantly large and in a rectilinear pattern with straight hedges, droves, and roads with hedgerows, including oaks and pines many of which date back to late 19th century enclosures of the area. Older field patterns are present at Windmill Hill and Hastings with irregular boundaries and old oak trees.
- 7.6.44 The Lower Lias Foothills and Lowland LLCA includes ‘Jordans’ which is not a Registered Park and Garden but is a designed parkland landscape that has been impacted by changes to the A358 previously. *“Jordans was originally approached off the old A358 between Taunton and Ilminster. Jordans is now accessed by taking the first turning on the right after the A303/A358 roundabout, signposted to Ilton, and then the next turning right through a wooden field gate along the old A358, which is now blocked off at the far end. The main entrance is through two stone gateposts, which were specially made for Jordans by the local firm of Minsterstone, Ilminster; these are in good condition; and two rusty wrought iron gates, these gates may have been made by the Estate Blacksmith, they are hung on wrought iron piers [...] The parkland of Jordans extends for approximately 100 acres round the area which would in former days have consisted of the house and stables, formal gardens, kitchen gardens and some wooded areas. The land on the Broadway side of the old road was divided and the little River Ding was diverted. The Parkland was affected by the re-routing of the A358 which was built on a higher plane than previously. This caused major problems with the two 19th century weirs; one was buried completely and there has been serious loss of water to the other”* [36]. There are a number of prominent mature tree specimens within and around the parkland, visible from the A358.
- 7.6.45 Ashill Wood/Every’s Copse is a combination of ancient and semi-natural woodland and ancient replanted woodland, located to the east of the A358 off Park Barn Lane. The watercourses of Fivehead River Main Channel 2 and Venner’s Water pass through the area and is heavily tree-lined, providing notable features meandering through the landscape. Away from Jordans and Ashill Wood/Every’s Copse there are relatively few woodland blocks within the LLCA.
- 7.6.46 The settlements at Ashill and Windmill Hill are located on areas of higher ground, with the windmill at Windmill Hill being a recognisable feature landscape in many long-distance views from the surrounding area. As the A358 passes north of Ashill, the change in topography is notable with the fields sloping down towards the road then continuing beyond towards Venner’s Water.
- 7.6.47 Merryfield Airfield is located outside this LLCA to the east. However, views of aircraft and their presence is a feature, and they have some influence on the tranquillity of the LLCA.
- 7.6.48 The A358 is relatively flat with naturalistic hedgerows and hedgerow trees limiting the influence of passing vehicles, although high-sided vehicles remain visible from the wider landscape. The road is single carriageway, unlit (except around Stewley Lane), and with few signs, with exceptions where the road widens around side

road junctions and on approach to Southfields Roundabout. There is an increase in lighting around Kenny and Ashill along residential streets.

- 7.6.49 The LLCA within the study area is assessed as being of medium sensitivity, including landscape features worthy of conservation which contribute to a sense of place and has some ability to accommodate large scale road infrastructure.

*Ham Hill Plateau, Yeovil Sands Escarpments and Valleys LLCA*

- 7.6.50 Part of the proposed scheme boundary (around Southfield Roundabout and A303) is located within this LLCA. Due to the nature of existing features and extent of the proposed scheme boundary within the LLCA, the proposed scheme is unlikely to result in significant impacts on this LLCA.

- 7.6.51 The baseline for that area of the proposed scheme and associated impacts are therefore considered within the assessment as part of Lower Lias Foothills and Lowland LLCA.

*Other LLCAs*

- 7.6.52 All other Regions and LLCAs within the Landscape of South Somerset Character Assessment [29] have been scoped out of the landscape assessment due to their distance and lack of landscape relationship to the existing A358 and the proposed scheme.

**Trees**

- 7.6.53 Through a process of desk-top review, and discussions with Tree Officers at SWTC, SSDC, and SCC, it has been determined that there are four TPOs within the vicinity of the proposed scheme. Three are within the SWTC administrative area and one within the SSDC administrative area. If the TPO trees are in close enough proximity to the proposed scheme boundary, they will be included within the Tree Survey. No other Tree Preservation Orders are present within or adjacent to the proposed scheme. This, however, does not mean there are trees that would be of sufficient quality or value to warrant protection, just that they may not have been under threat to require evaluation and protection.
- 7.6.54 Initial Tree Constraints plans (Figure 7.7 Initial Tree Constraints) have been produced using Bluesky's National Tree Map dataset [21]. The National Tree Map includes the location, height, and canopy/crown extents for trees 3m and above in height (described as having >90% of canopy coverage, increasing to >95% within 50m of buildings). It is created from high resolution aerial photography, accurate terrain and surface data, and colour infrared imagery.
- 7.6.55 Further detail on TPOs, ancient woodland, and veteran trees is provided within Appendix 7.3 Initial Tree Constraints.

**Nationally designated areas**

- 7.6.56 There is one nationally designated site located within the study area: the Blackdown Hills AONB which is noted for its dark skies, and which lies within the ZVT. The special qualities of the Blackdown Hills AONB are described in paragraph 7.6.8. As landscape impacts on the Blackdown Hills AONB have been scoped out, potential impacts on these special qualities are covered in views from the AONB, as part of the visual baseline and impact assessment of this LVIA.

- 7.6.57 There is one Grade II registered park and garden within the study area which is located at Hatch (Beauchamp) Court, located approximately 490m east of the proposed scheme. There are two conservation areas located within one kilometre of the proposed scheme at Hatch Beauchamp and Thornfalcon.
- 7.6.58 There are no World Heritage Sites within the study area.
- 7.6.59 Within the study area, there are a large number of ecological and heritage assets which contribute to the character of the landscape. These are described in detail in Chapter 6 Cultural heritage and Chapter 8 Biodiversity.
- 7.6.60 There are seven Ancient Woodland Inventory (AWI) sites located within the 1km study area. These include both ancient semi-natural woodland and ancient replanted woodland. The AWI sites are:
- Bickenhall Wood
  - Huish Coppice
  - Ashill Wood/Everyys Coppice
  - Line Wood
  - Stoke Wood
  - Knowl Wood
  - An unnamed wood, approximately 870m north of the proposed scheme

### **Visual**

- 7.6.61 The visual context of the study area varies throughout due to the nature of the landscape due to topographic features, woodlands, hedgebanks alongside rural roads contrasting with flat landscapes with large open fields and limited hedgerow trees.
- 7.6.62 Residential receptors are situated throughout the study area in a range of situations including small settlements, hamlets, and isolated properties, which includes existing properties fronting directly onto the existing alignment of the A358. Most residential properties within the area have some form of rural outlook due to the low density of built form in the study area making them susceptible to change.
- 7.6.63 Views vary from enclosed woodland walks and agricultural fields, to panoramic views from open fields and ridges. Visual receptors in the study may have reduced susceptibility to change as traffic on the existing A358 is a feature of many existing longer and open views, however but is often filtered to some degree by existing roadside vegetation.
- 7.6.64 Views from the road network away from the existing A358 are generally well enclosed due to their narrow, meandering nature, and well-maintained hedgerows and hedgebanks. More distant views for road users are often limited to glimpses of the wider countryside through field gates or views in the direction of travel on straighter stretches of road. Due to the characteristics of existing views for road users within the study area, road users have been scoped out of the visual assessment.
- 7.6.65 There are two specific viewpoints within the Blackdown Hills AONB with views towards the proposed scheme, at Staple Hill and Castle Neroche [37], where receptors may have high susceptibility to change. From Staple Hill there is an 800 m circular accessible walk from the car park, which includes two views to the north, created through clearance and management of woodland and signposted

for visitors. The views from Staple Hill are almost 180 degrees and include distant views towards Taunton, Fivehead ridge, and beyond. However, susceptibility is mitigated by the baseline low views of traffic moving on the A358 in the distance, primarily with larger and/or light-coloured vehicles visible against the wider rural landscape. From the viewpoint at Castle Neroche the view is directed north towards Taunton, views in the direction of the existing A358 are contained by trees adjacent to the viewpoint in both the winter and summer months.

7.6.66 There are extensive networks of public rights of way throughout the area, including marked long-distance walking routes such as the Herepath and East Deane Way, some of these cross or are in close proximity to the existing alignment of the A358. The Herepath is described as a shared cycle and walking bridleway, which forms a loop around Staple Fitzpaine including some of the Blackdown Hills AONB. The Herepath primarily follows a series of off-road tracks through wooded areas including Staple Park Wood, Piddle Wood and Bickenhall wood. The East Deane Way is a long walk wending its way through several villages and countryside to the south and eastern side of Taunton in and around the vale of Taunton Deane and on to Sedgemoor.

7.6.67 Descriptions of settlements within the study area are described in Table 7-8.

**Table 7-8 Settlements**

Settlements	Visual baseline description
Broadway	Existing views within the village are generally contained due to the low-lying nature of the settlement in relation to the A358. Established mature hedgerows enclose the road and hedgerows bordering fields which limit long distant views. However, St Aldhelm and St Eadburgha church to the east of the main village affords glimpsed views of high sided vehicles on the A358. The view across agricultural fields and over a managed hedgerow east towards the A358 allows partially filtered views of traffic which will be opened further during the winter period.
Ashill	Existing views north east towards the options from Ashill are mostly contained by existing mature vegetation along the A358 and hedgerows lining the road network. A clear view of the road and associated vehicles is afforded from the PRow which emerges from Crow Lane. Due to the steep topography in this area and the low profile of the A358, the road is not visible from the area closest to the settlement. However, the tops of lorries are visible as the A358 rises slightly to the east. The far-reaching views across Somerset showcases the mature oaks, native woodland, rolling hills and mixed field uses patchworking across the landscape. The change in views of the A358 during winter are not notably different.
Stewley	The village of Stewley is lower lying than the A358 and existing views west towards the road are currently screened by a mature native hedgerow with trees. Enclosed views are characteristic of this area and would be relatively unchanged during the winter period due to the density of the vegetation.
Battens Green	Existing views are available to the north east from Battens Green from residential cottages on Forest Drove over falling land towards the A358. The view north is over agricultural fields bounded by managed native hedgerows with intermittent trees, where glimpsed views of lorries and high sided vehicles on the A358 are available in the middle distance. The view extends long into the distance with rolling hills and mature native trees forming the background. During the winter period, the visibility of the existing road is not meaningfully changed due to the density of vegetation and the distance to the road. From other aspects, far reaching views are interrupted by the topography and enclosing vegetation. Views to the south are inhibited by the rising topography and mature vegetation.
Slough Green	Far reaching long-distance views are available north east across the undulating hills, pastoral land and wooded scarps which are representative of the landscape character

Settlements	Visual baseline description
	area. The undulating nature of the land and the size of established hedgerows and mature trees limit views and enclose much of the landscape. Where views are open along PRoW expansive areas of the district are visible. The existing A358 is not currently visible in the view in summer or winter.
Hatch Beauchamp and Hatch Green	Hatch Beauchamp Conservation Area has limited views out towards the surrounding landscape due to the density of housing and mature vegetation bordering roads and buildings. Hatch Green is similarly well enclosed and is positioned lower than the A358. Filtered views of vehicles on the A358 are available through a linear belt of trees and shrubs which border a pastoral field. During winter the visibility of traffic on the road is greater due to the lack of depth in the intervening planting.
Haydon	Situated to the east of Taunton, Haydon has a mixture of farming, a small number of residential buildings and a golf driving range. The flat nature of the land at this hamlet allows for open views south towards the Blackdown Hills AONB across the surrounding agricultural fields.
Shoreditch	The small village of Shoreditch is surrounded by a range of small to large pastoral fields. Views north west towards Taunton are screened by the existing M5 vegetated corridor. Densely vegetated roadways and field boundaries limit long distant views; however, a PRoW affords open views across arable fields towards the proposed scheme.
Taunton Holway	Taunton is predominantly residential to the south east and is bordered by the M5 motorway. The dense urban grain of the settlement limits far reaching views. To the south east the densely vegetated bunds screen middle and long-distance views across the character area. The A358 and M5 are not currently visible past the heavily vegetated corridor along the M5.
Taunton Staplehay	Situated to the south west of Taunton, Staplehay is a tight linear settlement surrounded by undulating farmland. Views within the settlement are well contained within the narrow lanes and streets. On the outskirts of the development undulating landform and hedgerows restrict many views of the M5 corridor. However glimpsed long-distance views of large vehicles are available through intermittent screening vegetation, from a small number of vantage points and PRoWs which look over the M5.
Thornfalcon	The small village and civil parish of Thornfalcon is surrounded by medium and large sized arable and pastoral agricultural fields predominantly bounded by hedgerows. Linear belts of trees and clumps of woodland are key visual features and form a short distance visual screen from many aspects within the village. The undulating landform also helps to contain the views from Thornfalcon. Views towards the A358 are limited by undulating landform and intervening vegetation. However, views of traffic on the A358 are afforded from Thorn Hill, a distinctive landscape feature in the local area.
Ruishton	The small town of Ruishton is relatively well visually contained by the steep topography falling away north east from the A358. The town has a dense grain with views being interrupted by trees and woodland. The town is surrounded by medium sized arable fields. In the southern extents of Ruishton glimpsed views of vehicles on the A358 and the wider landscapes and Henlade to the south. The low-lying nature of the town due to its proximity to the River Tone increases the sense of a visually enclosed landscape.
Henlade	Due to the low-lying nature of Henlade village views are generally contained. Characteristic wooded scarps to the south limit views to the south and the undulating landform around all other aspects limit distance views. Views of the existing A358 are well screened by existing vegetation and rising ground.
Ash	The small settlement of Ash is nestled within a valley alongside the defunct Taunton to Chard Railway and adjacent to the A358. Residential properties appear in small clusters, along with light and heavy industry surrounded by arable fields. Middle and long-distance views are restricted in the western portion of the settlement within the valley, due to undulating landform and intervening vegetation. However, the east of the settlement is situated on higher ground adjacent to the A358 with open views across

Settlements	Visual baseline description
	the land to the A358 and traffic forms a prominent feature in the short distance for these properties.
Stoke Hill	The settlement of Stoke Hill comprises small clusters of residences and isolated farmsteads within a steep and heavily wooded rural landscape. Views to the west, north west and south west are heavily restricted by Stoke Wood and to the east Henlade Wood restricts some views. To the north, north east, south, and south east expansive views are available of the gently undulating lowlands, residential receptors, and vegetation from PRowS. The A358 to the north is well contained within mature screening vegetation and undulating land.
Netherclay	A sparse settlement comprising isolated farmsteads and small clusters of houses surrounded by a rural landscape, and lying to the north of the Blackdown Hills Downs AONB. Views to the south are restricted by the steep heavily vegetated Blackdown Hills. To the north views comprise middle and long-distance open views of a predominantly flat arable landscape from residences and PRowS. Views of transportation corridors are not available within these views.
Rapps	A flat rural landscape comprising arable irregular medium size fields with small clusters of residential properties and farmsteads. Views across the settlement are predominantly short and middle distance in nature and restricted by intervening vegetation along field boundaries and rural lanes. To the west of the settlement glimpsed views of high sided vehicles on the A358 are available in places where the road is not contained with linear screening vegetation.

7.6.68 To understand and communicate the range of views and visual amenity within the study area, and provide a baseline for assessment within the ES, 45 representative viewpoint locations have been proposed (Figure 7.4 ZTV and Proposed Viewpoints) based on the output of the ZTV, initial site visits to the study area, and initial discussions with Officers at Taunton and West Somerset Council, SSDC, NE, and the Blackdown Hills AONB.

7.6.69 A description of the baseline condition for each of the 45 representative viewpoints is provided in Appendix 7.2 Visual Baseline with winter, summer, and night-time photographs provided on Figure 7.9 Viewpoint Photographs.

### Future baseline

7.6.70 The future baseline landscape will be identified and assessed in further detail throughout the Environmental Impact Assessment (EIA). This will be reported into the ES which supports to DCO application.

7.6.71 It is noted that there is a prominence of ash trees within the study area. Officers at the local authorities and Blackdown Hills have highlighted the risks to the landscape associated with ash dieback and the resultant impact on hedgerow trees and woodlands, and their contribution to the landscape character of the area. Ash dieback is a disease affecting the UK, and is not as a result of the proposed scheme. However, the design and construction will incorporate actions to minimise the effects of ash dieback. This will include careful specification and sourcing of ash stock for the proposed scheme.

7.6.72 Additional development within the study area will include the mixed-use Nexus 25 site, potential development of the former Horlicks site in Ilminster and some small-scale developments within settlement limits of local villages. The effects if these will be incorporated into the baseline assessment or the combined effects assessment in this chapter. This will be reported in the ES which supports the DCO application.

7.6.73 Other considerations for future baseline include the planned forestry operations proposed to occur on the edge of the Blackdown Hills AONB. The assessment will consider the extent to which this may change (widen or enclose) the landscape setting of the AONB, and availability of views in the direction of the proposed scheme.

## 7.7 Potential impacts

7.7.1 This section sets out the sources of landscape and visual impact from the proposed scheme. The impacts from the proposed scheme are considered with embedded, essential mitigation and enhancements included.

### Construction impacts

#### Landscape

7.7.2 Sources of potential impact on the landscape resource within the study area during construction include:

- Permanent removal of trees, hedgerows and other vegetation, both along the online and offline sections of the route of the proposed scheme.
- Temporary presence and movement of construction machinery used in earthworks, highway and structures construction on the site of construction and haul roads.
- Temporary presence of HGVs delivering materials and removing waste to and from the compound along the haul road and on the public highway (designated routes).
- Presence of temporary fencing, compounds (main and satellite), earthworks, and material storage areas.
- Early establishment of permanent environmental mitigation.
- Early establishment of permanent flood compensation and drainage features, such as balancing ponds and flood compensation areas.
- Creation of permanent earthworks, such as the cuttings at Stoke Road and Mattock's Tree Green junction and embankments for overbridges and the Ashill junction.
- Construction of permanent low embankments along the route of the proposed scheme.
- Construction of new and replacement permanent structures over local watercourses, such as the river Ding, and for the new junctions at Ashill and Mattock's Tree Green.
- Construction of permanent revised road arrangements at the Nexus 25 roundabout, and the dedicated left slip onto the A303 at Southfields roundabout.
- Permanent revision of the northbound on, and southbound off slips for the M5 at junction 25.
- Construction and use of temporary diversions and altered accesses during construction.
- Temporary reduction in tranquillity due to daytime and night construction activities and any night-time lighting (including any security lighting at compounds).

#### Visual

7.7.3 Sources of potential impact on visual amenity during construction include:

- Permanent tree, hedgerow and vegetation removal.
- Temporary presence and movement of construction machinery, and HGVs delivering materials, in views.
- Early establishment of permanent environmental mitigation (principally woodland or hedgerow improvements).
- Early establishment of permanent flood compensation and drainage features, such as balancing ponds and flood compensation areas.
- Creation of permanent earthworks, such as the cuttings at Stoke Road and Mattock's Tree Green junction and embankments for overbridges and the Ashill junction.
- Construction of permanent low embankments along the route of the proposed scheme.
- Construction of new and replacement permanent structures over local watercourses, such as the river Ding, and for the new junctions at Ashill and Mattock's Tree Green.
- Construction of permanent revised road arrangements at the Nexus 25 roundabout.
- Permanent revision of the northbound on, and southbound off slips for the M5 at junction 25.
- Construction and use of temporary diversions and altered accesses during construction.
- Presence of temporary fencing, compounds (main and satellite), earthworks and material storage areas.
- Temporary reduction in tranquillity due to activities and any night-time lighting (including any security lighting at compounds).

## Operational impacts

### Landscape

7.7.4 Sources of potential adverse and beneficial impact on the landscape resource during operation of the proposed scheme include:

- Tree and vegetation loss when compared to baseline at year 1, as any mitigation planting will be immature.
- Additional woodland planting incorporated into the proposed scheme to reduce visual impacts and improve landscape integration of the proposed scheme (additional planting to the early planting noted in paragraph 7.7.2).
- Presence of the widened A358 corridor and increased prominence in the landscape along the online section of the proposed scheme.
- The presence of the A358 corridor in new landscapes that did not previously have road infrastructure along the offline section of the proposed scheme.
- The extent, scale, and design of earthworks.
- The materials and appearance of proposed structures for the works (e.g. junctions, bridges, and retaining walls).
- Addition or removal of lighting along the A358 corridor.
- Addition of road signage along the A358 corridor.
- Any changes to the existing strategic green infrastructure network.
- Establishment and growth of planting for landscape mitigation and integration (particularly at year 15).

### Visual

7.7.5 Sources of potential impact on visual amenity during operation include:

- Tree and vegetation loss when compared to baseline increasing visibility of the A358 (particularly at year 1, as any mitigation planting will be immature).
- Presence of widened A358 corridor and increased prominence of traffic in views.
- Presence of the A358 corridor and associated traffic in some views that did not previously have road infrastructure along the online section, causing dust and visual intrusion.
- The extent, scale, and design of earthworks.
- The materials and appearance of proposed structures for the works (e.g. junctions, bridges, and retaining walls).
- Changes to lighting along the A358 corridor.
- Changes to road signage along the A358 corridor.
- Engineering or environmental features enclosing or changing views towards the Blackdown Hills AONB or other landscape features.
- Establishment of planting for visual mitigation (particularly at year 15).

## 7.8 Design, mitigation and enhancement measures

7.8.1 Environmental assessment and design shall incorporate essential mitigation measures using a hierarchical system as follows:

- 1 – Avoidance and prevention: design and mitigation measures to prevent the effect (e.g. alternative design options or avoidance of environmentally sensitive sites).
- 2 – Reduction: where avoidance is not possible, then mitigation is used to lessen the magnitude or significance of effects.
- 3 – Remediation: where it is not possible to avoid or reduce a significant adverse effect, these are measures to offset the effect.

7.8.2 In accordance with DMRB LA 107 *Landscape and visual effects* [1], the landscape design for the A358 will seek to:

- *“to deliver excellence in design quality that responds to the needs of people and places...”*
- *to deliver an inclusive, resilient and sustainable design solution.”*

7.8.3 The landscape objectives for the proposed scheme are to:

- link with local green infrastructure strategies, initiatives, and strategic green infrastructure opportunities
- consider distant views from the Blackdown Hills AONB (day and night)
- inform engineering design to avoid or reduce impacts
- respond to the rural characteristics of the wider landscape
- reinforce landscape structure perpendicular to, as well as along, the road corridor
- reinstate vegetation and screening function lost alongside existing road corridor during construction
- deliver environmental elements/mitigation with multiple functionality
- design planting and structures to respond to local typologies and characteristics

## Embedded mitigation

- 7.8.4 Full details of embedded mitigation proposed for the proposed scheme are presented in Chapter 2 The Project. DMRB LA 104 [17] defines mitigation as set out below:
- Embedded mitigation: design measures which are integrated into a project for the purpose of minimising environmental effects.
  - Essential mitigation: mitigation critical for the delivery of a project which can be acquired through statutory powers.
- 7.8.5 Specific embedded essential mitigation as it relates to landscape and visual impacts is described below:
- Revision of proposed access arrangements to Merryfield Airfield and Rapps to avoid potential impacts on Ashill Wood/Every's Copse ancient woodland and nearby mature trees.
  - Positioning Bickenhall Lane overbridge at a location where it has minimised height compared to the surrounding landscape due to the A358 being in cutting.
  - Positioning Village Road overbridge further north to avoid visual impacts on residential properties in close proximity, and landscape impacts on mature hedgerow trees to the south.
  - All bridge structure wing-walls parallel to the road corridor where possible to:
    - avoid prominent wing-walls in views from the wider landscape
    - allow hedgerow planting on approaches to get as close as possible to the A358
    - result in visual narrowing of cuttings at Stoke Road and Mattock's Tree Green
    - minimise the scale of the 'notch' through North Curry Sandstone Ridge LLCA
  - Re-design of property access at Jordans to avoid impacts on mature trees near the existing entrance.
  - Addition of a new PRow link to the west of the proposed scheme between Nexus 25 roundabout and Stoke Road to retain views towards Stoke Hill and Blackdown Hills AONB without the proposed scheme and passing traffic restricting or interrupting the view.
  - Widening online sections to one side only, where possible, to increase the retention of existing vegetation and its associated screening and landscape functions.

## Essential mitigation

- 7.8.6 Essential mitigation is defined as measures required to reduce and if possible offset likely significant adverse environmental effects, in support of the reported significance of effects in the environmental assessment.
- 7.8.7 Landscape mitigation has been proposed with reference to DMRB LD 117 *Landscape design* [38]. Proposed essential mitigation is presented on Figure 7.8 Environmental Mitigation Plan.
- 7.8.8 The environmental mitigation delivers multiple functions across topics, for example a woodland area to provide habitat creation and visual screening. Landscape mitigation measures proposed include:

- marshy grazing grassland
- roadside grassland
- scrub
- waterbodies and associated plans
- wet woodland and grassland mosaic
- grassland creation with scattered trees
- native species hedgerows
- native species hedgerows with trees
- native species woodland
- species rich (or conservation) grassland
- woodland edge management
- tree planting, gap filling, or enhancement of existing hedgerows away from the immediate scheme footprint.

#### Construction mitigation

7.8.9 The following landscape and visual mitigation measures will be applied during construction through the development of an Environmental Management Plan (EMP) that will be produced for the ES and submitted as part of the DCO application:

- Keeping a well ordered and tidy site, minimise stockpiles, with delivery of goods on an “as needed” basis.
- Use appropriate storage of waste materials and nets where required for both storage and transport of light materials, such as paper and cardboard.
- Vegetate soil storage areas where possible, and where they will be present for more than 6 months.
- Within temporary works areas, position taller or more visually intrusive elements in lower or less visible areas, or further from visual receptors.
- Works limited to daylight hours in the most part, with any night works kept to a minimum.
- Use solid site hoarding around compounds to reduce visibility of construction activities.
- Minimal, low level and directional lighting should be used for compound security and night works, whilst successfully meeting safety requirements.
- Works to be in accordance with BS 5837:2012, will seek to retain and protect existing significant trees and blocks of woodland during the construction period in accordance with the actions included in the EMP.
- Existing trees and vegetation to be retained would be protected during the construction phase based on a pre-agreed Tree Protection Plan and associated drawings, with protective fencing or ground protection provided where deemed necessary, in accordance with BS 5837:2012.
- Advanced planting of landscape and ecological mitigation areas where no engineering works are required.
- Treat exposed earthworks with seed mixes as soon as possible to reduce visual prominence prior to final landscape scheme being implemented.
- Retain vegetation and trees along the western side of the A358, where possible, through refined design of the proposed scheme and considered construction methodologies.
- Retain notable specimen trees where possible, within or adjacent to the proposed scheme, through local adjustments to earthworks, local roads, and construction methodology.

- Seek to avoid impacts to Ashill Wood/Every's Copse and Bickenhall wood, through understanding the extent of tree root areas and careful siting, detailing, and construction of the proposed access route to Merryfields Airfield.
- Mitigation design is being developed to avoid or reduce the potential for construction impacts to occur within the study area. This would seek to employ best-practice methods. As far as reasonably practicable, mitigation will include the following:
  - Where screening earthworks are proposed, such as bunds, as part of the wider mitigation design strategy, they would be constructed as early as is practicable to provide screening to the construction work.
  - Insertion of landscape planting of woodland early in the construction period to reduce visual impacts.
  - Develop the layout of compounds, soil storage, and other construction facilities sympathetically within the landscape.
  - Additionally, temporary construction buildings, fencing and facilities would be in appropriate tonal colours to reflect the overall landscape as well as screened in part by solid hoardings.
  - Ensure soil structures are protected where land would be used temporarily, such as for compounds, haul roads, re-grading areas, so that when it is returned to the existing land use, it is in a suitable condition.
  - Establishment of advanced planting for softening and filtering views of the construction and subsequent operational phase, as well as part of the wider visual mitigation if land is not required for other construction activities.

#### Operational mitigation

7.8.10 The following landscape and visual mitigation measures will be applied during operation:

- Native hedgerows, hedgerows with trees and blocks of planting to respond to the vernacular land cover, enhance green infrastructure networks crossing the A358, and reducing the visibility of the proposed scheme.
- Use of planting stock from local provenance suppliers.
- Appropriate grass mixes used on cutting and embankment slopes in locations where tree and shrub planting may not be appropriate or possible.
- Lighting will be kept to a minimum as required for safety purposes, with lighting proposed on approach to Southfields and Nexus 25 roundabouts only, with none along the mainline, overbridges, and Ashill and Mattock's Tree Green junctions.
- All lighting columns will be kept to a minimum height at maximum spacing and be directional to minimise effects on properties and the wider night sky.
- Bridge abutments perpendicular to the A358 to create visual narrowing through cuttings at Stoke Road and Mattock's Tree Hill and allow planting to go as close to the A358 as possible for visual screening and ecological connectivity.
- Consideration given to colour, texture, and materials of structures and their relationship to the local landscape character.
- Earthworks designed to reflect the form and characteristics of the surrounding landscape, which may change along the length of the proposed scheme.

- Providing off-site landscape and visual mitigation, such as hedgerow improvements, where it provides benefit to landscape character and/or visual receptors.
- Reduce prominence of A358 on de-trunked sections through decluttering of signage and highway features.

### Enhancement

7.8.11 Enhancements to the landscape character and visual amenity will be explored prior to the preparation of the ES and could include:

- Potential repurposing of the de-trunked A358 for local access. The remaining areas of the A358 no longer used as trunk road could be narrowed to improve local walking and cycling routes.
- Allowing public access to areas of environmental mitigation as education and natural open space.
- Within the proposed scheme boundary Linking planting typologies and proposals with existing local initiatives and strategies.

## 7.9 Assessment of likely significant effects

7.9.1 This section presents the assessment of likely significant effects on landscape and visual amenity resulting from the construction and operation of the proposed scheme.

7.9.2 The assessment of effects takes into account the potential impacts to each receptor following the implementation of embedded and essential mitigation measures to determine the significance of the residual effects.

### Construction effects

#### Landscape

7.9.3 Impacts potentially arising from the proposed scheme are described in detail within the LLCA assessments below.

#### *NCA 143, Mid Somerset Hills*

7.9.4 For the NCA, the impacts during construction will result in a reduction to tranquillity and loss of some features characteristic to NCA (most notably within North Curry Sandstone Ridge LLCA). However, the impacts to landscape character and features will be limited to the vicinity of the proposed scheme and not impact the wider character. The overall balance and features of the NCA will remain as the baseline condition.

7.9.5 This is assessed to be a negligible adverse magnitude of change resulting in a neutral significance of effect.

#### *Vale of Taunton Deane LLCA*

7.9.6 The majority of the offline section of the proposed scheme passes through the Vale of Taunton Deane LLCA south-east of the M5 junction and through to Ashe. The LLCA also contains a length of the proposed scheme from north of the Somerset Progressive School to just west of Griffin Lane.

7.9.7 Impacts within this LLCA during construction include:

- Construction activity taking place at scale within a rural landscape to the east and west of Stoke Road away from the existing A358.
- Earth moving activities associated with the cutting around Stoke Road, low embankment for mainline on approach to Nexus 25, creation of flood compensation areas, Stoke Road overbridge, realignment of Cad Brook, and highway drainage features.
- Vegetation removal will result in the loss of mature field trees to the east and west of Stoke Road, along Thornwater Stream, severance of a block of woodland north of Griffin Lane, a section of the naturalised disused railway corridor to the west of the Somerset Progressive School, and vegetation alongside the existing A358 to the south-east of the Somerset Progressive School.

7.9.8 The area to the east and west of Stoke Road experiences the most profound impact, with the proposed scheme bisecting areas of large open fields, bounded by hedgerows with mature hedgerow oaks typical of the area on its approach west towards Taunton. The impacts on this LLCA during construction would be uncharacteristic of the area and influence the perception of character within an area up to 500m of the proposed scheme to the south-west towards Haydon but with no influence on character to the north of the existing A358. The character of the LLCA will change through presence of activity within a generally static landscape, reduction in tranquillity, loss of landscape features, increase of urbanising features in a rural landscape, and change of land use.

7.9.9 This is assessed to be a major adverse magnitude of change due to large-scale impact to existing landscape character, including fields, the village of Henlade and settlements between the existing A358 and new offline section, caused by construction works and associated vehicles and deliveries. This is assessed to result in a large adverse significance of effect.

#### *North Curry Sandstone Ridge LLCA*

7.9.10 The proposed scheme is located across the south-western extent of the North Curry Sandstone Ridge at Mattock's Tree Hill, which typifies much of what characterises this area: an elevated ridge offering a simple setting of undeveloped agricultural land.

7.9.11 Impacts within this LLCA during construction include:

- Construction activity taking place at scale within an elevated rural landscape across the south-western extent of the LLCA.
- Earth moving activities associated with the cutting for the mainline, slip roads, link into Ashe, and access to nearby properties.
- Creation of temporary stockpile areas.
- Vegetation removal will result in the loss of prominent mature field trees at the top of the ridgeline, field boundaries, trees and vegetation at and opposite the entrance to Ashe Farm Caravan and Camping site, and along a section of the existing A358.

7.9.12 Notable changes will be experienced to the character of this LLCA. To the south-west of the A378, the impacts on this LLCA during construction will result in wholesale changes to the character of the area and influence the perception of character – at the end of the ridgeline just after it rises out from Ashe. However, to the north-east of the existing A358 the impact on this LLCA diminishes quickly due to the presence of intervening vegetation and buildings limiting perceptual

impacts, with tranquillity impacts limited by the presence of vehicles on the A358 and A378.

- 7.9.13 The change to landform will result in large-scale damage to existing landscape character and the distinctive ridgeline profile, alongside the addition of new uncharacteristic features due to the change from rural fields to extensive construction activity – however limited to the south-western extent of the LLCA.
- 7.9.14 This is assessed to be a moderate adverse magnitude of change, based on the loss and extensive damage to existing landscape character of Mattock's Tree Hill, an asset of local cultural value, and nearby settlements, caused by construction works and associated vehicles and deliveries. This is assessed to result in a moderate adverse significance of effect.

*Fivehead Farmed and Wooded Vale LLCA*

- 7.9.15 The proposed scheme is located along the existing A358 corridor, with new overbridges proposed at Griffin Lane, Bickenhall Lane, and Village Road (near Capland) extending the proposed scheme into the wider landscape.
- 7.9.16 Impacts within this LLCA during construction include:
- Construction activity along the A358 and within a rural landscape adjacent to the existing road corridor.
  - Soil storage and compound areas.
  - Earth moving activities associated with the embankments and cuttings along the road corridor and for proposed overbridges.
  - Engineering activities associated with new overbridges at Griffin Lane, Bickenhall Lane, and Village Road (near Capland).
  - Potential loss of TPO trees near Bickenhall Lane (subject to Tree Survey and design development) and mature trees along Fivehead River Main Channel 1.
  - Vegetation and tree removal alongside the existing A358 including impact on the edge of a woodland south of Bickenhall Lane and small copse south of Capland.
- 7.9.17 The loss of vegetation alongside the road corridor would increase the influence of traffic using the existing A358 on the landscape character during the construction phase. Although the change will be notable due to loss of existing features and presence of construction activity, the influence on the wider character and perception of the LLCA will be limited, although overall tranquillity will be reduced.
- 7.9.18 The proposed scheme is designed to avoid impacts on Bickenhall ancient woodland and vegetation along the western side of the A358 to the north.
- 7.9.19 This LLCA is primarily affected by the road widening elements of scheme as the alignment moves south-east so the impact is less significant. However, earthworks associated with the re-configuring of local roads around the Village Road bridge (near Capland) will create elevated embankments to carry a road bridge otherwise atypical of this character area.
- 7.9.20 This is assessed to result in a moderate adverse magnitude of change due to works associated with construction resulting from partial loss to existing landscape character and addition of new uncharacteristic, noticeable features or elements. This is assessed to result in a moderate adverse significance of effect.

*Lower Lias Foothills and Lowland LLCA*

- 7.9.21 The proposed scheme is located along the existing A358 corridor, with the Stewley Link, Broadway Street link, and the junction and overbridge at Ashill extending the proposed scheme into the wider landscape.
- 7.9.22 Impacts within this LLCA during construction include:
- Construction activity along the A358 and within a rural landscape adjacent to the existing road corridor.
  - Temporary soil storage and compound areas.
  - Earth moving activities associated with the embankments and cuttings along the road corridor, link roads and for the Ashill junction.
  - Engineering activities associated with new overbridge at Ashill.
  - Vegetation and tree removal alongside the existing A358, particularly between Kenny and Ashill, and south of Rapps.
  - Loss of some high-quality individual hedgerow, field, and parkland trees, particularly between the proposed scheme and Venner's Water, around a pond south of Ashill junction, and at the interface with Jordans park.
- 7.9.23 The loss of vegetation alongside the road corridor would increase the influence of traffic using the existing A358 on the landscape character during the construction phase. Between Venner's Water and the A358 and between Ashill and Rapps, larger scale construction activity will have a greater impact on landscape character within that area of the LLCA. Although the change will be notable due to loss of existing features and presence of construction activity, the influence on the wider character and perception of the LLCA will be limited, although tranquillity will be reduced.
- 7.9.24 The proposed scheme is designed to avoid impacts on Ashill Wood/Every's Copse ancient woodland and vegetation along the western side of the A358 to the north.
- 7.9.25 This LLCA is primarily affected by the road widening elements of scheme as the alignment moves south-east so the impact is less significant. However, earthworks associated with the re-configuring of local roads around the Village Road bridge (near Capland) will create elevated embankments to carry a road bridge otherwise atypical of this character area.
- 7.9.26 This is assessed to result in a moderate adverse magnitude of change due to works associated with construction resulting from partial loss to existing landscape character, loss of distinctive features with some mature tree stock, and addition of new uncharacteristic, noticeable features or elements in the form of the Ashill overbridge and slip-roads. This is assessed to result in a moderate adverse significance of effect.

Visual

- 7.9.27 A description of the preliminary nature of change and significance of effect during construction from the representative viewpoint locations is provided below in Table 7-9 (locations are shown on Figure 7.4 ZTV and Proposed Viewpoints).

**Table 7-9 Representative viewpoints construction**

Number	Nature of change	Magnitude of impact	Significance of effect
1	Change in nature of view from rural fields to close proximity views of large-scale construction activity associated with Stoke Road overbridge and earthworks for the cutting, demolition of a property on the skyline at Stoke Road will also be visible. Construction activity would become the dominant feature of the view.	Major adverse	Very large adverse
2	Construction activity would be readily apparent across the view in the middle-ground. Two bungalows would be removed to provide space for the A358. Pastoral fields would be divided by the construction activity, this would result in the loss of hedgerows and hedgerows with trees surrounding arable fields. Construction of the Stoke Road overbridge would cause tree and hedgerow loss around housing and farmsteads. Movement of construction vehicles/machinery would be visible during the period. Although the construction impacts and activity will be prominent features and change the nature of the view, the long distance and panoramic views will still be the dominant feature of the view.	Moderate adverse	Large adverse
3	Taller construction machinery visible in a small part of the view above existing vegetation above existing hedgerows. This will be at a distance and scale that it would form a barely noticeable feature of the view. This impact will be further reduced in summer months with intervening trees and hedgerows in leaf.	Negligible adverse	Slight adverse
4	Change in nature of view from rural fields to close proximity views of large-scale construction activity within the field beyond the first hedgerow in the view. Removal of mature trees from the view in adjacent or nearby fields will be noticeable. Views towards Stoke Hill and the Blackdown Hills AONB would remain in the middle ground and background. The impact will reduce to some degree in summer months due to screening by hedgerows, however construction activity will still be a prominent feature for much of the view. Due to the nature of change and proximity to the receptor, the proposed scheme will become the focal point of the view and detract from the amenity of more distant views.	Major adverse	Very large adverse
5	Hedgerows and hedgerows with trees will be removed resulting in more openness across the landscape in the middle ground of the view. Earthworks and construction activity will be visible across the view, closest just beyond Glebe Cottages and further away towards and past Stoke Road. Movement of construction vehicles/machinery would be visible during the period. In summer months, the impact will remain similar to the nature of the elevated view and position of the proposed scheme within the	Moderate adverse	Large adverse

Number	Nature of change	Magnitude of impact	Significance of effect
	landscape. Existing vegetation and landform will screen views south towards construction activity associated with Mattock's Tree Green junction. Although the construction impacts and activity will be prominent features and change the nature of the view, the long distance and panoramic views will still be the dominant feature of the view.		
6	Construction will change the appearance of agricultural fields in the middle ground of the view, increasing activity and movement. Part of the woodland north of Greenway Lane will be lost, allowing visibility of construction work and vehicles. In summer months, the impact will remain similar due to the nature of the elevated view and position of the proposed scheme within the landscape. Existing vegetation and landform will screen views east towards construction activity associated with Mattock's Tree Green junction. Although the construction impacts and activity will be prominent features and change the nature of the view, the long distance and panoramic views will still be the dominant feature of the view.	Moderate adverse	Moderate adverse
7	The central field within the middle ground of the view will feature large-scale construction activity associated with the cutting, slip roads, and overbridge structure. As the field is already exposed, construction work would be clearly visible from the PRoW. There will be a loss of hedgerows and trees from the ridgeline. In summer months intervening vegetation will screen some construction activity, but a large proportion of the view will remain unchanged from winter. Due to the landform facing the viewpoint and its prominence in the view, construction activity would become the dominant feature or focal point of the view.	Major adverse	Large adverse
8	Trees and hedgerows around the boundary of the field, and nature of topography between the viewpoint and the proposed scheme, will screen construction work, leaving views unaltered from the PRoW.	No change	Neutral
9	Segregation of fields and loss of hedgerows and hedgerow trees will be a noticeable change to the view. Construction activity will be clearly visible across a large proportion of the view. This will include activity associated with the cutting, slip roads, the links to Ashe and nearby properties, and overbridge structure. Due to the landform facing the viewpoint and its prominence in the view, construction activity would become the dominant feature or focal point of the view. The impact will remain similar in summer and winter.	Major adverse	Large adverse

Number	Nature of change	Magnitude of impact	Significance of effect
10	Existing vegetation alongside the A358 will be removed, resulting in increased views of the traffic along the A358. Construction activity will predominantly be on the opposite side of the A358 from this viewpoint and will be associated with widening works. In summer months any vegetation retained alongside the A358 or taller trees to the west will reduce visibility of construction activity. Construction activity will form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
11	All views towards the construction works will be obscured by landform and existing vegetation.	No change	Neutral
12	Construction activity in small proportion of very distant views located at the current position of the A358 in the view. There would be a small increase in the prominence of the A358 and construction area due to vegetation removal.	Negligible adverse	Slight adverse
13	Removal of hedgerow with trees would open views towards the proposed scheme. A section of an arable field next to A358 would be used to widen the A358. Earthworks, construction vehicles, and activities associated with the Village Road overbridge will be clearly visible, and become the dominant feature, across the view.	Major adverse	Large adverse
14	Trees/hedgerow to the north of the receptor would be removed resulting in views opening to the east. This combined with the flat topography would result in the road and passing traffic becoming a more noticeable feature within the view. Construction activity visible along the highway corridor. Earthworks and construction associated with the Bickenhall Lane overbridge will be noticeable to the north, beyond the existing Bickenhall Lane – the flat nature of the landscape and presence of existing hedgerows limits the influence of this on the overall nature of the view. The impact will remain similar in summer and winter.	Moderate adverse	Moderate adverse
15	Clearance of vegetation along the A358 will expose views towards construction activity and passing traffic. Removal of hedgerow and hedgerow with trees to allow for the reprofiling of ground to create the Village Road overbridge. Changes will be noticeable across the background of the view but will not change the overall balance of features and elements that comprise the existing view. In summer, hedgerow trees along the local road will filter views towards construction activity although it will still be perceptible.	Minor adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
16	Hedgerow with trees will be removed on either side of the existing carriageway opening views towards the construction and passing traffic. Construction associated with Village Road and Bickenhall Lane overbridges will be visible within the background of the view. In summer, intervening hedgerow trees will provide some screening of the proposed scheme. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
17	Some views of construction activity will be possible in the background, resulting in very small change to distant elements of the view. In summer, intervening hedgerow trees will provide some screening of the proposed scheme. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Negligible adverse	Slight adverse
18	Close proximity views towards vegetation clearance opening up views towards vehicles on the A358. Construction activity and earthworks within fields to north of A358 for widening and Stewley Link. Construction activity will become the dominant feature or focal point of the view in summer and winter.	Major adverse	Large adverse
19	Removal of hedgerow and, in some cases, associated trees, to allow for the widening of online section will increase visibility of vehicles on the A358. This will also result in exposed views into the construction site and of any vehicles/activities being used/undertaken during the construction process. Activities associated with the Village Road overbridge will also be visible. The change will take place at the middle to background of the view. This will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
20	Construction machinery and earthworks would become a readily apparent feature crossing the background of the view. This will be associated with the A358 widening and the Stewley Link slightly down the slope, visible above the tree line along Venner's Water.	Moderate adverse	Moderate adverse
21	Views of larger construction machinery will be visible between and above trees in small proportions of the background view. Slight increase in prominence of passing vehicles along the A358 in the middle ground of the view due to vegetation removal. The overall nature of the view remains as baseline condition.	Negligible adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
22	Construction activity to widen the A358, create Ashill junction, and the Stewley Link will be clearly visible and become the dominant feature of the view. Over the course of construction, the background view towards trees beyond the A358 will become obscured by earthworks associated with the junction.	Major adverse	Large adverse
23	Hedgerows with trees and tree planting would be removed to alongside the A358 and for the Ashill junction, resulting in exposed views of construction work and vehicles using the A358. The works associated with the junction profiling and overbridge construction will be most prominent, however works associated with Stewley and Broadway Street links will also be visible. Mature field/hedgerow trees between the viewpoint and the A358 will be removed. Activity will take place at a lower elevation to the viewpoint in the middle ground, the foreground of the field and distant views towards Ilton and beyond will remain. The impact will be similar during winter and summer. Overall, construction activity would form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
24	From ground level, vegetation loss will open views towards construction work activities and vehicles on the A358 within a small part of the background of the view. Views are more likely to affect residents from the top floor windows of houses with construction activity taking place in nearby fields associated with the Ashill junction and Stewley Link. The impact will be similar during winter and summer. Overall, construction activity would form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
25	Hedgerows and trees along the A358 will be removed to allow space to expand the dual carriageway within the field in the foreground of the view. There will be open views towards the proposed scheme and of vehicles on the A358 for residents, users of the road, and PRowS. Once established, soil storage areas between the viewpoint and the proposed alignment will screen some construction activity and passing vehicles. Views beyond the A358 to the Blackdown Hills horizon line will remain. The changes will form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
26	The individual mature oak tree at the centre of the viewpoint photograph will be removed with construction activity extending from the existing A358 to the north side of the tree position. A new entrance to Jordans will be created. There will be open views of construction work and vehicles on the A358, from the PRow and potential filtered views from the residential property within Jordans park. Impacts will	Major adverse	Large adverse

Number	Nature of change	Magnitude of impact	Significance of effect
	be similar during summer and winter. Construction activity will become the dominant feature focal point of the view.		
27	Construction activity to widen the A358, create Ashill junction, and the Stewley Link will be clearly visible and become the dominant feature of the view. The visibility of traffic on the A358 will be increased. The distant horizon line will remain visible beyond construction activity. Impacts will be similar during summer and winter.	Major adverse	Large adverse
28	Hedgerow with trees alongside the A358 will be removed to widen the corridor resulting in exposed views towards the construction work, passing vehicles on the A358, and any machinery/vehicles being used. The vegetated background of the view beyond will remain. Due to lack of intervening vegetation between the viewpoint and the proposed scheme, the impacts will be similar during summer and winter. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
29	Hedgerow with trees alongside the A358 will be removed to widen the corridor resulting in exposed views towards the construction work, passing vehicles on the A358, and any machinery/vehicles being used. The vegetated background of the view beyond will remain. Due to lack of intervening vegetation between the viewpoint and the proposed scheme, the impacts will be similar during summer and winter. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
30	Views of larger construction machinery will be visible between intervening trees in small sections across the background view. Slight increase in prominence of passing vehicles along the A358 in the middle ground of the view due to vegetation removal. The overall nature of the view remains as baseline condition.	Negligible adverse	Slight adverse
31	Vegetation to the south of A358 and hedgerow to the north will be removed. Widening and presence of construction activity associated with A358 widening and construction of the Stewley Link will be visible in close proximity within foreground of the view in both summer and winter. Further south there will be more distant views towards construction of the Ashill junction, screened to some extent by landform. Beyond the proposed scheme, views of trees along Venner's Water, the rolling agricultural landscape, and long-distance views will remain. Construction activity will would form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse

Number	Nature of change	Magnitude of impact	Significance of effect
32	<p>The group of three mature field trees will be removed due to construction of the A358 widening, Stewley Link and drainage features (opportunities to retain will be explored through use of Tree Survey and design development in advance of the ES). All roadside vegetation to north of the existing A358 will be removed resulting in loss of positive element of the view and increased prominence of traffic on the A358. Construction of the Stewley Link will take place in the foreground of the view across the fields. Construction activity will become the dominant feature or focal point of the view in both summer and winter.</p>	Major adverse	Large adverse
33	<p>Distant view over and between tree canopies to construction activity in the vicinity of Bickenhall Lane, including vegetation clearance along the A358, slight increase in prominence of passing vehicles, and earthworks associated with the Bickenhall Lane overbridge. Visibility of activity will be reduced slightly in summer months due to leaf cover on intervening trees in the middle ground. From this distance, and with the wider context of the view, construction activity would form a barely noticeable feature or element.</p>	Negligible adverse	Slight adverse
34	<p>Distant view over and between tree canopies to construction activity, including vegetation clearance along the A358 resulting in a slight increase in prominence of passing vehicles. Visibility of activity will be reduced slightly in summer months due to leaf cover on intervening trees in the middle ground. From this distance, and with the wider context of the view, construction activity would form a barely noticeable feature or element.</p>	Negligible adverse	Slight adverse
35	<p>In the background of the view, construction activity will be visible in two locations: the north of Stoke Hill and wood; and at Mattock's Tree Green. Away from these locations, visibility of the proposed scheme will be obscured by intervening landform and vegetation. Due to the elevated nature of the viewpoint and the relative position of the proposed scheme, the impact will be similar during summer and winter months.</p> <p>To the north of Stoke Hill and wood, construction activity will be visible within the distance across the fields associated with the offline section north of Stoke Road. The loss of existing trees and hedgerows will be barely perceptible, however construction movements and areas of broken ground will be perceptible.</p> <p>At Mattock's Tree Green construction activity associated with the new junction and associated earthworks will be perceptible.</p> <p>In combination, the changes to the view will add new elements to a small proportion of the background</p>	Minor adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
	view but not alter the overall balance of features and elements that comprise the existing view.		
36	<p>In the background of the view, construction activity will be visible in two locations: the north of Stoke Hill and wood; and at Mattock's Tree Green. Away from these locations, visibility of the proposed scheme will be obscured by intervening landform and vegetation. Due to the elevated nature of the viewpoint and the relative position of the proposed scheme, the impact will be similar during summer and winter months.</p> <p>To the north of Stoke Hill and wood, construction activity will be visible within the distance across the fields associated with the offline section north of Stoke Road. The loss of existing trees and hedgerows will be barely perceptible; however construction movements and areas of broken ground will be perceptible.</p> <p>At Mattock's Tree Green construction activity associated with the new junction and associated earthworks will be perceptible.</p> <p>In combination, the changes to the view will add new elements to a small proportion of the background view but not alter the overall balance of features and elements that comprise the existing view.</p>	Minor adverse	Slight adverse
37	<p>To the north of Stoke Hill and wood, construction activity will be visible within the distance across the fields associated with the offline section north of Stoke Road. The loss of existing trees and hedgerows will be barely perceptible; however construction movements and areas of broken ground will be perceptible in summer and winter.</p> <p>At Mattock's Tree Green construction activity associated with the new junction and associated earthworks will be perceptible in glimpsed views, more so in the winter than the summer due to vegetation in the foreground.</p> <p>The change to the view will add new elements to a small proportion of the background view but not alter the overall balance of features and elements that comprise the existing view.</p>	Minor adverse	Slight adverse
38	Vegetation removal, construction machinery and earthworks along the A358 further highlight its position within the landscape through increasing the prominence of vehicles on the A358 in the distant view. Construction activity to north of Stoke Hill will be additional change to view where no movement is present in the baseline view, screened to some degree by surrounding vegetation and forms a small proportion of the overall view. The overall nature of the baseline condition would remain.	Negligible adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
39	Construction machinery and earthworks along the A358 further highlight its position within the landscape, with vegetation removal increasing the prominence of vehicles on the A358 in the distant view. The nature of the change will be similar in winter and summer months. The change would be to a small proportion of the overall view and the nature of the baseline condition would remain.	Negligible adverse	Slight adverse
40	Construction machinery and earthworks to north of Stoke Hill will result in a change to the background of the view where there is no movement or vehicles in baseline. Activity would be screened to some degree by surrounding vegetation and forms a small proportion of the overall view. The nature of the change will be similar in winter and summer months. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
41	Layers of existing trees and slight variations in topography screen views towards the proposed scheme.	No change	Neutral
42	Vegetation removal along the A358 will increase the visibility of passing traffic. Construction activity will be visible in a small proportion of the view, between foreground hedgerow with trees that provide visual screening. Visibility of construction activity will be reduced by screening effect provided by existing vegetation in the summer months. The change will be perceptible but not alter the overall balance of the features/elements that comprise the existing view.	Minor adverse	Slight adverse
43	Clear view across field towards construction activity within the middle ground of the view beyond the field boundary hedgerow. The photograph illustrates a glimpsed through a field gate which is a glimpsed view for people walking, cycling, or driving along the road. Therefore, the impact will be perceptible but not alter the overall balance of features and elements that comprise the existing view along the road. Distant views towards properties at Henlade and towards the distant hills will remain.	Minor adverse	Slight adverse
44	Top of larger construction machinery visible in a small proportion of the view above existing tree line at location of Village Road overbridge. This will form a barely noticeable feature or element of the view.	Negligible adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
45	View across roadside hedgerow into field containing construction activity associated with A358 widening. Notable impacts include removal of mature hedgerow vegetation within the proposed scheme boundary and presence of earth-moving and vehicles across the view. Removal of vegetation alongside the A358 will increase the visibility of passing traffic. Construction will include the widened A358 and associated drainage features. Construction activity will form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
View from the road	<p>Construction activity will be visible along the A358 throughout the construction period. This will be a detractor to the existing rural context along the corridor.</p> <p>The removal of vegetation alongside the road corridor will open up views to the wider landscape which, viewed across construction activity, will increase perception of the wider landscape context and create a more varied journey.</p> <p>In most locations, construction activity will be predominantly on a single side of the road, however at junction and overbridge locations the nature of the view will be similar to driving through a construction site with little visual amenity due to activity all around the road corridor.</p> <p>For the majority of the corridor, the change will be a noticeable feature or element of the view which is readily apparent to the receptor.</p>	Moderate adverse	Slight adverse

## Operational effects

### Landscape

#### *NCA 143, Mid Somerset Hills*

- 7.9.28 Impacts from the proposed scheme are described in detail within the LLCA assessments below.
- 7.9.29 For the NCA, the impacts during year 1 will result in a reduction to tranquillity and loss of some features characteristic to NCA (most notably within North Curry Sandstone Ridge LLCA) and addition of overbridge structures along the A358 that are not a feature of the existing character. Impacts to landscape character and features will be limited to the vicinity of the proposed scheme and not impact the wider character. The overall balance and features of the NCA will remain as the baseline condition.
- 7.9.30 This is assessed to be a negligible adverse magnitude of change resulting in a neutral significance of effect at year 1.
- 7.9.31 At year 15, mitigation will be established and further reduce the influence of the proposed scheme on the wider landscape. This is assessed to remain a negligible adverse magnitude of change resulting in a neutral significance of effect at year 1.

*Vale of Taunton Deane LLCA*

## 7.9.32 Impacts within this LLCA during operation include:

- New large scale highway infrastructure and associated vehicles within a rural landscape to the east and west of Stoke Road away from the existing A358.
- Widened A358 between north of the Somerset Progressive School to just west of Griffin Lane.
- Lighting columns on approach to Nexus roundabout.
- Change to field/landscape pattern.
- Changes to landform associated with the cutting around Stoke Road, low embankment for mainline on approach to Nexus 25, creation of flood compensation areas, Stoke Road overbridge, realignment of Cad Brook, and highway drainage features.
- Presence of the new overbridge structure at Stoke Road.
- Presence of basin drainage features into the landscape.
- A more open landscape as a result of loss of mature trees.
- Proposed vegetation within the environmental mitigation.
- Reduced tranquillity in the vicinity of the proposed scheme due to additional presence of moving vehicles, presence of urban/highway infrastructure, and presence of road noise.
- Reduced traffic on the de-trunked A358.

## 7.9.33 Environmental design and mitigation measures within this LLCA include:

- Reinstatement of hedgerow boundaries where possible.
- Gap-filling, enhancement, and tree planting within existing hedgerows to strengthen the landscape character of the rural landscape around the proposed scheme.
- Absence of hedgerow along a length of the proposed scheme to allow views across the wider landscape and adjacent fields.
- Hedgerow with tree planting to replace mitigate features lost during construction.
- A riparian corridor around the realigned Cad Brook.
- Hedgerow planting along the approach to Stoke Road overbridge to recreate the hedge-lined character to the north-east and south-west.
- Grassland areas around the proposed scheme providing seasonal variation to the landscape and potentially accessible amenity for users of existing and proposed PRoW.
- Hedgerow, trees, and planting alongside the widened section of the proposed scheme to reinstate the nature of the landscape character along the existing A358.
- Planting of small woodland blocks to mitigate severance of woodland block north of Griffin Lane, with woodland edge management on the impacted woodland.

7.9.34 The proposed scheme will result in the loss of landscape features and addition of uncharacteristic, conspicuous features to the landscape between the east and west of Stoke Road away from the existing A358. The de-trunked A358 would remain and its influence to the north-east of the LCA will be reduced due to the redistribution of traffic on to the new alignment.

7.9.35 The widening between north of the Somerset Progressive School to just west of Griffin Lane will increase the prominence of the A358 within the landscape, but

not impact features or change the wider perception of landscape character away from the corridor.

- 7.9.36 The proposed scheme will be a prominent feature in the landscape at year 1 due to the scale of change within the LLCA and immaturity of proposed planting. At year 1 this is assessed to be a major adverse magnitude of change due to large-scale impact to existing landscape character, including fields and the village of Henlade between the existing A358 and new offline section of the proposed scheme, significantly increasing the aural and visual influence of transport features on the landscape. This is assessed to result in a large adverse significance of effect.
- 7.9.37 At year 15 the environmental mitigation will be established and the impacts on landscape character will be reduced within the LLCA, particularly to the east of Stoke Road, and between north of the Somerset Progressive School to just west of Griffin Lane. The mitigation will replace some of the landscape features lost although the maturity of tree planting will not be equivalent to some of the baseline tree stock lost. The influence of the proposed scheme on the wider landscape will be reduced, however the offline section to the west of Stoke Road will still result in adverse impacts on landscape pattern, landform, and tranquillity. At year 15 this will result in a moderate adverse magnitude of change due to mitigation treatments helping to reinstate some lost features and partially embed new infrastructure into local landscape character. This is assessed to result in a moderate adverse significance of effect.

*North Curry Sandstone Ridge LLCA*

- 7.9.38 Impacts within the LLCA during operation include:
- Creation of a cutting through the ridgeline, and loss of open fields towards ridge.
  - New large scale highway infrastructure and associated vehicles within a rural landscape to the west of the existing A358.
  - Addition of roundabouts and an overbridge structure.
  - New link into Ashe and access to private properties.
  - Reduced traffic on the de-trunked A358.
  - Reduced tranquillity in the vicinity of the proposed scheme due to additional presence of moving vehicles, presence of urban/highway infrastructure, and presence of road noise.
  - Change to field/landscape pattern.
- 7.9.39 Environmental design and mitigation measures within this LLCA include:
- Reinstatement of hedgerow boundaries where possible.
  - Provision of hedgerow along approaches to the overbridge to recreate a green horizon line.
  - Tree planting within the roundabout to replace lost field/hedgerow trees
  - Scattered tree planting around the slip roads to minimise prominence of cutting slopes and bridge structure.
- 7.9.40 Notable changes will be experienced to the character of this LLCA. To the south-west of the A378, the impacts on this LLCA during year 1 will result in wholesale changes to the character of the area and influence the perception of character – at the end of the ridgeline just after it rises out from Ashe. The design of bridge parapets perpendicular to the road will minimise the notch through the ridgeline

and maintain the perception of higher ground and landform. To the north-east of the existing A358 the impact on this LLCA diminishes quickly due to the presence of intervening vegetation and buildings limiting perceptual impacts, with tranquillity impacts limited by the presence of vehicles on the A358 and A378.

- 7.9.41 The change to landform will result in large-scale damage to existing landscape character and the distinctive ridgeline profile, alongside the addition of new uncharacteristic features due to the change from rural fields to extensive construction activity – however limited to the south-western extent of the LLCA. Environmental mitigation will be immature and not function to reduce impacts at year 1.
- 7.9.42 At year 1 the proposed scheme is assessed to be a moderate adverse magnitude of change, based on the loss and extensive damage to existing landscape character of Mattock's Tree Hill, an asset of local cultural value. This is assessed to result in a moderate adverse significance of effect.
- 7.9.43 At year 15 the environmental mitigation will be established and the impacts on landscape character will be reduced within the LLCA, particularly in minimising the perception of the cutting, changes to landform, and appearance of the ridgeline. Hedgerow planting alongside the link into Ashe and local properties will knit them into the landscape in a manner characteristic of the wider landscape. Although the perceptual impacts can be mitigated to some degree, the physical change to topography and presence of large-scale highway infrastructure cannot be mitigated. At year 15 this will result in a moderate adverse magnitude of change due to mitigation treatments helping to reinstate some lost features and partially embed new infrastructure into local landscape character. This is assessed to result in a moderate adverse significance of effect.

#### *Fivehead Vale LLCA*

- 7.9.44 Impacts within this LLCA during operation include:
- Widened A358 corridor.
  - Changes to landform associated with the overbridges at Bickenhall Lane and Village Road (near Capland).
  - Revised local road corridors at Bickenhall Lane and Village Road (near Capland).
  - Presence of overbridge structure at Griffin Lane.
  - A more open landscape as a result of loss of mature trees and roadside vegetation.
  - Proposed vegetation within the environmental mitigation.
- 7.9.45 Environmental design and mitigation measures within this LLCA include:
- Gap-filling, enhancement, and tree planting within existing hedgerows to strengthen the landscape character of the rural landscape around the proposed scheme.
  - Hedgerow, trees, and planting alongside the widened section of the proposed scheme to reinstate the nature of the landscape character along the A358.
  - Planting of woodland blocks to build on the strategic woodland corridor between fivehead ridge and the Blackdown Hills AONB, including additional woodland/tree planting alongside Bickenhall Wood ancient woodland.
  - Hedgerow with tree planting along approaches to overbridges to minimise impact of earthworks on wider landscape character.

- Woodland edge management on impacted woodland.
- Creation of grassland areas around Village Road overbridge.

- 7.9.46 This LLCA is primarily affected by the road widening elements of the proposed scheme. Widening to the east in the vicinity of Hatch Park will remove an existing bund planted with mature trees, it is anticipated that the outer edge of this tree belt can be retained through design development and construction to limit the influence of the road corridor on the landscape at this location.
- 7.9.47 The embankments and structures associated with Bickenhall Lane and Village Road overbridges are otherwise atypical of this LLCA. At year 1 they will be prominent features in the landscape due to the immaturity of environmental mitigation. However, the impact on the character of the wider landscape will be limited by the screening effects of features in the wider landscape and the presence of the existing A358 within the LLCA.
- 7.9.48 At year 1 the magnitude of change is assessed to be minor adverse due to slight loss or damage to existing landscape character along the A358 and addition of new uncharacteristic features and elements in the form of overbridges and a widened road corridor. This is assessed to result in a slight adverse significance of effect.
- 7.9.49 At year 15 the environmental mitigation will be established and the impacts on landscape character will be reduced within the LLCA, particularly in minimising the perception of the Bickenhall Lane and Village Road overbridges and returning the influence of the A358 corridor on the landscape character closer to the baseline context. Woodland planting and hedgerow improvements will help to strengthen the green infrastructure network through the area, particularly along the woodland corridor between fivehead ridge and the Blackdown Hills AONB. At year 15 this will result in a negligible adverse magnitude of change due to the very minor alteration to the landscape character of the LLCA once mitigation is established. This is assessed to result in a slight adverse significance of effect.

#### *Lower Lias Foothills and Lowland LLCA*

- 7.9.50 Impacts within this LLCA during operation include:
- Widened A358 corridor.
  - Changes to landform associated with the overbridge and slip roads at Ashill junction.
  - Change to extent, and location of local road corridors and vehicle movements through the landscape for new links at Stewley and Broadway Street.
  - A more open landscape as a result of loss of mature trees and roadside vegetation.
  - Lighting on the approach to Southfields roundabout.
  - Proposed vegetation within the environmental mitigation.
- 7.9.51 Environmental design and mitigation measures within this LLCA include:
- Gap-filling, enhancement, and tree planting within existing hedgerows to strengthen the landscape character of the rural landscape around the proposed scheme, including towards Venner's Water.
  - Hedgerow, trees, and planting alongside the widened section of the proposed scheme to reinstate the nature of the landscape character along the A358.

- Hedgerow planting on both sides of proposed local links to recreate the rural lane character of existing roads away from the A358.
- Planting of woodland blocks to link with the Ashill Wood/Every's Copse ancient woodland and elsewhere to break-up the linear appearance of the A358 from the wider landscape.
- Scattered tree planting around the Ashill overbridge to minimise impact of earthworks and vehicles on wider landscape character.

7.9.52 The A358 widening will increase the influence of the road corridor on landscape character, with the divergence of the north and southbound carriageways west of Jordans increasing the footprint of the A358. The local road links at Stewley and Broadway street will contribute further to the creation of a wider corridor of transport infrastructure through the LLCA – a corridor of through traffic and a corridor of local lanes. This will reduce the coherence and connectivity of landscape elements of the LLCA to the east and west of the A358 and result in some landlocked parcels of land that have been utilised for environmental mitigation.

7.9.53 At year 1 the magnitude of change is assessed to be moderate adverse due to the loss of vegetation along the corridor and addition of two links and an uncharacteristic junction with slip road and overbridge which increases the influence of transport infrastructure on landscape character in this area, as well as reduce the character of connectivity within the landscape. This is assessed to result in a moderate adverse significance of effect.

7.9.54 At year 15 the environmental mitigation will be established and the impacts on landscape character will be reduced within the LLCA, particularly in minimising the perception of the Ashill junction and presence of adjacent strategic and local road corridors. The Ashill junction and widened A358 will continue to have an impact on landscape character, however the presence of established hedgerows and combination of planting along both local links and the A358 will reduce the prominence and perception of the corridor away from Ashill junction – returning similar to the baseline context. Woodland planting and hedgerow improvements will help to strengthen the green infrastructure network through the area, particularly around Ashill Wood/Every's Copse ancient woodland.

7.9.55 At year 15 this will result in a minor adverse magnitude of change due to continued absence of mature trees removed not fully mitigated by their 15-year-old replacements, and presence of the uncharacteristic earthworks and overbridge at Ashill junction. This is assessed to result in a slight adverse significance of effect.

#### Visual

7.9.56 A description of the preliminary nature of change and significance of effect during year 1 of operation from the representative viewpoint locations is provided in Table 7-10 (locations are shown on Figure 7.4 ZTV and Proposed Viewpoints).

**Table 7-10 Representative viewpoints year 1**

Number	Nature of change	Magnitude of impact	Significance of effect
1	Demolished property on Stoke Road absent from skyline, replaced with realignment of Stoke Road and associated overbridge at lower elevation. View of vehicles travelling along the A358 emerging from the cutting and moving across the view. Agricultural field replaced with species-rich grassland in the foreground of the view offering continual ground cover and seasonal diversity. Proposed hedgerow with tree planting will be immature but will reinstate the landscape pattern removed during constriction. The views of passing traffic will add movement and result in a change in perception from what was previously a tranquil rural view. Although the proposed scheme will not become the dominant feature of the view from this receptor, it will form a noticeable feature that is readily apparent.	Major adverse	Large adverse
2	The presence of the A358 and associated vehicles will be readily apparent across the view in the middle-ground. Where previously mature field trees were located within the landscape there will be views west along the A358 towards the connection to the Nexus 25 roundabout. Hedgerows and hedgerows with trees will be planted in the vicinity of the A358 and along the realigned River Ding, existing hedgerows away from the A358 will be enhanced through gap filling, tree planting, or widening. The movement of traffic will add a new prominent feature to the view within a relatively static landscape. The impacts will remain similar in both summer and winter. At night moving vehicles between the Nexus 25 roundabout and the Stoke Road overbridge, and the lighting along the A358 on approach to Nexus roundabout, will result in additional lighting within a previously dark area of the landscape. Although the view of the A358 and associated vehicles will be prominent features and adversely change the nature of the view, the long distance and panoramic views will still be the dominant feature of the view.	Moderate adverse	Large adverse
3	Passing high-sided vehicles visible in a small part of the view above existing vegetation above existing hedgerows. This will be at a distance and scale that it would form a perceptible feature of the view. This impact will be further reduced in summer months with intervening trees and hedgerows in leaf.	Minor adverse	Slight adverse
4	Change in nature of view from rural fields to close proximity views of large-scale road corridor and passing vehicles, on transition from cutting to low embankment, within the field beyond the first hedgerow in the view. Absence of mature trees from the view in adjacent or nearby fields will be noticeable. Views towards Stoke Hill and the Blackdown Hills AONB will remain in the middle ground and background. The impact will reduce to some degree in summer months due to screening by hedgerows, however the presence of the road and movement of vehicles will still be a prominent feature for much of the view. Due to the nature of change and proximity to the receptor, the	Major adverse	Very large adverse

Number	Nature of change	Magnitude of impact	Significance of effect
	proposed scheme will become the focal point of the view and detract from the amenity of more distant views. Visibility of the proposed scheme to the west will be reduced in summer months but remain clearly visible to the east.		
5	The proposed scheme infrastructure and vehicle movements will be visible across the view, closest just beyond Glebe Cottages and further away towards and past Stoke Road. This will be further away but more prominent in the view than the existing A358 due to the scale and lack of screening. In summer months, the impact will remain similar to the nature of the elevated view and position of the proposed scheme within the landscape. Existing vegetation and landform will screen views south towards the proposed scheme Mattock's Tree Green junction in summer and winter. At night, the movement of lights on vehicles along the proposed scheme will be a noticeable addition to the view. Although the proposed scheme will be a noticeable feature, views of passing vehicles are a feature of the baseline, and the long distance and panoramic views will still be the dominant feature of the view.	Moderate adverse	Moderate adverse
6	The proposed scheme and vehicles travelling along it will be clearly visible in place of agricultural fields in the middle ground of the view, increasing activity and movement. The prominence of vehicles in the view will be greater compared to the baseline. In summer months, the impact will remain similar due to the nature of the elevated view and position of the proposed scheme within the landscape. At night the position of passing vehicles will be slightly closer to the viewpoint, however the overall nature of the view at night will be similar to baseline. Existing vegetation and landform will screen views east towards the proposed scheme at Mattock's Tree Green junction. Although the proposed scheme will be a perceptible change, it will not alter the overall balance of features and elements that comprise the existing view.	Moderate adverse	Moderate adverse
7	The central field within the middle ground of the view will include the cutting, slip roads, and overbridge structure with clear views of passing vehicles, including over the higher ground. The design of the bridge structure, with the abutments parallel to the road allows earthworks to minimise the visibility of the structure and the cutting. In summer months intervening vegetation will screen some infrastructure and vehicle movements, but a large proportion of the proposed scheme will remain unchanged from winter. At night, the lights of passing vehicles will be a notable new addition to the view. Due to the landform facing the viewpoint and its prominence in the view, the proposed scheme would become the dominant feature or focal point of the view.	Major adverse	Large adverse
8	Trees and hedgerows around the boundary of the field, and nature of topography between the viewpoint and the proposed scheme, will screen views towards the proposed scheme, leaving views unaltered from the PRoW.	No change	Neutral

Number	Nature of change	Magnitude of impact	Significance of effect
9	Segregation of fields and loss of hedgerows and hedgerow trees will be a noticeable change to the view. The proposed scheme, cuttings, slip roads, overbridge, access to local properties, and vehicles will be visible across a large proportion of the view. Due to the landform facing the viewpoint and its prominence in the view, the change will become the dominant feature or focal point of the view. The impact will remain similar in summer and winter.	Major adverse	Large adverse
10	As a result of vegetation removed along the A358 and unestablished environmental mitigation, there will be increased views of the traffic along the A358. The proposed scheme infrastructure will have a minimal impact on the perception of the view. In summer months any vegetation retained alongside the A358 or taller trees to the west will reduce visibility of vehicles on the A358. The increased visibility of vehicles will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
11	All views towards scheme will be obscured by landform and existing vegetation.	No change	Neutral
12	Presence of widened road without established environmental mitigation allowing views of passing traffic within small proportion of very distant views located at the current position of the A358 in the view. The change in view between summer and winter will be barely perceptible at the distance between the viewpoint and the section of the proposed scheme that will be visible. This change will be a barely noticeable feature or element of the view.	Negligible adverse	Slight adverse
13	The widening of the A358 into the field will result in clearly visible views of passing vehicles due to absence of established roadside vegetation. The embankment and structure associated with the Village Road overbridge will be clearly visible, and become a prominent feature, across the view. Vehicles crossing the bridge will be visible against the skyline, although this impact will be intermittent as the overbridge will carry local traffic. Due to the lack of intervening vegetation the impacts will be equivalent in summer, winter, and at night. At night the lights on passing vehicles will be clearly visible moving across the view. The proposed scheme will become the dominant feature of the view.	Major adverse	Large adverse
14	The A358 and passing vehicles will be a more noticeable feature within the view. The Bickenhall Lane overbridge will be noticeable to the north, beyond the existing Bickenhall Lane – the flat nature of the landscape and presence of existing hedgerows limits the influence of this on the overall nature of the view. The impact will remain similar in summer, winter, and at night. The nature of change will be equivalent in summer and winter. The increased prominence of the A358 will be a noticeable element of the view which is readily apparent to the receptor, however the overall nature of the baseline view will remain.	Moderate adverse	Moderate adverse

Number	Nature of change	Magnitude of impact	Significance of effect
15	The absence of established vegetation along the A358 will expose views towards passing vehicles. The Village Road overbridge will be visible along the road corridor and filtered by hedgerow trees. The design of the structure, with abutments parallel to the A358, will result in screening of vehicles on the A358 for a small section of the view. Changes will be noticeable across the background of the view but will not change the overall balance of features and elements that comprise the existing view. In summer, hedgerow trees along the local road will filter views towards the A358 and overbridge although they will still be perceptible.	Minor adverse	Slight adverse
16	Absence of vegetation alongside the A358 will increase the prominence of passing vehicles in the background of the view. The Village Road overbridge and Bickenhall Lane overbridge will be visible within the background of the view, although barely perceptible at this distance and orientation. In summer, intervening hedgerow trees will provide some screening of the overbridges and A358. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
17	The absence of established vegetation alongside the A358 will result in very small change to distant elements of the view. In summer, intervening hedgerow trees will provide some screening of the proposed scheme. The change will be barely noticeable and not alter the overall balance of features and elements that comprise the existing view.	Negligible adverse	Slight adverse
18	Close proximity views towards vehicles travelling on the widened A358. The presence of the Stewley Link will add further change to the view. Views towards strategic and local road infrastructure will become the dominant feature or focal point of the view in summer and winter.	Major adverse	Large adverse
19	Absence of established vegetation alongside the A358 will increase visibility of vehicles in the middle ground of the view. The Village Road overbridge will also be visible in the background although, due to the elevation of the viewpoint, set against the wider landscape beyond and not be a prominent feature of the view. The design of the overbridge structure, with abutments parallel to the A358 means that earthworks, rather than structural elements, will be facing the viewpoint resulting in a more natural appearance. This will be perceptible but not alter the overall balance of features and elements that comprise the existing view in both summer and winter.	Minor adverse	Slight adverse
20	The widened A358 and vehicles travelling along it will be more prominent than the baseline, but in an equivalent position and proportion of the view. The presence of the Stewley Link will also be notable change, slightly down the slope, visible above the tree line along Venner's Water. Due to the position on rising ground above the tree line, the change will be equivalent in both summer and winter.	Moderate adverse	Moderate adverse

Number	Nature of change	Magnitude of impact	Significance of effect
21	The absence of vegetation alongside the A358 will result in a slight increase in prominence of passing vehicles in the middle ground of the view. However, the overall nature of the view remains as baseline condition in both summer and winter.	Negligible adverse	Slight adverse
22	The Ashill junction, and the Stewley Link (with associated vehicles and signage) will be clearly visible and become the dominant feature of the view. The background view towards vehicles on the A358 and trees beyond it will be obscured by earthworks associated with the junction and slip roads. Vehicles using the junction will appear visible on the skyline above the viewpoint elevation. The impacts will be equivalent during summer and winter.	Major adverse	Large adverse
23	The absence of established vegetation around the junction will result in clear views towards vehicles using the A358, Ashill junction, Stewley and Broadway Street link. This will be at a lower elevation to the viewpoint in the middle ground and not against the skyline, the foreground view of the field and distant views towards Ilton and beyond will remain. The design of the overbridge structure, with the abutments perpendicular to the road, will minimise the visual perception of this as earthworks will screen much of the structure from this viewpoint. The impact will be similar during winter and summer. Overall, the change will form a noticeable feature or element of the view which is readily apparent to the receptor in both summer and winter.	Moderate adverse	Moderate adverse
24	From ground level, vehicles on the A358, slip roads, and overbridge will be visible within a small part of the background of the view. From the top floor windows of houses the middle ground view will include the Ashill junction and Stewley Link. The impact will be similar during winter and summer. Overall, the proposed scheme will form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
25	There will be open views towards the widened A358 in closer proximity to the viewpoint, including clear views of vehicles on the A358, for residents, users of the road, and PRowS. Views beyond the A358 to the Blackdown Hills horizon line will remain. The field between Cad Road and A358 will be established with species rich grassland providing some seasonal variation and natural movement within the foreground of the view. The changes will form a noticeable feature or element of the view which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
26	The individual mature oak tree at the centre of the viewpoint photograph will be notably absent from the view. There will be open views towards vehicles on the A358 from the PRow and filtered views from the residential property within Jordans. Impacts will be similar during summer and winter, except from within the property in Jordans with parkland trees and vegetation screening views in summer. The field between the viewpoint and the A358 will be established with species rich grassland providing some seasonal variation	Major adverse	Large adverse

Number	Nature of change	Magnitude of impact	Significance of effect
	and natural movement within the foreground of the view – reflecting more parkland characteristics than the existing agricultural field. The prominence of passing vehicles will become the dominant feature focal point of the view.		
27	The widened A358, Ashill junction overbridge, earthworks, and slip roads, the Stewley Link, and associated vehicle movements will be clearly visible and become the dominant feature of the foreground and middle ground view in place of the agricultural field. The distant horizon line will remain visible beyond the Ashill junction. Impacts will be similar during summer and winter.	Major adverse	Large adverse
28	Absence of established vegetation resulting in exposed views towards passing vehicles on the A358 and Stewley and Broadway Street link. The vegetated background of the view beyond will remain. Due to lack of intervening vegetation between the viewpoint and the proposed scheme, the impacts will be similar during summer and winter. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
29	Absence of established vegetation resulting in exposed views towards passing vehicles on the A358 and Stewley and Broadway Street link. The vegetated background of the view beyond will remain. Due to lack of intervening vegetation between the viewpoint and the proposed scheme, the impacts will be similar during summer and winter. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
30	Slight increase in prominence of passing vehicles along the A358 in the middle ground of the view due to absence of established vegetation. The overall nature of the view remains as baseline condition.	Negligible adverse	Slight adverse
31	The A358 will be widened and form a greater presence in the view when viewed from higher ground, the Stewley Link will be visible in the field beyond. To the south-east there will be more distant views towards the Ashill junction, screened to some extent by landform. All aspects of the proposed scheme will remain as visible in both summer and winter. Beyond the proposed scheme, views of trees along Venner's Water, the rolling agricultural landscape, and long-distance views will remain. The increased prominence of highway and local road infrastructure with associated vehicle movements will form noticeable features of the view that are readily apparent to the receptor.	Moderate adverse	Moderate adverse
32	The absence of three mature field trees and vegetation alongside the A358 will be notable. The widened A358 and Stewley Link with associated vehicle movements will become the dominant feature of the view. This will be the case in both summer and winter.	Major adverse	Large adverse

Number	Nature of change	Magnitude of impact	Significance of effect
33	Distant view over and between tree canopies towards the A358, with slight increase in prominence of passing vehicles due to absence of established roadside vegetation. The presence of the Bickenhall Lane overbridge will not result in a discernible change to the view. Visibility of vehicles will be reduced slightly in summer months due to leaf cover on intervening trees in the middle ground. From this distance, and with the wider context of the view, the proposed scheme will form a barely noticeable feature or element.	Negligible adverse	Slight adverse
34	Distant view over and between tree canopies towards A358, absence of established roadside vegetation resulting in a slight increase in prominence of passing vehicles. Visibility of vehicles will be reduced slightly in summer months due to leaf cover on intervening trees in the middle ground. From this distance, and with the wider context of the view, construction activity would form a barely noticeable feature or element.	Negligible adverse	Slight adverse
35	<p>In the background of the view, the proposed scheme will be visible in two locations: the north of Stoke Hill and wood; and at Mattock's Tree Green. Away from these locations, visibility of the proposed scheme will be obscured by intervening landform and vegetation. Due to the elevated nature of the viewpoint and the relative position of the proposed scheme, the impact will be similar during summer and winter months.</p> <p>To the north of Stoke Hill and wood, vehicles will be visible in the distance moving across the fields associated with the offline section north of Stoke Road. At night, the lighting on approach to Nexus roundabout will be a barely perceptible addition to the view, however the lights of vehicles moving along the A358 will be an additional element. This will be a perceptible change to the view.</p> <p>At Mattock's Tree Green the presence of the with the new junction and associated earthworks will be perceptible. At night, the lights of vehicles at the junction will be visible, the prominence of this will be greater but in an equivalent position to the existing lighting at the A358/A378 junction. Passing traffic on the A358 in this location is a feature of the baseline view in both summer and winter and the change will be barely perceptible to the casual observer.</p> <p>In combination, the changes to the view will add new elements to a small proportion of the background view but not alter the overall balance of features and elements that comprise the existing view.</p>	Minor adverse	Slight adverse
36	In the background of the view, the proposed scheme will be visible in two locations: the north of Stoke Hill and wood; and at Mattock's Tree Green. Away from these locations, visibility of the proposed scheme will be obscured by intervening landform and vegetation. Due to the elevated nature of the viewpoint and the relative position of the proposed scheme, the impact will be similar during summer and winter months.	Minor adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
	<p>To the north of Stoke Hill and wood, vehicles will be visible in the distance moving across the fields associated with the offline section north of Stoke Road. At night, the lighting on approach to Nexus roundabout will be a barely perceptible addition to the view, however the lights of vehicles moving along the A358 will be an additional element. This will be a perceptible change to the view.</p> <p>At Mattock's Tree Green the presence of the with the new junction and associated earthworks will be perceptible. At night, the lights of vehicles at the junction will be visible, the prominence of this will be greater but in an equivalent position to the existing lighting at the A358/A378 junction. Passing traffic on the A358 in this location is a feature of the baseline view in both summer and winter and the change will be barely perceptible to the casual observer.</p> <p>In combination, the changes to the view will add new elements to a small proportion of the background view but not alter the overall balance of features and elements that comprise the existing view.</p>		
37	<p>In the background of the view, the proposed scheme will be visible in two locations: the north of Stoke Hill and wood; and at Mattock's Tree Green. Away from these locations, visibility of the proposed scheme will be obscured by intervening landform and vegetation. Due to the elevated nature of the viewpoint and the relative position of the proposed scheme, the impact will be similar during summer and winter months.</p> <p>To the north of Stoke Hill and wood, vehicles will be visible in the distance moving across the fields associated with the offline section north of Stoke Road. At night, the lighting on approach to Nexus roundabout will be a barely perceptible addition to the view, however the lights of vehicles moving along the A358 will be an additional element. This will be a perceptible change to the view.</p> <p>At Mattock's Tree Green the presence of the with the new junction and associated vehicle movements will be perceptible in glimpsed views, more so in the winter than the summer due to vegetation in the foreground.</p> <p>The change to the view will add new elements to a small proportion of the background view but not alter the overall balance of features and elements that comprise the existing view.</p>	Minor adverse	Slight adverse
38	<p>Absence of established vegetation along the A358 further highlights its position within the landscape through increasing the prominence of vehicles in the distant view. Visibility of vehicles on the offline section activity, to the north of Stoke Hill, will be an additional change where no movement is present in the baseline view. However, activity will be screened to some degree by surrounding vegetation and only forms a small proportion of the overall view. The overall nature of the baseline condition would remain in summer and winter.</p>	Negligible adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
39	Absence of established vegetation along the A358 further highlight its position within the landscape, increasing the prominence of vehicles on the A358 in the distant view. The nature of the change will be similar in winter and summer months. The change would be to a small proportion of the overall view and the nature of the baseline condition would remain.	Negligible adverse	Slight adverse
40	Presence of passing vehicles in the view along the A358 to north of Stoke Hill will result in a change to the background of the view where there is no movement or vehicles in baseline. Activity would be screened to some degree by surrounding vegetation and forms a small proportion of the overall view. The nature of the change will be similar in winter and summer months. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
41	Layers of existing trees and slight variations in topography screen views towards the proposed scheme.	No change	Neutral
42	Vegetation removal along the A358 will increase the visibility of passing traffic. Construction activity will be visible in a small proportion of the view, between foreground hedgerow with trees that provide visual screening. Visibility of construction activity will be reduced by screening effect provided by existing vegetation in the summer months. The change will be perceptible but not alter the overall balance of the features/elements that comprise the existing view.	Minor adverse	Slight adverse
43	Clear view across field towards traffic on the A358 north of Stoke Road within the middle ground of the view beyond the field boundary hedgerow during summer and winter. The photograph illustrates a glimpsed through a field gate which is a glimpsed view for people walking, cycling, or driving along the road. Therefore, the impact will be perceptible but not alter the overall balance of features and elements that comprise the existing view along the road. Distant views towards properties at Henlade and towards the distant hills will remain.	Minor adverse	Slight adverse
44	Views towards the proposed scheme will be screened by intervening vegetation in both summer and winter.	No change	Neutral
45	View across roadside hedgerow into field containing A358 widening. Absence of mature hedgerow vegetation and vegetation alongside the A358 will increase the visibility of passing traffic and be a loss of existing elements of the view. This will form a noticeable feature or element of the view which is readily apparent to the receptor in both summer and winter.	Moderate adverse	Moderate adverse
View from the road	The widened A358 corridor will be of more consistent appearance along the length of road between Nexus roundabout and Southfields roundabout. The absence of established vegetation alongside the road corridor will allow views to the wider landscape which, will increase perception of the wider landscape context and create a more varied journey.	Moderate beneficial	Slight beneficial

Number	Nature of change	Magnitude of impact	Significance of effect
	<p>The presence of Stoke Road overbridge, Mattock's Tree Green junction, Bickenhall Lane overbridge, Village Road overbridge, and Ashill junction will add new more urban features to the journey. The design of bridge structures, with abutments parallel to the A358 will result in a common appearance to these structures.</p> <p>For the majority of the corridor, the change will be a noticeable feature or element of the view which is readily apparent to the receptor. The increased availability of views across the wider landscape will be beneficial to users.</p>		

7.9.57 A description of the preliminary sensitivity, nature of change and significance of effect during year 15 from the representative viewpoint locations is provided in Table 7-11. To avoid repetition, the descriptions provided under 'nature of change' relate to changes between year 1 and year 15, during which the establishment of environmental mitigation measures occurs. The magnitude of impact and significance of effect reports on the change between baseline and year 15.

**Table 7-11 Representative viewpoints year 15**

Number	Nature of change	Magnitude of impact	Significance of effect
1	<p>Established hedgerow with tree planting alongside the top of the A358 cutting, and within land to the south, will screen and filter the appearance of the infrastructure and integrate it with the landscape. High-sided vehicles will still be visible passing across the view, more prominent in winter than summer months. The proposed scheme will result in a noticeable feature of the view which is readily apparent to the receptor.</p>	Moderate adverse	Large adverse
2	<p>Planted hedgerows with trees along the A358 and surrounding land will reinstate the treed appearance of the land west of Stoke Road, filter visibility of the proposed scheme in some elements of the view and reduce the prominence of passing vehicles. Filtered views of passing vehicles will still be visible beyond or between planting, with the movement of vehicles across the view remaining noticeable although less-so during summer months. At night, mitigation planting will reduce the prominence of lighting on approach to the Nexus roundabout and of vehicles on the A358.</p>	Moderate adverse	Moderate adverse
3	<p>Hedgerow and tree planting will be established and reduce visibility of passing traffic, although filtered views will remain in winter months. This will be a barely noticeable element of the view from this receptor.</p>	Negligible adverse	Neutral

Number	Nature of change	Magnitude of impact	Significance of effect
4	Hedgerow enhancements to field boundaries and hedgerow with tree planting along the mainline will work to screen views towards passing traffic. There will be filtered views of passing vehicles in winter months, becoming less apparent in summer months. The prominence of the proposed scheme in the view will be much reduced from year 1, although still a readily apparent feature. The presence of Stoke Hill and the Blackdown Hills continue to be a key feature of the view.	Moderate adverse	Moderate adverse
5	Established scrub and hedgerows with trees to the north and north-east of the proposed scheme will screen the infrastructure and some of the vehicles using it. Established mitigation will reduce the prominence and visibility of vehicle lights moving within the view. Screening of passing vehicles will be more effective in summer than winter. The proposed scheme will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
6	The hedgerows with trees planting will screen views towards the infrastructure and some of the vehicles. High-sided vehicles will be visible between tree planting. The nature of change in summer and winter will be similar, with visibility of vehicles being of equivalent prominence to the baseline view.	Negligible adverse	Slight adverse
7	Scrub planting and hedgerows with trees will obscure the physical change to landform and screen views of passing traffic. Although high-sided vehicles will still be visible, this is similar to the baseline view. The abutments on the overbridge being parallel to the A358 allows replacement hedgerow planting, to replace the hedgerow lost during construction, to extend across a substantial portion of the view. The wooded characteristic will be a visual change from the baseline view of rising agricultural field; however, it will extend the wooded appearance between Ashe and the north-east of the existing A358.	Minor adverse	Slight adverse
8	As per year 1.	No change	Neutral
9	Established hedgerow planting along the link to local properties, hedgerows with trees alongside the slip road, and scrub planting to the junction will minimise the presence of the proposed scheme infrastructure. There would be filtered views of vehicles over the hedgerows, however, some views of vehicles passing along slip-roads with greater prominence in winter than summer. There will be a greater presence of vegetation within the view than the baseline condition. The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view	Minor adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
10	A belt of woodland planting alongside the widened A358 will effectively restore the baseline condition, although the footprint of the A358 will appear slightly wider in the view. Any difference from the baseline view in the visibility of vehicles on the A358 in both summer and winter, will be barely noticeable.	Negligible adverse	Neutral
11	As per year 1.	No change	Neutral
12	Established environmental mitigation measures, including hedgerow and hedgerow with tree planting, will restore appearance of A358 to that of the baseline condition in both summer and winter.	No change	Neutral
13	Established hedgerow planting along the approaches to the Village Road overbridge will soften its appearance against the skyline. The structure design, with abutments parallel to the A358, will minimise the overbridge appearance in the view and allow hedgerow planting on approach to get as close to the A358 as possible. The tops of vehicles crossing the A358 will be visible beyond the hedgerow. A hedgerow with trees along the A358 will reinstate much of the baseline view as it relates to the passing traffic. The nature of change will be equivalent in summer and winter. The proposed scheme will be perceptible but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse
14	The structure design, with abutments parallel to the A358, will minimise the Bickenhall Lane overbridge appearance in the view and allow hedgerow planting on approach to get as close to the A358 as possible. Established environmental mitigation measures of hedgerow and tree planting alongside the A358 and Bickenhall Lane will restore much of the view to that of the baseline condition. The nature of change will be equivalent in summer and winter.	Negligible adverse	Neutral
15	Hedgerow and hedgerow with tree planting alongside the A358, approach to Village Road overbridge, and adjacent field boundary will reinstate much of the baseline view. The nature of change will equivalent in summer and winter. The presence of the overbridge and embankments with the realigned local road will be a perceptible change but not alter the overall balance and nature of the view.	Minor adverse	Slight adverse
16	Established environmental mitigation measures will restore the appearance of A358 to that of the baseline condition. Hedgerow planting on approach to the overbridges will integrate them within the view. There will be a barely noticeable change to the view from this location in both summer and winter.	Negligible adverse	Neutral
17	Established environmental mitigation alongside the A358 will restore the baseline condition in summer and winter.	No change	Neutral

Number	Nature of change	Magnitude of impact	Significance of effect
18	Established environmental mitigation measures of planting alongside both the A358 and Stewley Link will contain and filtering views towards traffic on A358. However the scale of change and closer proximity of passing vehicles will remain readily apparent in both summer and winter.	Moderate adverse	Moderate adverse
19	Hedgerow and hedgerow with trees planting will reinstate the baseline view towards the A358 and filter views of cars passing across the overbridge. The nature of change will be equivalent in summer and winter.	Negligible adverse	Slight adverse
20	Hedgerow planting with trees alongside both the Stewley Link and A358 will reduce the prominence of passing traffic. Although high-sided vehicles will remain visible, they will be filtered by tree planting which will be an improvement on the baseline view. Hedgerow enhancement perpendicular to the road will strengthen the landscape pattern and reduce the linearity of the proposed scheme passing across the view. In winter months there will be filtered views towards passing traffic that will be perceptibly slightly more prominent than the baseline condition. The scale of the change from an agricultural field will be notable, although by year 15 the mitigation will integrate the proposed scheme into the view.	Minor adverse	Slight adverse
21	Environmental mitigation measures alongside the A358 will restore the baseline view in both summer and winter.	No change	Neutral
22	The local road from Rapps to the Ashill junction will remain clearly visible, although hedgerow with tree planting will act in the foreground to screen views towards the junction beyond. These filtered views will be further mitigated through tree and hedgerow planting on earthworks. Woodland planting to the north of the junction will screen views towards Stewley Link. The mitigation measures will be effective in mitigating or screening views of the Ashill junction and associated traffic, although the nature of the view will change from agricultural fields to a more wooded character combined with infrastructure associated with the Ashill junction. In winter months, filtered views towards vehicles using the junction will be more prevalent.	Minor adverse	Slight adverse
23	Established environmental mitigation in the form of woodland planting between and along the Stewley and Broadway Street link, alongside hedgerow planting on approach to the overbridge and scrub planting around the junction will mitigate views towards the proposed scheme. The context of the view would be altered with slightly more enclosed views in the middle ground and a more wooded appearance. Although there will be changes to the view, the nature of the view will be equivalent to the baseline context in both summer and winter.	Negligible adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
24	Mitigation planting around the junction and A358 will have established, resulting in filtered views towards vehicles. The most notable change will be local traffic crossing the Ashill junction overbridge and at the top of slip roads in the middle ground when viewed from upper storey of properties, this will be more notable in the winter months.	Minor adverse	Slight adverse
25	An established woodland block will filter views to the north, and the hedgerow alongside Cad Road will be enhanced to include tree planting, filtering views towards the A358. Alongside the A358, hedgerow with tree planting will be established reinstating the screening effect of the baseline condition in both summer and winter. The changes associated with the A358 infrastructure will form a barely noticeable element of the view.	Negligible adverse	Neutral
26	Hedgerows with trees alongside the A358 will be established and restore the filtered views of passing traffic in both summer and winter. However, the traffic will be at a closer proximity to the viewpoint, due to the proximity and the absence of the prominent mature tree, this will be a perceptible change but not alter the overall balance of the baseline view.	Minor adverse	Slight adverse
27	The mitigation planting will have established, including woodland, trees, and hedgerows in the foreground around and alongside the Stewley Link. This will effectively screen views towards the junction from properties on Park Barn Lane but foreshorten and lose the more open baseline view, this is mitigated to some degree through the use of grassland with scattered trees. From the PRoW woodland planting to the north of the junction will reinstate the nature of views towards passing vehicles, however the embankments position the vehicles above the view and enclose the view. This will result in a noticeable feature which is readily apparent to the receptor.	Moderate adverse	Moderate adverse
28	Established mitigation planting along the Stewley and Broadway Street link and the A358 will have established aiding in screening the road from view and restoring much of the baseline condition in both summer and winter.	Negligible adverse	Neutral
29	Established mitigation planting along the Stewley and Broadway Street link and the A358 will have established aiding in screening the road from view and restoring much of the baseline condition in both summer and winter.	No change	Neutral
30	Mitigation planting will have established restoring the nature of the baseline view from this receptor in both summer and winter.	No change	Neutral

Number	Nature of change	Magnitude of impact	Significance of effect
31	Planting of hedgerows with trees will screen the view of the infrastructure itself, however clear views of passing traffic will remain. This is equivalent to the baseline view. The hedgerows with trees will be a new feature to the view and increase the tree coverage when compared to the baseline. The design will need consideration in detailing to ensure distant views from this viewpoint are not obstructed. In winter months, there will be a discernible increase in the prominence of infrastructure and passing traffic.	Negligible adverse	Slight adverse
32	Established environmental mitigation measures will include hedgerow with tree planting alongside the Stewley Link and the A358. This will restore the appearance of traffic on the A358 to the baseline view and integrate the Stewley Link with the character of the surrounding landscape. the absence of the three mature field trees would not be fully mitigated. The nature of change will be equivalent in summer and winter, resulting in a noticeable change to the view which is readily apparent due to the proximity and nature of change.	Moderate adverse	Moderate adverse
33	Established environmental mitigation in the form of hedgerows and hedgerows with trees alongside the A358 and Bickenhall Lane will restore the nature of the baseline view in both summer and winter.	No change	Neutral
34	Established environmental mitigation in the form of hedgerows and hedgerows with trees alongside the A358 will restore the nature of the baseline view in both summer and winter.	No change	Neutral
35	To the north of Stoke Hill and wood, established environmental mitigation will partially screen vehicles in the distance moving across the fields associated with the offline section north of Stoke Road. At night, established hedgerows and trees along the A358 will screen vehicle lighting, and a woodland block will screen views of some lighting on approach to Nexus roundabout. Vehicles passing in the distance on the A358 is a feature of the wider baseline view and the proposed scheme will result in an incremental, but perceptible, change to that aspect which will be more prominent in winter than summer.	Minor adverse	Slight adverse
36	To the north of Stoke Hill and wood, established environmental mitigation will partially screen vehicles in the distance moving across the fields associated with the offline section north of Stoke Road. At night, established hedgerows and trees along the A358 will screen vehicle lighting, and a woodland block will screen views of some lighting on approach to Nexus roundabout. Vehicles passing in the distance on the A358 is a feature of the wider baseline view and the proposed scheme will result in an incremental, but perceptible, change to that aspect which will be more prominent in winter than summer.	Minor adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
37	To the north of Stoke Hill and wood, established environmental mitigation will partially screen vehicles in the distance moving across the fields associated with the offline section north of Stoke Road. At night, established hedgerows and trees along the A358 will screen vehicle lighting, and a woodland block will screen views of some lighting on approach to Nexus roundabout. Vehicles passing in the distance on the A358 is a feature of the wider baseline view and the proposed scheme will result in an incremental, but perceptible, change to that aspect which will be more prominent in winter than summer.	Minor adverse	Slight adverse
38	Establishment of planting along the A358 will restore the baseline condition south of Stoke Road and further filter passing vehicles to the north of Stoke Road. This will form a barely noticeable element of the view in both summer and winter.	Negligible adverse	Slight adverse
39	Establishment of planting along the A358 will restore the baseline condition in both summer and winter.	No change	Neutral
40	Establishment of planting along the A358 will restore the baseline condition south of Stoke Road and further filter passing vehicles to the north of Stoke Road. This will form a barely noticeable element of the view in both summer and winter.	Negligible adverse	Slight adverse
41	Layers of existing trees and slight variations in topography screen views towards the proposed scheme.	No change	Neutral
42	Proposed mitigation planting would have established restoring much of the baseline condition.	No change	Neutral
43	Established tree, hedgerow, and woodland planting to the south of the proposed scheme will filter views of passing traffic within the middle ground of the view beyond the field boundary hedgerow during summer and winter. This would be a glimpsed view through a field gate and a small change to the overall nature of the view to people walking, cycling, or driving along the road.	Negligible adverse	Neutral
44	Layers of existing trees and slight variations in topography screen views towards the proposed scheme.	No change	Neutral
45	Enhancement of the hedgerow along Capland Lane will assist in screening views into the field and towards the widened A358. Alongside the A358, hedgerow with tree planting will restore views of passing vehicles to equivalent to the baseline condition in both summer and winter. This will be a perceptible change but not alter the overall balance of features and elements that comprise the existing view.	Minor adverse	Slight adverse

Number	Nature of change	Magnitude of impact	Significance of effect
View from the road	<p>The establishment of vegetation alongside the A358 corridor will reinstate a more enclosed feel to the journey which will be equivalent to the baseline situation.</p> <p>The change will be perceptible but not alter the overall balance of features and elements that comprise the existing view in both summer and winter.</p>	Minor adverse	Neutral

## 7.10 Monitoring

- 7.10.1 DMRB LA 104 *Environmental assessment and monitoring* [17] states that where significant landscape and visual effects have been identified “projects must undertake proportionate monitoring of associated mitigation measures” in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
- 7.10.2 DMRB LA 107 *Landscape and visual effects* [1] states in paragraph 4.1 that monitoring “*shall determine the effectiveness of delivery of mitigation measures linked to the landscape or screening commitments agreed as part of the assessment process.*”
- 7.10.3 Proposed planting would be monitored every year for the first three years under a normal establishment phase to ensure successful establishment and then inspected every 2-5 years for the next 12 years, a total of 15 to ensure the landscape mitigation is successful in mitigation significant effects as predicted.
- 7.10.4 It is essential that the proposed planting establish well and are monitored and maintained to ensure it thrives and grows to the desired extent, so that it becomes effective as mitigation during the long-term operation of the new road infrastructure.
- 7.10.5 Full details will be provided in the Landscape and Ecological Management Plan (LEMP) which will be developed and will set out a framework in which the successful establishment of these measures can be managed and ensured. The LEMP will be submitted as part of the ES and in support of the DCO application.

## 7.11 Summary

- 7.11.1 This LVIA provides information on the landscape and visual baseline conditions between 2020 and 2021 (winter and summer baseline photography was taken). It sets out the methodology used to assess the significant effects of the proposed scheme on landscape character and views, and the visual resources as experienced by people.
- 7.11.2 The greatest long-term landscape and visual effects of the proposed scheme options will be experienced where the proposed scheme deviates from the existing road corridor and where new junctions or overbridges are proposed.
- 7.11.3 There are no significant impacts identified on the Blackdown Hills AONB.

## Construction assessment

- 7.11.4 During construction there are likely to be significant effects on the LLCAs that the online section of the proposed scheme passes through due to anticipated extensive removal of roadside vegetation across a large strip of the landscape, and presence of machinery and earthworks operations. These are:
- Vale of Taunton Deane LLCA (large adverse).
  - North Curry Sandstone Ridge LLCA (moderate adverse).
- 7.11.5 During construction, there are likely to be significant effects on a range of visual receptors in both short and medium distance views. From residential properties located near the engineering footprint, such as those around Henlade and Ashill, and individual properties with clear views across open fields towards existing vegetation alongside the A358 corridor. From public rights of way, there are likely to be significant effects experienced from elevated positions in relatively close proximity to the proposed scheme, such as from Stoke Hill and Thorn Hill, where a length of the proposed scheme will be visible in the middle distance across a large proportion of the view.
- 7.11.6 The significant effects on representative viewpoints during construction are:
- Two very large adverse (viewpoints 1 and 4).
  - 10 large adverse (viewpoints 2, 5, 7, 9, 13, 18, 22, 26, 27, and 32).
  - Nine moderate adverse (viewpoints 6, 10, 14, 20, 23, 24, 25, 31, and 45).

## Operational assessment

- 7.11.7 At year 1 there are likely to remain significant effects on LLCAs that the proposed scheme passes through due to anticipated removal of roadside vegetation across a large strip of the landscape and the exposure of passing traffic and new earthworks and structures to the surrounding landscape. By year 15 the majority of significant landscape effects will be reduced through establishment of landscape mitigation measures. However, it is likely that significant landscape effects will remain due to the offline sections of the proposed scheme within the existing rural landscape and nature of proposed earthworks, junctions and structures for:
- Vale of Taunton Deane LLCA (large adverse year 1, moderate adverse year 15).
  - North Curry Sandstone Ridge LLCA (moderate adverse year 1 and year 15).
- 7.11.8 At year 1 the likely significant visual effects will be similar to those during construction, due to anticipated removal of roadside vegetation across a large strip of the landscape and the exposure of passing traffic and new earthworks and structures resulting in a prominence of the A358 within views. These likely significant effects also extend to night-time views in year 1 due to the visibility of headlights and scheme lighting in the absence of any established roadside planting.
- 7.11.9 The significant effects on representative viewpoints during year 1 are:
- One very large adverse (viewpoint 4).
  - 10 large adverse (viewpoints 1, 2, 7, 9, 13, 18, 22, 26, 27, and 32).
  - Nine moderate adverse (viewpoints 5, 6, 14, 20, 23, 24, 25, 31, and 45).

7.11.10 By year 15, established environmental mitigation will be effective and restore the visual context for receptors with views towards online widening. Likely significant visual effects will be limited to those residential properties or PRow: with views towards new elevated structures or junctions and the offline sections of the proposed scheme; in close proximity and facing the online section of the proposed scheme; and users of PRow around the offline section of the proposed scheme, including from Stoke Hill.

7.11.11 The significant effects on representative viewpoints during year 15 are:

- One large adverse (viewpoint 1).
- Five moderate adverse (viewpoints 2, 4, 18, 27, and 32).

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 8  
Biodiversity

HE551508-ARP-EBD-ZZ-RP-LE-000003

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## 8 Biodiversity

### 8.1 Introduction

- 8.1.1 This chapter provides a preliminary assessment of the potential impacts and effects on biodiversity from the construction and operation of the A358 Taunton to Southfields Dualling Scheme (the proposed scheme), following the methodology set out in Design Manual for Roads and Bridges (DMRB) *LA 108 Biodiversity (LA 108)* [1].
- 8.1.2 This chapter details the methodology followed for the assessment, summarises the regulatory and policy framework related to biodiversity and describes the existing environment in the area surrounding the proposed scheme. Following this, the design, mitigation and residual effects of the proposed scheme are reported, along with the limitations of the assessment.
- 8.1.3 A high-level quantification of the level of biodiversity that will be lost to the proposed scheme, and the biodiversity resource provided by the habitat creation/enhancement included within the proposed scheme, will be undertaken using the Department for Environment, Food and Rural Affairs (Defra) metric version 2.0 [2]. The Environment Bill is currently progressing through parliament; it is anticipated this will require developments, including nationally significant infrastructure projects, to achieve a 10% net gain in biodiversity. Should the Environment Bill be enacted during the assessment period of the proposed scheme, the proposed scheme would be reviewed in light of any new requirements and the design revisited to make any necessary amendments. At present, it is understood that due to timing the proposed scheme will not fall under the requirements of the Environment Bill if it becomes law.

### 8.2 Legislative and policy framework

- 8.2.1 A framework of international, European, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats.

#### Legislation

- 8.2.2 The following relevant legislation exists to protect habitats and species of nature conservation importance:
- The Conservation of Habitats and Species Regulations 2017 (the 'Habitat Regulations')
  - The Ramsar Convention on Wetlands 1971
  - Wildlife and Countryside Act 1981
  - Natural Environment and Rural Communities Act 2006 (NERC Act 2006)
  - The Countryside and Rights of Way Act 2000
  - The Hedgerow Regulations 1997
  - The Eels (England and Wales) Regulations 2009
  - Salmon and Freshwater Fisheries Act 1975
  - The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
  - Protection of Badgers Act 1992
  - Invasive Alien Species (Enforcement and Permitting) Order 2019

- 8.2.3 These pieces of legislation include a number of offences relating to protected species and requirements for licences to allow construction works to proceed. In addition, the Habitats Regulations set out the requirement for the consideration of the potential effects of a project on European designated sites.
- 8.2.4 The legislation and policy relating to specific species are further detailed within the ecological baseline reports, provided within the PEI report Biodiversity appendices (Appendices 8.1 to 8.23).

### National policy

- 8.2.5 As discussed in Chapter 1 Introduction, the primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the *National Policy Statement for National Networks*, (NPSNN), [3], which, sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered. Table 8-1 identifies the NPSNN policies relevant to biodiversity and then specifies where in the PEI report chapter information is provided to address the policy.

**Table 8-1 Relevant NPSNN policies for biodiversity assessment**

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in this PEI report chapter is information provided to address this policy
4.22 and 4.25	<p>The NPSNN describes the need under the Habitats Regulations to consider whether the proposed scheme could have a significant effect on the objectives of a European site and the procedure to be followed.</p> <p>Prior to granting a DCO, the Secretary of State must, under the Habitat Regulations considered whether it is possible that the project could have a significant effect on the objectives of a European site, or on any site to which the same protection is applied.</p> <p>Applicants are required to provide sufficient information to enable the Secretary of State to carry out an Appropriate Assessment if required, this should include details of any measures that are proposed to minimise or avoid any likely significant effects on the site.</p> <p>If it is not possible to rule out an adverse effect on the integrity of a European site, it is possible to apply for derogation from the Habitats Directive, subject to the proposal meeting three tests:</p> <ul style="list-style-type: none"> <li>• That there are no feasible, less-damaging alternatives.</li> <li>• That there are imperative reasons of overriding public interest (IROPI) for the proposal going ahead.</li> <li>• That adequate and timely compensation measures will be put in place to ensure the overall coherence of the network of protected sites is maintained.</li> </ul>	A Habitats Regulations Assessment (HRA) is being undertaken, initially comprising a screening of likely significant effects on European sites, provided in Appendix 8.1 and discussed briefly in Section 8.10.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in this PEI report chapter is information provided to address this policy
	<p>Where a development may negatively affect any priority habitat or species on a site for which they are a protected feature the IROPI case would need to be solely on the grounds of human health, public safety or beneficial consequences of primary importance to the environment.</p>	
5.22 – 5.23	<p>The NPSNN details that the applicant must ensure the environmental statement clearly sets out any likely significant effects on:</p> <ul style="list-style-type: none"> <li>• internationally, nationally or locally designated sites of ecological importance</li> <li>• protected species or other species identified as being of principal importance for the conservation of biodiversity</li> <li>• habitats of principal importance for the conservation of biodiversity</li> </ul> <p>And the statement considers the full range of potential impacts on ecosystems.</p> <p>The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity.</p>	<p>The assessment of effects on all biodiversity receptors is detailed in Section 8.10 Assessment of likely significant effects.</p>
5.24 – 5.31	<p>The NPSNN describes the general principle that development should avoid significant harm to biodiversity conservation interests, including through mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided or mitigate, as a last resort, appropriate compensation measures should be sought.</p> <p>The NPSNN describes that the Secretary of State should ensure, in taking decisions, that appropriate weight is attached to designated sites of international, national and local importance. As described above, paragraphs 4.22 to 4.25 detail the approach to be taken to the identification and assessment of significant effects upon internationally designated sites.</p> <p>Where a proposed development on land within or outside a Site of Special Scientific Interest (SSSI) is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect on the site's notified special interest features is likely, an exception should be made only where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs.</p>	<p>The assessment of effects on designated sites is included in Section 8.10 Assessment of likely significant effects.</p>

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in this PEI report chapter is information provided to address this policy
	<p>Sites of regional and local biodiversity interest have a fundamental role to play in meeting overall national biodiversity targets, as well as wider social benefits. The Secretary of State should give due consideration to such regional or local designations. However, these designations should not be used in themselves to refuse development consent.</p>	
5.32 – 5.35	<p>The NPSNN gives guidance on the principles that should be applied to the assessment of habitats and species.</p> <p>The NPSNN describes that the Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and veteran trees, unless the national need for and benefits of the development, in that location, clearly outweigh the loss. Where irreplaceable habitats would be affected by development proposals, the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reason for this.</p> <p>The NPSNN describes that the Secretary of State should ensure that applicants have taken measures to ensure protected habitats and species, and those of principal importance for the conservation of biodiversity, are protected from the adverse effects of development. The Secretary of State should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits of the development clearly outweigh that harm.</p> <p>The NPSNN describes that the Secretary of State should consider whether the applicant has maximised opportunities for building in beneficial biodiversity features as part of good practice design.</p>	The assessment of effects on habitats and species is included in Section 8.10 Assessment of likely significant effects.
5.36 – 5.38	<p>The NPSNN gives guidance on the principles that should be applied in the EIA and design development, including avoiding adverse impacts on sites, species and habitats (outlined in 5.22); providing appropriate mitigation measures as an integral part of a development and taking advantage of opportunities to conserve and enhance biodiversity features in and around development.</p> <p>The NPSNN states that the Secretary of State should consider what appropriate requirements should be attached to any consent and/or in any planning obligations entered into in order to ensure that mitigation measures are delivered. The Secretary of</p>	Section 8.9 Design, mitigation and enhancement measures outlines the design, mitigation and enhancement measures incorporated in the proposed scheme.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in this PEI report chapter is information provided to address this policy
	State will take account of what mitigation measures may have been agreed between the applicant and Natural England, and whether they have granted or refused, or intend to grant or refuse any relevant licences.	

8.2.6 Particular attention has been made to the planning policy and strategy documents listed below that are applicable to assessing the impacts of the proposed scheme on the identified ecological resources:

- NPSNN [3]
- *National Planning Policy Framework* [4]
- *UK-Post 2010 Biodiversity Framework* [5] (which replaced the UK Biodiversity Action Plan (BAP))
- *Biodiversity 2020: A strategy for England's wildlife and ecosystem services* [6]
- *A Green Future: Our 25 Year Plan to Improve the Environment* [7]
- *Towards a Wilder Britain* [8]

8.2.7 The Government's detailed policy on environmental mitigations for developments is set out in section 5, Biodiversity and ecological conservation of the NPSNN. It states:

*"Paragraph 5.20: Biodiversity is the variety of life in all its forms and encompasses all species of plants and animals and the complex ecosystems of which they are a part. Government policy for the natural environment is set out in the Natural Environment White Paper (NEWP). The NEWP sets out a vision of moving progressively from net biodiversity loss to net gain, by supporting healthy, well-functioning ecosystems and establishing more coherent ecological networks that are more resilient to current and future pressures."*

8.2.8 Highways England recognises the national loss of biodiversity and that the road network includes a substantial area of land within the UK. Due to this, Highways England produced their *Delivery Plan 2020 – 2025* [9] which commits to the delivery of improved biodiversity, as set out in Highways England's Biodiversity Plan and reducing the net loss of biodiversity by end of Road Period 1, on an ongoing annual basis. In addition, *Highways England Road Investment Strategy (RIS 2) 2020 – 2025* [10] further commits to delivering no net loss of biodiversity by 2025, and continuing progress towards the target of delivering a net gain in biodiversity by 2040.

8.2.9 Biodiversity policy within the UK has been revised through the publication of the *UK Post-2010 Biodiversity Framework* [5] which supersedes the *UK Biodiversity Action Plan ('BAP')* and covers the period from 2011 to 2020. A total of 65 Priority Habitats and 1,150 Species of Principal Importance (SPI) were identified as the most in need of protection. An update to the UK BAP is awaited.

8.2.10 However, the UK list of SPI remains an important reference source and has been used to draw up statutory lists of SPI in England as required under Section 41 (s41) of the NERC Act 2006. A total of 56 Habitats of Principal Importance (HPI) and 943 SPI found in England are included in the s41 list. These habitats and

species were identified as requiring action in the UK BAP and continue to be regarded as conservation policies in the subsequent UK post-2010 Biodiversity Framework.

### Local policy and guidance

8.2.11 Consideration has been given to the following local policies and guidance relating to biodiversity:

- *Taunton Deane Local Plan* [11] with particular focus on Chapter 7, 'Environment and Conservation'
- *Taunton Deane Local Biodiversity Action Plan* [12]
- *Taunton Deane Borough Council Adopted Core Strategy 2011-2028* [13]
- *Somerset Highways Biodiversity Manual* [14]
- *Somerset County Council Pollinator Action Plan 2018-2028* [15]
- *Wild Somerset - The Somerset Biodiversity Strategy 2008-2018* [16]

### Guidance and standards

8.2.12 A range of standards and guidance documents are available for biodiversity. The principal assessment sources, which have been taken into account, include:

- Highways England standards, namely DMRB LA 108 [1], DMRB LA 104 *Environmental assessment and monitoring (LA 104)* [17], DMRB LD 118 *Biodiversity design (LD 118)* [18] and DMRB LA 115 *Habitats Regulations assessment (LA 115)* [19]
- The ecological assessment will be undertaken using the Chartered Institute of Ecology and Environmental Management (CIEEM) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* [20]
- Natural England - *Ancient woodland, ancient trees and veteran trees: protecting them from development* [21]

8.2.13 Guidance for specific species, groups and other ecological features is discussed in individual relevant sections or is provided in the PEI report ecological baseline reports (Appendices 8.1 to 8.23).

## 8.3 Assessment methodology

### Assessment of biodiversity value and significance criteria

8.3.1 This assessment methodology is based on that set out in DMRB LA 104 *Environmental assessment and monitoring LA 104* [17] and DMRB LA 108 *Biodiversity (LA 108)* [1]. LA 108 sets out a process for the establishment of the relative importance of the biodiversity resources including sites, habitats, species populations and assemblages of species, characterisation of predicted scheme impacts before and after mitigation and the subsequent assessment of significance of effects.

8.3.2 The assessment methodology for ecological resources is supplemented where appropriate with guidance from the CIEEM *Guidelines for Ecological Impact Assessment* [20].

8.3.3 The assessment process has also relied on professional judgement by qualified individuals with relevant expertise, recognising scheme-specific circumstances,

and decisions have been made through consultation with stakeholders including Natural England.

### Valuation of resources

- 8.3.4 The importance of resources including sites, habitats, species populations and assemblages of species is assessed in accordance with guidance provided in DMRB LA 108 [1], as summarised in Table 8-2.
- 8.3.5 The valuation of bat roosts has been informed by guidance on valuing bats in ecological impact assessment by Wray et al [22]. The valuation of roosts considers the distribution and relative rarity of the bat species based on its UK population size and the type of bat roost present. The guidance provides a framework for assigning roosts, commuting routes and foraging areas to geographic importance categories that are consistent with the values defined in DMRB LA 108 [1] as summarised in Table 8-2.

**Table 8-2 Biodiversity resource importance**

Importance	Typical biodiversity resources
<b>International or European importance</b>	
Sites	Sites including: <ol style="list-style-type: none"> <li>1) European sites:               <ul style="list-style-type: none"> <li>• Sites of Community Importance</li> <li>• Special Protection Areas (SPAs)</li> <li>• Potential SPAs (pSPAs)</li> <li>• Special Areas of Conservation (SACs)</li> <li>• Candidate or possible SACs</li> <li>• Wetland of international importance (Ramsar site)</li> </ul> </li> <li>2) Biogenic Reserves, World Heritage Sites (where recognised specifically for their biodiversity value) and Biosphere reserves</li> <li>3) Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such</li> </ol>
Habitats	N/A
Species	Resident, or regularly occurring, populations of species which may be considered at an International or European level <sup>1</sup> where: <ul style="list-style-type: none"> <li>• the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or</li> <li>• the population forms a critical part of a wider population at this scale; or</li> <li>• the species is at a critical phase of its life cycle at an international or European scale</li> </ul> Bat roosts as defined in Wray et al [22]: <ul style="list-style-type: none"> <li>• SACs designated for Annex II bat species (greater horseshoe (<i>Rhinolophus ferrumequinum</i>) and lesser horseshoe (<i>Rhinolophus hipposideros</i>), barbastelle (<i>Barbastellus barbastella</i>) and Bechstein's (<i>Myotis bechsteini</i>))</li> </ul>
<b>UK or National (England)</b>	
Sites	Sites including: <ol style="list-style-type: none"> <li>1) Sites of Special Scientific Interest (SSSIs)</li> </ol>

<sup>1</sup> Such species include those listed within Council Directive 79/409/EEC on the conservation of wild birds or animal/plant species listed within Council Directive 92/43/EEC.

Importance	Typical biodiversity resources
	2) National Nature Reserves (NNRs) 3) National Parks 4) Marine Protected Areas including Marine Conservation Zones 5) Areas which meet the criteria, but which are not themselves designated
Habitat	Habitats including: 1) Areas of UK BAP priority habitats 2) Habitats included in the relevant statutory list of Species of Principal Importance and habitats 3) Areas of irreplaceable habitats including: <ul style="list-style-type: none"> <li>• ancient woodland</li> <li>• ancient or veteran trees</li> </ul> 4) Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such
Species	Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where: <ul style="list-style-type: none"> <li>• the loss of these populations would adversely affect the conservation status or distribution of the species at this scale</li> <li>• the population forms a critical part of a wider population at this scale</li> <li>• the species is at a critical phase of its life cycle at a UK or national scale</li> </ul> Bat roosts as defined in Wray et al [22]. <ul style="list-style-type: none"> <li>• Maternity sites for rarest species in England (greater horseshoe, Bechstein's, Alcatheo (<i>Myotis alcatheo</i>), greater mouse-eared (<i>Myotis myotis</i>), barbastelle, grey long-eared (<i>Plecotus austriacus</i>))</li> </ul>
<b>Regional (South-West England)</b>	
Sites	Designated sites (non-statutory) including heritage coasts
Habitats	Areas of habitats identified (including for restoration) in regional plans or strategies (where applicable)
Species	Species including: <ul style="list-style-type: none"> <li>• Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where:               <ul style="list-style-type: none"> <li>- the loss of these populations would adversely affect the conservation status or distribution of the species at a regional scale</li> <li>- the population forms a critical part of a wider regional population</li> <li>- the species is at a critical phase of its life cycle at a regional scale</li> </ul> </li> <li>• Species identified in regional plans or strategies</li> </ul> Bat roosts as defined in Wray et al [22]: <ul style="list-style-type: none"> <li>• Mating sites for rarer species (lesser horseshoe, whiskered (<i>Myotis mystacinus</i>), Brandt's (<i>Myotis brandtii</i>), Daubenton's (<i>Myotis daubentonii</i>), Natterer's (<i>Myotis nattereri</i>), Leisler's (<i>Nyctalus leisleri</i>), noctule (<i>Nyctalus noctula</i>), Nathusius' pipistrelle (<i>Pipistrellus nathusii</i>), serotine (<i>Eptesicus serotinus</i>)) and rarest species (greater horseshoe, Bechstein's, Alcatheo, greater mouse-eared, barbastelle, grey long-eared) including well used swarming sites</li> <li>• Maternity sites (rarer species as above)</li> <li>• Hibernation sites (rarest species as above)</li> <li>• Significant hibernation sites for rarer/rarest species (as above) or all species assemblages</li> </ul>
<b>County (Somerset)</b>	

Importance	Typical biodiversity resources
Sites	Wildlife/ nature conservation sites designated at a county level (or equivalent) level including: <ol style="list-style-type: none"> <li>1) Local Wildlife Sites (LWS)</li> <li>2) Local Nature Conservation Sites (LNCS)</li> <li>3) Local Nature Reserves (LNRs)</li> <li>4) Sites of Importance for Nature Conservation (SINCs)</li> <li>5) County Wildlife Sites (CWS)</li> </ol>
Habitats	Areas of habitat identified in the county or equivalent authority plans or strategies (where applicable)
Species	Species including <ol style="list-style-type: none"> <li>1) Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where:               <ul style="list-style-type: none"> <li>• the loss of these populations would adversely affect the conservation status or distribution of the species across the County</li> <li>• the population forms a critical part of a wider population</li> <li>• the species is at a critical phase of its life cycle</li> </ul> </li> <li>2) Species identified in a county or equivalent authority area plans or strategies</li> </ol> <p>Bat roosts as defined in Wray et al [22]:</p> <ul style="list-style-type: none"> <li>• Maternity sites for common species (common pipistrelle (<i>Pipistrellus pipistrellus</i>), soprano pipistrelle (<i>Pipistrellus pygmaeus</i>), brown long-eared (<i>Plecotus auritus</i>)).</li> <li>• Small numbers of hibernating bats for common species (as above) and rarer species (lesser horseshoe, whiskered, Brandt's, Daubenton's, Natterer's, Leisler's, noctule, Nathusius' pipistrelle, serotine).</li> <li>• Feeding perches for rarer species (as above) and rarest species (greater horseshoe, Bechstein's, Alcaho, greater mouse-eared, barbastelle, grey long-eared).</li> <li>• Individual bats for rarer/rarest species (as above).</li> <li>• Small numbers of non-breeding bats for rarer/rarest species (as above).</li> </ul>
<b>Local</b>	
Sites	Wildlife/ nature conservation sites designated at a local level including sites including: <ol style="list-style-type: none"> <li>1) LWS</li> <li>2) LNCS</li> <li>3) LNRs</li> <li>4) SINCs</li> <li>5) Sites of Local Nature Conservation Importance (SLNCIs)</li> </ol>
Habitats	Areas of habitat considered to appreciably enrich the habitat resource within, the local context including features of importance for migration, dispersal, or genetic exchange
Species	Populations/communities of species considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange <p>Bat roosts as defined in Wray et al [22]:</p> <ul style="list-style-type: none"> <li>• Feeding perches for common species (common pipistrelle, soprano pipistrelle, brown long-eared).</li> <li>• Individual bats for common species (as above).</li> <li>• Small numbers of non-breeding bats for common species (as above).</li> <li>• Mating sites for common species (as above).</li> </ul>

Table taken from Table 3.9 of DMRB LA 108 [1] 'Biodiversity Resource Importance'

- 8.3.6 In circumstances where there are other environmental factors influencing the value of the receptor which are not covered by the guidance in DMRB LA 108 [1], professional judgement has been applied in accordance with the CIEEM *Guidelines for Ecological Impact Assessment* [20]. In such instances the justification for valuation is fully described.
- 8.3.7 Ecological receptors within the study area are described within Section 8.6. Baseline Conditions. Receptors valued below local importance are assessed as having limited ecological value. Therefore, only receptors valued as being of local importance or above will be taken forward for detailed assessment. However, the Department for Environment Food and Rural Affairs (Defra) biodiversity metric used will take account of all habitats lost, including those valued at less than local importance.

#### Characterisation of impacts

- 8.3.8 The potential impacts arising from the proposed scheme on receptors taken forward for detailed assessment are described and characterised in detail in accordance with Table 3.11 in DMRB LA 108 [1], and as shown in Table 8-3.

**Table 8-3 Characterisation of impacts**

Level of impact		Typical description
Major	Adverse	<ol style="list-style-type: none"> <li>1 Permanent/irreversible damage to a biodiversity resource</li> <li>2 the extent, magnitude, frequency, and/or timing of an impact negatively affect the integrity or key characteristics of the resource</li> </ol>
	Beneficial	<ol style="list-style-type: none"> <li>1 Permanent addition of, improvement to, or restoration of a biodiversity resource</li> <li>2 The extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource</li> </ol>
Moderate	Adverse	<ol style="list-style-type: none"> <li>1 Temporary/reversible damage to a biodiversity resource</li> <li>2 the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource</li> </ol>
	Beneficial	<ol style="list-style-type: none"> <li>1 Temporary addition of, improvement to, or restoration of a biodiversity resource</li> <li>2 The extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource</li> </ol>
Minor	Adverse	<ol style="list-style-type: none"> <li>1 Permanent/irreversible damage to a biodiversity resource</li> <li>2 the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource</li> </ol>
	Beneficial	<ol style="list-style-type: none"> <li>1 Permanent addition of, improvement to, or restoration of a biodiversity resource</li> <li>2 the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource</li> </ol>
Negligible	Adverse	<ol style="list-style-type: none"> <li>1 Temporary/reversible damage to a biodiversity resource</li> <li>2 the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource</li> </ol>
	Beneficial	<ol style="list-style-type: none"> <li>1 Temporary addition of, improvement to, or restoration of a biodiversity resource</li> <li>2 the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource</li> </ol>
No change		No observable impact, either positive or negative

Table taken from DMRB LA 108 [1] (Table 3.11 Level of impact and typical descriptions).

- 8.3.9 The level of impact on biodiversity will also be concluded in accordance with CIEEM's *Guidelines for Ecological Impact Assessment in the UK and Ireland* [20].
- 8.3.10 Air quality modelling assessment has been used to assess the impact of nitrogen (N) deposition on sensitive habitats. More details on air quality can be found in Chapter 5 Air Quality.

#### Zone of influence

- 8.3.11 The CIEEM *Guidelines for Ecological Impact Assessment* [20] have been used to guide the characterisation of impacts process. For example, in determining factors influencing character such as the complexity of the impact (whether it is direct or indirect), and the Zone of Influence<sup>2</sup> (Zol) of that receptor. The Zol is the area over which ecological features may be subject to significant effects. This area may differ for different receptors. The Zol is explained in more detail within Section 8.6.

#### Assessment of significance of effects

- 8.3.12 In accordance with DMRB *LA 104* [17] and DMRB *LA 108* [1], and shown in Table 8-4, the significance of effects characterised as Neutral, Slight, Moderate, Large, Very Large and both adverse and beneficial, is determined by assessing the importance of resources/receptors against any residual impact.
- 8.3.13 In accordance with DMRB *LA 108* [1], a significant effect is considered to be any effect of moderate, large or very large categories once mitigation has been taken into account. Significant effects, or impacts which affect receptors protected under legislation, require consideration of avoidance, reduction or mitigation as defined within CIEEM Guidance [20].

### **Table 8-4 Impact Significance matrix**

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<sup>2</sup> The 'zone of influence' for a project is the area over which ecological features may be subject to significant effects as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change. It may be appropriate to identify different zones of influence for different features.

Resource importance	Level of Impact					
		No change	Negligible	Minor	Moderate	Major
International or European importance		Neutral	Slight	Moderate or large	Large or very large	Very large
UK or National importance		Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Regional importance		Neutral	Neutral or slight	Slight	Moderate	Moderate or large
County or equivalent authority importance		Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Local importance		Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Table taken from DMRB LA 108 [1] (Table 3.13 Significance matrix)

8.3.14 The assessment of the significance of effects is also informed by professional judgement of ecologists experienced in the assessment of ecological impacts of major linear infrastructure schemes in the UK, and further guidance provided within CIEEM Guidelines [20].

### Stakeholder engagement

8.3.15 Natural England have been engaged via the discretionary advice service, discussions to date have focussed on agreement over the scope of surveys to inform the assessment of the proposed scheme. Technical Working Groups (TWG) are being set up with key stakeholders including the local planning ecologists and representatives of Somerset Wildlife Trust. The intention is for TWG meetings to discuss a shared vision for the proposed scheme and more detailed design with regard to the infrastructure crossings/ecological networks and achieving biodiversity targets. Further details on the consultation relating to biodiversity would be provided in the Statements of Common Ground, which would be submitted with the DCO application.

## 8.4 Assessment assumptions and limitations

8.4.1 The preliminary assessment presented in this chapter is based on the ecological surveys completed to date and the data collected and assessed at the time of writing. Every effort has been made to ensure that the findings of the study present as accurate an interpretation as possible of the status of flora and fauna within the study area; however, surveys are ongoing which will provide additional data on the ecology of the area. Updated survey results and an updated assessment of biodiversity impacts will be reported in the ES.

8.4.2 Ecological surveys are limited by factors that affect the presence of plants and animals, such as the time of year, weather, migration patterns and behaviour. Surveys undertaken have been largely conducted during the optimal survey periods and using standard methodologies accepted by Natural England and other statutory bodies. Field survey limitations, assumptions of presence and deviations from optimal survey windows and standard methodologies are stated within the individual technical reports appended to this PEI Report chapter.

8.4.3 Ecological surveys have been undertaken across the proposed scheme since 2016. The validity of data collected prior to 2021 has been assessed in accordance with CIEEM guidance [20], and the 2021 survey scope designed to ensure an up-to-date ecological baseline to inform the assessment of the

proposed scheme in the ES. For example, given the agricultural nature of the majority of the land within the proposed scheme, the potential for rapid change in habitat types is recognised. Therefore, updated habitat and protected species scoping surveys are being undertaken for the whole of the proposed scheme to ensure the assessment captures any changes. Land access has been good across the proposed scheme, however there were areas where access was not permitted prior to 2021; for example the woodland belt to the south of Griffin Lane has not been surveyed to date. However, access has been agreed for 2021 surveys. Therefore land access is not considered to be a significant limitation to the assessment of the biodiversity effects arising from the proposed scheme for the ES. All biodiversity surveys carried out in 2021 will be amalgamated with existing data and reported in the ES issued to support the DCO application.

- 8.4.4 Where ‘reasonable worst-case’ valuations are necessary they have been made based on the information available at the time of writing. This has included consideration of any available field or desk study data (including aerial photography), a comparison with similar habitat areas occurring in the wider local area, and a qualitative consideration against any factors that indicate suitability for the particular habitat or species in question. The degree or precaution built into the assessment, and mitigation provided, is linked to the level of confidence in the existing data upon which the assessment is based. The findings of surveys undertaken in 2021 will be reviewed and, where appropriate, be used to inform updates to the environmental mitigation, which may include additional habitat creation measures, that will be detailed in the ES.

## 8.5 Study area

- 8.5.1 Initially the ecology of the proposed scheme and surrounding area was surveyed over five years between 2016 and 2020, in which time several route options were considered, with the preferred route (Pink Modified Option) being determined and announced in 2019 (see Chapter 3 Assessment of Alternatives). The survey data available and relevant to the proposed scheme has been incorporated into the baseline and will be supplemented by update survey data being collected during 2021/2022. The scope of surveys to be undertaken has been developed in consultation with Natural England to ensure refinement of the baseline previously established in order to inform the impact assessment of the proposed scheme.
- 8.5.2 The study area for each survey was based upon the options selection stage design and varied for different species and ecological survey methods to ensure compliance with specific guidance for species, groups and habitats.
- 8.5.3 The maximum extent of the study areas was determined by guidance, the predicted Zone of Influence (Zoi) of the proposed scheme and consultation with statutory bodies. For example, surveys for badger (*Meles meles*) extended 0.31 miles (500 metres) from the proposed scheme, as per DMRB *LD 118 Biodiversity design (LD 118)* [18]. Where there are any deviations from guidance, these are described and justified within the assessment and ecological baseline reports within PEI report Appendices 8.1 to 8.23.
- 8.5.4 Table 8-5 provides a summary of the desk study and field study area distances applied for each ecological receptor surveyed for the proposed scheme; specific guidance used is provided below for each biodiversity receptor considered. The 2021/2022 survey study area is detailed in Table 8-5 where it deviates from the study area of the surveys undertaken previously.

**Table 8-5 Summary of the study area distances applied for each biodiversity receptor considered**

Biodiversity resource or survey type	Study area
<b>Desk study</b>	
Internationally designated nature conservation sites, including SAC, SPA and Ramsar Sites	<p>18.6 miles (30 kilometres) from the proposed scheme boundary for sites designated for bats. European sites within likely foraging range for birds species (where the Zol could affect potentially functionally linked land). A 6.2 miles (20 kilometres) study area was applied to identify any internationally designated site with potential hydrological connectivity, sites beyond this were considered in consultation with water environment specialists to identify sites with hydrological connectivity and an impact pathway from the proposed scheme.</p> <p>Any internationally designated site with a component SSSI that has an Impact Risk Zone (IRZ) that extends into the proposed scheme boundary. The IRZ defines zones around each SSSI which reflect the particular sensitivities of the features for which the SSSI is notified and could potentially extend beyond the study areas defined for internationally designated sites.</p> <p>0.12 miles (200 metres) from the Affected Road Network (ARN) for sites sensitive to N deposition (assessed for air quality impacts only).</p>
Nationally and locally designated nature conservation sites, including NNR, SSSI, Local Nature Reserves (LNR), priority habitats, Local Wildlife Sites (LWS), ancient woodland, ancient and veteran trees and Royal Society for the Protection of Birds Reserves.	<p>Any SSSI that has an Impact Risk Zone that extends into the proposed scheme boundary.</p> <p>1.2 miles (2 kilometres) from the proposed scheme boundary for other sites.</p> <p>0.12 miles (200 metres) from the ARN for sites sensitive to N deposition (assessed for air quality impacts only).</p>
Records of protected species and notable species from Somerset Environmental Records Centre (SERC).	1.2 miles (2 kilometres) from the proposed scheme boundary.
<b>Field survey</b>	
Extended Phase 1 habitat survey	The Extended Phase 1 habitat survey was conducted up to 0.31 miles (500 metres) from the proposed scheme boundary (undertaken in 2016).
UK Habitats Classification (UKHab) survey	Surveys are being conducted in 2021 within up to 0.16 miles (250 metres) of the proposed scheme boundary.
River Habitat Survey (RHS) and River Corridor Survey (RCS)	<p>Watercourses which were within the proposed scheme boundary or wider catchment likely to be impacted by the works were considered, and the RHS was ultimately undertaken along 0.31 mile (500 metres) lengths of the River Ding and the associated Back Stream.</p> <p>Further RCS will be undertaken in 2021 with the study area extended to include up to 0.31 miles (500 metres) upstream and downstream of all locations where the proposed scheme will</p>

Biodiversity resource or survey type	Study area
	cross a watercourse, including crossing points of the existing A358 carriageway.
Modular river (MoRPh) surveys	MoRPh surveys will be undertaken in 2021 up to 0.16 miles (250 metres) upstream and downstream at all locations where the proposed scheme will cross a watercourse, including crossing points of the existing A358 carriageway.
Assessment of habitat suitable for migratory and resident populations of fish such as salmonid species, European eel ( <i>Anguilla anguilla</i> ), lamprey species and shad species.	<p>Fish habitat assessments and electric fishing were undertaken on a 0.06 mile (100 metres) stretch of the River Ding where a channel diversion is part of the proposed scheme.</p> <p>Further surveys will be undertaken in 2021 with the study area extended to include up to 0.06 miles (100 metres) upstream and downstream of all locations where the proposed scheme crosses a watercourse, including crossing points of the existing A358 carriageway.</p>
Hedgerow Survey	All hedgerows within 0.03 miles (50 metres) of the proposed scheme boundary.
Woodland Survey - National Vegetation Classification (NVC)	<p>Woodland sites within 0.12 miles (200 metres) of the proposed scheme boundary were scoped in for NVC surveys if they had the potential to support protected or notable plant species, were designated for their botanical interest, and/or were listed on the Ancient Woodland Inventory. This distance was used to account for potential air quality impacts which have potential to have adverse impacts within 0.12 miles (200 metres) of the air pollution source in accordance with DMRB LA 105 Air quality [23].</p> <p>Further surveys will be undertaken in 2021 at woodland sites within 0.06 miles (100 metres) of the proposed scheme where access issues or survey limitations were previously an issue.</p>
Botanical Survey - NVC	<p>Grassland and woodland sites of potential conservation importance selected based on the Phase 1 habitat Map within the proposed scheme boundary or hydrologically connected sites. The Phase 1 habitat Map is available in Appendix 8.2 Preliminary Ecological Appraisal (PEA).</p> <p>Further surveys will be undertaken in 2021 at grassland sites within 0.06 miles (100 metres) of the proposed scheme where access issues or survey limitations were previously an issue.</p>
Bat surveys – ground level tree assessments	Trees within 0.06 miles (100 metres) of the proposed scheme options at the time of survey (which includes all those within the proposed scheme boundary) were surveyed from ground level.
Bat surveys – aerial tree climbing	Following the GLTA results, aerial tree climbing surveys were conducted on all trees with high bat roosting potential within 0.06 miles (100 metres) of the proposed scheme boundary, and all trees with moderate potential within 0.01 miles (20 metres) of the proposed scheme boundary.

<b>Biodiversity resource or survey type</b>	<b>Study area</b>
Bat surveys – internal building inspections	Internal inspections were conducted (where possible) on high potential buildings within 0.06 miles (100 metres) of the proposed scheme boundary, buildings with moderate or better potential to support roosting bats within 0.01 miles (20 metres) of the proposed scheme boundary, and buildings with low potential to support roosting bats which would be directly impacted by construction.
Bat surveys – dusk emergence and dawn re-entry surveys	Moderate and high potential buildings and trees, and low potential buildings within the proposed scheme boundary were included in emergence and re-entry surveys. Buildings and trees with moderate and high suitability within 0.01 miles (20 metres) and 0.06 miles (100 metres) of the proposed scheme boundary, respectively, were also subject to emergence and re-entry surveys (dawn and dusk).
Bat surveys – hibernation surveys	Any caves or other underground features which could provide suitable hibernation conditions within 0.06 miles (100 metres) of the proposed scheme boundary.
Bat surveys – activity transects and automated detector surveys	Fourteen transects designed to cover suitable bat foraging and commuting habitat within 0.16 miles (250 metres) of the proposed scheme boundary. Three static detectors were deployed for each transect route.
Bat surveys – crossing points	Fourteen bat crossing point locations along the proposed scheme alignment.  Update and additional crossing point surveys will be undertaken in 2021 to include additional locations resulting from design changes to the proposed scheme.
Bat surveys – bat trapping and radio-tracking	In woodlands/tree-dominated habitats within or adjacent to the proposed scheme boundary.
Badgers – surveys to identify and classify badger setts including activity level, followed by badger bait marking of main setts.	Surveys were conducted within a 0.31 mile (500 metres) area of the proposed scheme boundary.  Targeted update surveys will be undertaken in 2021 within 0.16 miles (250 metres) of the proposed scheme boundary.
Breeding bird survey transects	Fourteen pre-determined transect routes designed to cover all of the habitats suitable for breeding birds present within 0.16 miles (250 metres) of the preferred route of the proposed scheme boundary with particular focus upon those areas that were likely to be directly affected by the proposed scheme.
Wintering bird survey transects	Nine pre-determined routes designed to cover areas of open farmland and grassland suitable for wintering birds within 0.6 miles (1 kilometre) of the preferred route of the proposed scheme, with the scope reduced to 0.31 miles (500 metres) from the proposed scheme where areas lack extensive open fields or where a small realignment of the road occurs.
Barn owl ( <i>Tyto alba</i> ) surveys	Stage 1 (Desk-based scoping) and Stage 2 (Investigative Field Survey) were combined into one walkover undertaken within 0.9 miles (1.5 kilometres) of the proposed scheme boundary. Stage 3 (Nest Verification Surveys) was completed within 0.31 miles (500 metres) of the proposed scheme boundary.

Biodiversity resource or survey type	Study area
	Targeted update Stage 1, Stage 2 and Stage 3 surveys will be undertaken in 2021 within up to 0.31 miles (500 metres) of the proposed scheme boundary.
Dormouse ( <i>Muscardinus avellanarius</i> )	<p>Suitable habitat within 0.16 miles (250 metres) of the proposed scheme boundary.</p> <p>Targeted update surveys will be undertaken in 2021 within 0.06 miles (100 metres) of the proposed scheme boundary.</p>
Great crested newt ( <i>Triturus cristatus</i> ) surveys, including Habitat Suitability Index (HSI) assessments, environmental DNA (eDNA) surveys and population size class estimate surveys.	<p>All ponds and other potentially suitable waterbodies identified within 0.25 miles (400 metres) of the proposed scheme were assessed for their suitability to support great crested newts using the standardised HSI methodology [24]. Further eDNA surveys were undertaken of ponds within 0.25 miles (400 metres) of the proposed scheme boundary. Population size class estimate surveys were undertaken on ponds testing positively for great crested newt eDNA.</p> <p>Targeted update HSI surveys will be undertaken in 2021 on all waterbodies within 0.16 miles (250 metres) of the online section and 0.31 miles (500 metres) of the offline section of the proposed scheme boundary. Update eDNA surveys will be undertaken on all waterbodies within 0.03 miles (50 metres) of the proposed scheme, and all of those within the described buffers (as detailed for HSI surveys) of the online and offline sections of the proposed scheme with an HSI score of 0.5 or above. Population estimate surveys will be undertaken on all ponds that return a positive or inconclusive eDNA survey result.</p>
Reptiles	A habitat suitability assessment, presence/likely absence surveys and population assessment surveys were conducted within 0.06 miles (100 metres) of the proposed scheme boundary.
Otter ( <i>Lutra lutra</i> )	<p>Following the Extended Phase 1 habitat survey, 23 watercourses within 0.16 miles (250 metres) of the proposed scheme boundary were identified as having potential to support otters, of which 15 were subject to detailed survey. A minimum survey extent of 1.2 miles (2 kilometres) was covered for each watercourse.</p> <p>Update surveys will be undertaken in 2021; habitat suitability assessments will be undertaken on all watercourses that are located within the footprint of the proposed scheme and up to 0.16 miles (250 metres) from the construction boundary. Surveys for field signs of otter will be undertaken along watercourses within the construction boundary of the proposed scheme, extending up to 0.06 miles (100 metres) upstream and downstream of the construction boundary. Where the habitat suitability assessments indicate low suitability for otter within the 0.06 mile (100 metre) buffer, but high suitability for otter beyond 0.06 miles (100 metres), then the field signs surveys may be extended accordingly, up to 0.16 miles (250 metres) upstream and downstream of the construction boundary.</p>
Water vole ( <i>Arvicola amphibius</i> )	Watercourses wholly or partially within 0.16 miles (250 metres) of the proposed scheme boundary were surveyed for water vole, including habitat suitability and presence/absence.

Biodiversity resource or survey type	Study area
	<p>Updates surveys will be undertaken in 2021; habitat suitability assessments will be undertaken on all watercourses that are located within the footprint of the proposed scheme and up to 0.16 miles (250 metres) from the construction boundary.</p> <p>Surveys for field signs of water vole will be undertaken along watercourses within the construction boundary of the proposed scheme, extending up to 0.06 miles (100 metres) upstream and downstream of the construction boundary. Where the habitat suitability assessments indicate low suitability for water vole within the 0.06 mile (100 metre) buffer, but high suitability for water vole beyond 0.06 miles (100 metres), then the field signs surveys may be extended accordingly, up to 0.16 miles (250 metres) upstream and downstream of the proposed scheme construction boundary. In addition, field signs surveys will be further extended to up to 0.31 miles (500 metres) upstream and downstream of the construction boundary where potential river diversions are proposed.</p>
White-clawed crayfish ( <i>Austropotamobius pallipes</i> )	<p>Within the proposed scheme boundary and where indirect effects could occur.</p> <p>Update surveys will be undertaken in 2021 including habitat assessment and, where required, presence/ likely absence surveys within 0.06 miles (100 metres) upstream and downstream on all watercourses crossed by the proposed scheme.</p>
Terrestrial invertebrates	<p>Suitable terrestrial invertebrate habitats, including broadleaved woodland, open grassland with veteran trees and calcareous grassland (as identified within the Extended Phase 1 habitat survey) within or adjacent to the proposed scheme boundary (within 0.31 miles (500 metres)).</p> <p>Targeted update surveys will be undertaken in 2021 within 0.06 miles (100 metres) of the proposed scheme.</p>
Brown hairstreak	<p>Suitable habitats within 0.03 miles (50 metres) of the proposed scheme boundary.</p>
Aquatic invertebrate assessment through kick sampling and manual searching.	<p>Within the proposed scheme boundary and where indirect effects could occur.</p> <p>Update surveys will be undertaken in 2021 with sampling points within 0.06 miles (100 metres) upstream and downstream on all watercourses crossed by the proposed scheme.</p>

8.5.5 A desk study was carried out, followed by field studies. Definition of the desk and field study areas follows guidance given in DMRB *LD 118* [18] and other available sources of survey good practice guidance referenced below and in PEI report Appendices 8.1-8.23.

### Desk Study

8.5.6 A desk study was undertaken in 2016 and updated in 2021 to collate and review records of statutory and non-statutory designated sites, protected and notable species and notable habitats within 1.2 miles (2 kilometres) of the options being considered at the time. This search area was extended to 18.6 miles (30

kilometres) for SACs where bats are a qualifying species. This desk study was updated in December 2019 and again in February 2021 to account for any additional protected and notable species and notable habitat records since the date of the first desk study search and to ensure that the age of the ecological data used to inform the assessment is no older than 12-18 months, in line with CIEEM guidance [20].

8.5.7 The following organisations and resources have been consulted to compile the desk study:

- Multi-Agency Geographic Information for the Countryside (MAGIC) (Defra).
- Somerset Environmental Records Centre (SERC).
- Woodland Trust, for records of veteran trees.
- The Ancient Woodland Inventory [25].
- Environment Agency (EA) monitoring data (Ecology and Fish Data Explorer) for aquatic ecological features (fish, white-clawed crayfish, macro-invertebrates and macrophytes) up and downstream of where watercourses are directly crossed by the proposed scheme.
- The EA were contacted in 2016 for records of otter road casualties within the vicinity of the A358.
- Aerial photography and Ordnance Survey maps from between 2016 and 2021 have been reviewed.

### Field survey methodology

8.5.8 The field survey methods used are summarised within Table 8-6 and additional details provided in the following section.

**Table 8-6 Summary of field survey methods used for each type of biodiversity resource relevant to the proposed scheme**

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
Extended Phase 1 habitat survey	The broad habitat types within the study area have been identified and mapped in accordance with the Handbook for Phase 1 Habitat Survey [26].  Features of potential significance to protected species were identified and recorded as target notes which are included in Appendix 8.2 Preliminary Ecological Appraisal (PEA). Habitats have been classified according to Joint Nature Conservation Committee (JNCC) habitat types and are shown on the Phase 1 Habitat map within Appendix 8.2	March and April 2016	PEIR Appendix 8.2
UKHab survey	UKHab surveys are being undertaken in line with the relevant guidance [27] throughout 2021, the results of which will inform the Environmental Statement (ES).  All habitats within the study area will be classified using the UKHab classification system. A description of each habitat, including botanical communities, key indicator species and	To be undertaken throughout 2021	To be reported in the ES

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	indicative physical characteristics will be included.		
River Habitat Survey (RHS) and River Corridor Survey (RCS)	<p>RHS and RCS were undertaken of the River Ding in accordance with relevant guidance [28] [29].</p> <p>Further RCS will be undertaken within the study area in 2021, to include all watercourses crossed by the proposed scheme.</p>	<p>August 2020</p> <p>To be undertaken throughout 2021</p>	<p>PEIR Appendix 8.3</p> <p>To be reported in the ES</p>
Modular river (MoRPh) surveys	MoRPh surveys will be undertaken within the study area in 2021 according to the relevant best practice guidelines [30] [31] [32].	To be undertaken throughout 2021	To be reported in the ES
Hedgerow surveys	<p>Hedgerows within the study area were surveyed in accordance with the methodology within the Hedgerow Survey Handbook [33].</p> <p>Additional surveys to be undertaken in 2021 to include those hedgerows within the study area not previously surveyed due to previous access issues and design changes.</p>	<p>Within the optimal survey period between 2017 and 2020</p> <p>Additional surveys: throughout the optimal survey period in 2021</p>	<p>PEIR Appendix 8.4</p> <p>To be reported in the ES</p>
National vegetation classification (NVC) surveys	<p>NVC surveys were undertaken for woodland and grassland, following best practice guidance and standard methodology [34] [35]. The nomenclature for the vascular plants in this report follows Stace [36] and Atherton et al. [37] for both scientific and English names.</p> <p>Additional NVC surveys will be undertaken within the study area where access issues or survey limitations were previously an issue.</p>	<p>April – June 2017 (woodland) and May – August 2017 (grassland)</p> <p>Additional surveys: to be undertaken throughout 2021</p>	<p>PEIR Appendix 8.5</p> <p>To be reported in the ES</p>
Bat roost surveys	<p><u>Ground-level tree assessments</u></p> <p>Trees in the study area were subject to a ground-level assessment to obtain an initial judgement on potential roost features (PRF) and likely roosting potential, as per good practice guidelines [38]. Trees were classified according to their potential to support roosting bats, whilst any evidence of bats was also recorded.</p> <p>Targeted ground-level assessments will be undertaken within the study area focussing on areas where access was previously unavailable, as well as areas that are now within the study area due to design changes. In addition, where the requirement for emergence/re-entry surveys is identified for a tree, (see below) an update ground-level inspection will be undertaken prior to the survey to make an assessment of current roosting potential.</p>	<p>2017 – 2020</p> <p>Additional and update surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.6</p> <p>To be reported in the ES</p>

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	<p><u>Aerial tree-climbing surveys</u> Trees with high or moderate roosting potential within the study area were subject to aerial tree-climbing surveys as per good practice guidelines [38]. Surveys were undertaken by two suitably qualified tree climbers, at least one of whom held a Natural England Level 2 bat licence. Features were inspected using an endoscope as appropriate.</p> <p>As a result of these surveys, trees were re-classified according to roost potential and were further assessed as to the potential to support hibernating bats. Trees that were deemed unsafe to climb were not included but were subject to alternative survey methods such as emergence/re-entry, or otherwise indicated as requiring further survey.</p> <p>Targeted aerial tree-climbing surveys to be undertaken within the study area focussing on areas where access was previously unavailable, as well as areas that are now within the study area due to design changes.</p>	<p>2017 – 2019</p> <p>Additional surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.6</p> <p>To be reported in the ES</p>
	<p><u>External building and structure inspections</u> Buildings and structures (such as bridges and culverts) within the study area were surveyed externally according to good practice guidelines [38], and classified according to their potential to support roosting bats.</p> <p>Targeted external inspections to be undertaken within the study area of the proposed scheme, focussing on areas where access was previously unavailable, as well as areas that are now within the study area due to design changes, or where updated emergence/re-entry surveys are required.</p>	<p>2017 – 2020</p> <p>Additional surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.6</p> <p>To be reported in the ES</p>
	<p><u>Internal building inspections</u> Buildings with the potential to be directly impacted by the proposed scheme and those supporting confirmed roosts within the study area were subject to internal inspections as per good practice guidelines [38]. Buildings were classified according to roost potential, including their potential for use as a hibernation site.</p> <p>Update internal building inspections are not generally being undertaken currently, due to ongoing access and Covid-19 restrictions. However, buildings within the study area where access was previously unavailable are to be subject to external inspections (see above) and</p>	<p>2019</p>	<p>PEIR Appendix 8.6</p>

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	emergence/re-entry surveys (see below) as appropriate.		
	<p><u>Dusk emergence and dawn re-entry surveys</u></p> <p>Trees, buildings and structures identified to be of high, moderate or low (buildings only) roosting potential were subject to emergence/re-entry surveys to provide an assessment of the presence or likely absence of roosting bats. Survey effort and detailed methodology was as per good practice guidance [38].</p> <p>Targeted additional and update emergence/ re-entry surveys to be undertaken within the study area. These are focusing upon trees, buildings and structures within the study area where access was previously unavailable, or to account for land now within the study area due to design changes, as well as where the survey information is now considered to be out of date.</p>	<p>May – October of 2017 – 2020</p> <p>Additional and update surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.6</p> <p>To be reported in the ES</p>
	<p><u>Hibernation surveys</u></p> <p>Where suitable hibernation roost potential had previously been identified, buildings and features were proposed to be subject to hibernation surveys to identify the presence/ likely absence of hibernating bats. Due to Covid-19 restrictions, only one building was subject to such surveys. These surveys were undertaken in accordance with good practice guidelines [38], whilst static detectors (Wildlife Acoustic SM4BAT full spectrum bat detectors) were also deployed where appropriate.</p> <p>Hibernation surveys to be undertaken at buildings/structures identified as providing hibernation potential within the study area during winter of 2021/2022.</p>	<p>January and February 2021</p> <p>To be undertaken in winter 2021/2022</p>	<p>PEIR Appendix 8.7</p> <p>To be reported in the ES</p>
Bat activity surveys	<p><u>Bat activity transect surveys</u></p> <p>Bat activity transect routes were designed to provide adequate coverage (where access allowed) of all suitable bat foraging and commuting habitat within the study area. Surveys were planned and undertaken according to good practice guidelines [38].</p> <p>Two full spectrum detector models were used (Anabat Walkabout and Batlogger M) to record sound files throughout the transect surveys.</p> <p>It was agreed, in consultation with Natural England that update activity transect surveys were not required, with a focus on other methods such as advanced surveys and automated detector surveys instead. Transect</p>	<p>April – October 2017 – 2020</p> <p>Additional surveys to be undertaken at transect 14 in 2021</p>	<p>PEIR Appendix 8.8</p> <p>To be reported in the ES</p>

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	<p>14 was not surveyed in previous years due to access restrictions and is therefore currently subject to activity surveys.</p>		
	<p><i>Automated detector surveys</i> Three static detectors (Wildlife Acoustic SM4BAT full spectrum bat detectors) were installed for each transect in line with good practice guidance [38]. Static detectors were set up to begin recording 30 minutes before sunset and stop recording 30 minutes after sunrise and were deployed across a range of suitable habitats within the study area.</p> <p>Targeted static detector surveys to be undertaken, with detectors deployed for a minimum of 5 nights on a monthly basis in key locations within the study area, where access allows.</p>	<p>April – October 2017 – 2020</p> <p>Additional surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.8</p> <p>To be reported in the ES</p>
	<p><i>Bat crossing point surveys</i> Bat crossing point locations were chosen within the study area (where access allowed), to determine potential fragmentation of bat foraging and commuting habitat along with direct bat mortality. Surveys were conducted according to best practice guidance and methodologies [39]. The surveys consisted of visual observations of bats along linear habitat features to be crossed or severed by the proposed scheme over a 90-minute period.</p> <p>Update and additional surveys are planned to be undertaken, with new locations resulting from design changes to the proposed scheme. As agreed, following consultation with Natural England, surveys are being undertaken once per month from May to August during the peak activity period (i.e. a total of four surveys at each crossing point) using multiple surveyors equipped with full spectrum detectors (Batlogger M) and infrared cameras.</p>	<p>May – September 2017 – 2020</p> <p>Update and additional surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.8</p> <p>To be reported in the ES</p>
<p>Bat advanced surveys</p>	<p><i>Bat trapping and radio tracking</i> Trapping of bats using mist nets and harp traps (including the use of acoustic lures) and the fixing of radio transmitters (tags) was used in order to understand the potential impacts of the proposed scheme upon the target species (barbastelle and Bechstein's). Trapping was carried out in accordance with the conditions of Natural England licence 2017-30599-SCI-SCI and in accordance with good practice guidelines [38].</p> <p>Tagged bats were simultaneously or subsequently followed by radio-tracking teams during the survey session to locate and identify</p>	<p>Appropriate survey periods in 2017 – 2020</p>	<p>PEIR Appendix 8.9</p>

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	<p>roost sites and to examine flying activity of the tagged bats. Where access was possible to roost sites, emergence counts were undertaken to determine the status/function of the roost.</p> <p>An increased advanced survey effort will be undertaken, which comprises at least three capture and radio tracking sessions at key identified locations within the study area. These surveys will cover all species, with a focus on Annex II bat species to identify key (maternity) roosts and crossing points along the proposed scheme.</p>	Additional surveys to be undertaken in 2021	To be reported in the ES
Badger	<p>Badger walkover surveys and badger bait marking surveys were conducted in accordance with best practice guidelines [40] [41], to assess the presence of badger setts, sett activity status and badger territory ranges.</p> <p>Update surveys will be undertaken within the study area to verify previous field data and to re-confirm the classification of known setts, as well as identify any additional setts and previously unrecorded field signs. Update survey findings will be used to inform future territory mapping (bait marking analysis).</p>	<p>Walkover: February 2017 – February 2020 Bait marking: February – March 2020</p> <p>Update surveys to be undertaken in 2021/2022</p>	<p>PEIR Appendix 8.10</p> <p>To be reported in the ES</p>
Breeding birds	<p>Breeding bird surveys were conducted in accordance with the Common Bird Census and Breeding Bird Surveys methods [42]. Update surveys were undertaken in 2020, although due to the Covid-19 pandemic, only one visit was made to each transect.</p> <p>Update surveys will be undertaken within the study area due to the time lapsed since the surveys in 2017 and due to the survey baseline was not able to be fully updated during the 2020 survey season. These surveys comprise 14 walked transects across suitable habitats.</p>	<p>April, May and June 2017 and June 2020</p> <p>Update surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.11</p> <p>To be reported in the ES</p>
Wintering birds	<p>Wintering bird surveys were conducted within the study area in accordance with best practice guidance [42] to assess the capacity of suitable habitats to support assemblages of wintering birds. These surveys comprised nine walked transects that covered the largest open farmland and grassland habitats within the survey area.</p>	October 2020 – March 2021	PEIR Appendix 8.12
Barn owl	<p>Habitat suitability assessments, followed by stage 1, stage 2 and stage 3 barn owl surveys were carried out where appropriate using best practice guidance [43] to identify Potential Nest Sites (PNS), Occupied Breeding Sites (OBS), Active Roost Sites (ARS) and / or Temporary Roost Sites (TRS).</p>	<p>Habitat assessments: 2017 Stage 1&amp;2: June and July 2017 Stage 3: August – November</p>	PEIR Appendix 8.13

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	Update stage 1, stage 2 and stage 3 surveys will be undertaken within the study area.	2017  Update surveys to be undertaken in 2021	To be reported in the ES
Hazel dormouse	Habitat suitability assessments were undertaken, followed by nest tube surveys within suitable habitat. Best practice guidelines [42] were followed to establish presence or likely absence of this species.  Update hazel dormouse surveys will be undertaken within the study area in 2021. Nest tubes and nest boxes are being used to determine presence or likely absence and to allow for an assessment of likely population size.	Habitat assessments: May 2016 Presence/likely absence: February – November 2017  Update surveys to be undertaken in 2021	PEIR Appendix 8.14  To be reported in the ES
Great crested newt	<u>Habitat Suitability Index (HSI) assessments</u>  Suitable waterbodies within the study area were subject to HSI assessments following standardised methodology [24]. Waterbodies recorded to be dry, be isolated by significant dispersal barriers or support flowing water were not subject to HSI assessment.  Update HSI assessments will be undertaken in 2021 on all waterbodies within the study area.	2017 – 2020  Update surveys planned to be undertaken in 2021	PEIR Appendix 8.15  To be reported in the ES
	<u>eDNA surveys</u>  eDNA surveys were undertaken by experienced ecologists each holding a Natural England great crested newt Class Licence (Level 1 CL08).  Update eDNA surveys will be undertaken in 2021 on all waterbodies within the study area and all of those with an HSI score of 0.5 or above.	eDNA: June 2018, May 2019 and May 2020  Update surveys to be undertaken in 2021	PEIR Appendix 8.15  To be reported in the ES
	<u>Presence/likely absence and population estimate surveys</u>  Prior to eDNA surveys being conducted, all suitable ponds within the study area were subject to presence/likely absence surveys in accordance with best practice guidance [44]. Where great crested newts were identified as present, these waterbodies were also subject to population estimate surveys.	Presence/likely absence and population estimate (where required): March – mid-June 2017	PEIR Appendix 8.15

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	Update population estimate surveys will be undertaken on all ponds that return a positive or inconclusive eDNA survey result.	Update surveys to be undertaken in 2021	To be reported in the ES
Reptiles	<p>Habitat suitability assessments were completed for the study area, with subsequent survey visits to determine presence/likely absence, population size and importance (where required), in accordance with best practice guidance [45].</p> <p>Update surveys will be undertaken in 2021 within the study area due to the time elapsed since the previous surveys. In addition, a number of additional locations have been scoped into the study area following design changes.</p>	<p>Habitat assessments: 2017 Presence/likely absence: April – October 2017</p> <p>Update surveys will be undertaken in 2021</p>	<p>PEIR Appendix 8.16</p> <p>To be reported in the ES</p>
Otter	<p>Habitat suitability assessments were completed for the study area. Suitable watercourses were subject to presence/ likely absence surveys following standard methodology [46] and DMRB guidelines [47]. DMRB guidelines were subsequently withdrawn but after the surveys were undertaken, so were pertinent when used.</p> <p>Update surveys will be undertaken within the study area due to the time elapsed since the previous surveys. Surveys will be undertaken following the current standard methodology [46].</p>	<p>Habitat assessments and presence/likely absence: 2017 - 2020</p> <p>Update surveys will be undertaken in 2021</p>	<p>PEIR Appendix 8.17</p> <p>To be reported in the ES</p>
Water vole	<p>Habitat suitability assessments were completed for the study area. Presence/ likely absence surveys were completed, where required, following best practice guidance [48].</p> <p>Update surveys will be undertaken within the study area due to the time elapsed since the previous surveys.</p>	<p>Habitat suitability assessments: mid-April – June 2017. Presence/likely absence: June 2017 – August 2020</p> <p>Update surveys will be undertaken in 2021</p>	<p>PEIR Appendix 8.18</p> <p>To be reported in the ES</p>
White-clawed crayfish	<p>Habitat suitability assessments were undertaken for the study area. Presence/ likely absence surveys were completed (where required) following best practice guidance [49] [50].</p> <p>Given the length of time that has lapsed since the previous surveys in 2017, update habitat assessment and, where required, presence/ likely absence surveys will be undertaken within the study area including all watercourses crossed by the proposed scheme.</p>	<p>Habitat suitability assessments and presence/likely absence surveys: October 2017</p> <p>Update surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.19</p> <p>To be reported in the ES</p>

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
Terrestrial invertebrates	<p>Suitable habitats for notable invertebrate species were identified during Phase 1 surveys. Targeted surveys were undertaken at the identified locations. Methods used at all sites involved visual searching of nectaring sites and basking areas, the use of a hand net or pooter to capture individual species, sweeping of vegetation, beating of foliage and grubbing. Pitfall traps, pan-traps and a light trap were used at certain sites where the habitats present allowed. Species requiring further identification were collected and identified under microscope.</p> <p>Given the length of time that has lapsed since the previous surveys, update terrestrial invertebrate surveys will be undertaken across suitable habitats within 0.06 miles (100 metres) of the proposed scheme.</p>	<p>Phase 1 surveys: 2016</p> <p>Targeted surveys: late season 2017 and early season 2019</p> <p>Update surveys to be undertaken in 2021</p>	<p>PEIR Appendix 8.20</p> <p>To be reported in the ES</p>
Brown hairstreak	<p>Suitable hedgerow habitats were identified within the study area, with egg search surveys being undertaken at each suitable location according to the UK Butterfly Monitoring Scheme survey guidance [51].</p>	<p>December 2020 – March 2021</p>	<p>PEIR Appendix 8.21</p>
Aquatic invertebrates	<p>Aquatic kick sampling surveys were undertaken at 16 representative sampling locations within the study area, in watercourses to be crossed by the proposed scheme.</p> <p>Under laboratory conditions, macroinvertebrate samples were analysed to Taxon Level 5. For each given sample, the taxa present, and their abundance was recorded to inform the metrics. A series of biological indices were then calculated to analyse the invertebrate community data.</p> <p>Due to the length of time lapsed since the previous surveys in 2017, update surveys will be undertaken within the study area including all watercourses crossed by the proposed scheme.</p>	<p>May – September 2017</p> <p>Update surveys will be undertaken in 2021</p>	<p>PEIR Appendix 8.22</p> <p>To be reported in the ES</p>
Fish	<p>A single, fully quantitative, three-run, electric fish survey was undertaken along the River Ding.</p> <p>Further surveys will be undertaken within the study area in 2021, to include all watercourses crossed by the proposed scheme.</p>	<p>October 2020</p> <p>Update surveys will be undertaken in 2021</p>	<p>PEIR Appendix 8.23</p> <p>To be reported in the ES</p>
Other section 41 Species of Principal Importance	<p>Species-specific surveys were not undertaken for the remaining SPIs. However, desk study records, incidental sightings and knowledge of the presence of suitable habitat gathered during other habitat surveys has informed professional judgement as to the likelihood of other SPI species occurring throughout the proposed</p>	<p>N/A</p>	<p>To be reported in the ES</p>

Biodiversity Survey	Field survey methods	Dates of survey	Reference/ Appendix
	scheme. Given the presence of suitable habitats, a range of Species of Principal Importance are anticipated to be present along the proposed scheme.		

#### Extended Phase 1 habitat survey

- 8.5.9 The Extended Phase 1 habitat survey was carried out during March and April 2016. The broad habitat types within 0.31 miles (500 metres) of the proposed scheme options at the time of the surveys have been identified and mapped in accordance with the *Handbook for Phase 1 Habitat Survey* [26].
- 8.5.10 During the Extended Phase 1 survey, features of potential significance to protected species were identified and recorded as target notes which are included in Appendix 8.2 *Preliminary Ecological Appraisal (PEA)*. These included habitats of potential significance or evidence of, or potential for, any protected or notable species.
- 8.5.11 Habitats within the study area have been classified according to JNCC habitat types and are shown on the Phase 1 Habitat map given within Appendix 8.2 *Preliminary Ecological Appraisal (PEA)*. Where possible, plant species have been identified to species level. The species lists have been compiled and incorporated into the PEA. Further details on the methodology and limitations can be found in Appendix 8.2 of the PEA.

#### UKHab survey

- 8.5.12 UKHab surveys are being undertaken in line with the relevant guidance [27] throughout 2021, the results of which will inform the baseline information within the ES.
- 8.5.13 Surveys are being conducted within up to 0.16 miles (250 metres) of the proposed scheme, whereby all habitats will be classified using the UKHab classification system. A description of each habitat, including botanical communities, key indicator species and indicative physical characteristics will be included.

#### River habitat and river corridor survey

- 8.5.14 RHS and RCS were undertaken along the River Ding, as a section of this watercourse would require diversion as part of the proposed scheme. The surveys were undertaken in accordance with the methodology outlined within *River Habitat Survey in Britain and Ireland; Field Survey Guidance Manual* [28] and the *River Corridor Survey – Conservation and Technical Manual* [29] by an accredited RHS surveyor.
- 8.5.15 Both surveys were undertaken in August 2020 over the same 0.31 mile (500 metre) reach of the river; from ST 33453 15486 to ST 33704 15683. The downstream extent of the survey reach was approximately 0.04 miles (60 metres) upstream of where the existing A358 crosses the River Ding, near Horton Cross.
- 8.5.16 In broad terms, RHS is a method designed to characterise and assess the physical structure of freshwater streams and rivers. Using the application of a set of rules to RHS data, artificial modification to the physical structure of the river channel (e.g. channel realignment, weirs, culverts, sluices, bridges) can be

expressed as a Habitat Modification Score. This score is used to assign a Habitat Modification Class (HMC) (ranging on a five-point scale from 'pristine/semi-natural' to 'severely modified') for each 0.31 mile (500 metre) survey.

- 8.5.17 A Habitat Quality Assessment (HQA) score can also be derived, which describes the habitat diversity of the site. A greater HQA score indicates a more varied habitat with a greater number of natural physical (riparian and in-channel) features (e.g. riffles, pools, sediment bars and vegetation structure).
- 8.5.18 RCS comprises mapping and characterising the habitats, flow types, vegetation communities/species and physical features of a watercourse. Like RHS, the survey covers a 0.31 mile (500 metre) section of river. It supplements the RHS data as the exact location of features is recorded/mapped and plant species (as opposed to plant morphotypes) within the channel and riparian zone are recorded.
- 8.5.19 The RHS and RCS methodologies are detailed in Appendix 8.3: *A358 River Habitat/Corridor Technical Report*.
- 8.5.20 RCS are being undertaken in the 2021 survey season, with the scope expanded to include up to 0.31 miles (500 metres) upstream and 0.31 miles (500 metres) downstream of all 21 locations where the proposed scheme will cross a watercourse, including crossing points of the existing A358 carriageway. The results of which will inform the ES.

#### Modular river (MoRPh) surveys

- 8.5.21 MoRPh surveys are being undertaken during the 2021 survey season following relevant best practice guidance [30] [31] [32]. These surveys will be carried out at all 21 locations where the proposed scheme will cross a watercourse, including crossing points of the existing A358 carriageway. The results of which will inform the BNG calculations utilising the Defra Metric and will be reported in the ES.
- 8.5.22 Each MoRPh survey comprises a desk-based and field-based element. The desk-based element will identify hydrogeomorphological river type, whilst the field-based element, known as a MoRPh Sub-reach Field Survey, will capture information within the study area on each sub-reach of each watercourse. Additionally, at each survey location, influencing factors such as pollution sources and recent management practices are to be recorded.

#### Hedgerow surveys

- 8.5.23 All hedgerows within the area of the proposed scheme options at the time of the surveys and within a 0.03 mile (50 metre) buffer were assessed within the optimal period between 2017 and 2020. Survey methodology followed that detailed in the *Hedgerow Survey Handbook* [33], and the Hedgerows Regulations 1997, and the hedgerow importance was assessed following the criteria provided in Part II of Schedule 1 of the Hedgerows Regulations 1997. These criteria include, but are not limited to, features such as the presence and/or abundance of woody species, connections with other ecological features, rare tree species, and woodland ground flora species. The aims of the hedgerow assessment were to:
- identify hedgerows that are classified as 'important' under the Wildlife and Landscape criteria of the Hedgerows Regulations 1997; and
  - identify hedgerows that, although not deemed 'important' under the ecological criteria of the Hedgerows Regulations 1997, have ecological value in terms of species diversity or as potential wildlife corridors.

- 8.5.24 Further details on the methodology and limitations can be found in Appendix 8.4 *Hedgerow Technical Report*.
- 8.5.25 Additional hedgerow surveys are being undertaken within the optimal survey period in 2021. All hedgerows within up to 0.03 miles (50 metres) of the proposed scheme that have not previously been subject to survey are to be included. The results of which will inform the ES.

#### National vegetation classification (NVC) surveys

- 8.5.26 NVC surveys were undertaken for woodland in April to June 2017 and for grassland in May to August 2017, following best practice guidelines and standard methodology [34] [35].
- 8.5.27 Woodland sites within 0.12 miles (200 metres) of the proposed scheme options at the time of the surveys were scoped in for NVC surveys if they had the potential to support protected or notable plant species, were designated for their botanical interest, and/or were listed on the Ancient Woodland Inventory. This distance was used to account for potential air quality impacts which have potential to have adverse impacts within 0.12 miles (200 metres) of the air pollution source.
- 8.5.28 Grassland sites scoped in for NVC surveys were based on the Phase 1 Habitat Survey carried out in 2016, which indicated the potential presence of grassland of conservation importance in these areas and targeted for more detailed botanical investigation. The areas surveyed are shown in Appendix 8.5 *A358 National Vegetation Classification Technical Report*.
- 8.5.29 Grasslands within a total of 13 sites, and woodlands within a total of 15 sites within the Zol were initially considered for detailed NVC surveys and prioritised for further survey. Of these, eight grasslands and 11 woodlands fall within 0.06 miles (100 metres) of the proposed scheme. Detailed NVC surveys were undertaken on all but one of the grassland parcels, with a partial survey of a second site. Various access restrictions prevented survey of seven woodland sites within the Zol, with a further two deemed unsuitable for detailed NVC survey.
- 8.5.30 The nomenclature for the vascular plants in this report follows Stace [36] and Atherton et al. [37] for both scientific and English names.
- 8.5.31 Further details on the methodology and limitations, including figures, can be found in Appendix 8.5 *A358 National Vegetation Classification Technical Report*.
- 8.5.32 NVC surveys are being undertaken in 2021 following the above methodology. Seven sites have currently been identified as previously being subject to access issues or survey limitations and will, therefore, be surveyed during the 2021 survey season. Additional sites may be subject to NVC surveys following the completion of the UKHab surveys detailed above. The results of which will inform the ES.

#### Bat surveys

- 8.5.33 A suite of bat surveys was carried out between 2017 and 2020 in accordance with available land access. The surveys included bat roost surveys and activity surveys, all of which were carried out broadly in accordance with the Bat Conservation Trust (BCT) good practice guidelines [38], and following consultation with Natural England in 2017 to agree the survey methodology. Where update surveys are proposed for the 2021/2022 survey seasons, these have been scoped through consultation with Natural England consultation in 2021.

## *Bat roost surveys*

### *Habitat assessment*

- 8.5.34 As part of the Extended Phase 1 habitat survey undertaken in 2016, potentially suitable habitats for roosting bats were identified within 0.06 miles (100 metres) of the proposed scheme options at the time of the surveys. Habitats were initially assessed using aerial photography as part of a desk-study exercise followed by ground truthing during the Extended Phase 1 habitat survey in May 2016. Further details can be found in Appendix 8.2 *Preliminary Ecological Appraisal (PEA)*. Following the Extended Phase 1 habitat survey, more detailed preliminary roost assessments were undertaken as outlined below.

### *Ground-level tree assessments*

- 8.5.35 Trees within 0.06 miles (100 metres) of the proposed scheme footprint at the time of the surveys were assessed from ground level between 2017 and 2020, to obtain an initial judgement on PRF and likely roosting potential as per good practice guidelines [38].
- 8.5.36 The trees were classified according to their potential to support roosting bats; as negligible, low, moderate, high or confirmed as a roost, taking into account connectivity to the wider environment and position in the context of the landscape. Any evidence of bats such as presence, droppings or staining was also recorded.
- 8.5.37 It was not possible during the course of these surveys to access all land parcels or individual trees to complete the 2020 survey, as such these land parcels and individual trees will be surveyed in 2021.
- 8.5.38 Targeted updated ground-level tree assessments are being undertaken in the 2021 survey season. These surveys will focus upon areas within 0.06 miles (100 metres) of the proposed scheme where access was previously unavailable or to account for land now within the study area due to design changes. Where the requirement for emergence/re-entry surveys is identified (see below) a ground-level inspection will be undertaken prior to the survey to make an assessment of the current roosting potential of trees. The results of these surveys will inform the requirement for further survey effort and will be reported in the ES.

### *Aerial tree-climbing surveys*

- 8.5.39 To provide further assessment of trees with potential to be affected by the proposed scheme, aerial inspection surveys were undertaken in 2017 and 2019. The surveys were undertaken by two suitably qualified tree climbers (CS38 certified in tree-climbing and aerial rescue), at least one of whom held a Natural England Level 2 bat licence. Where larger features were accessible, they were assessed with use of an endoscope.
- 8.5.40 The surveys included all high roosting potential trees within 0.06 miles (100 metres) and moderate roosting potential trees within 0.01 miles (20 metres) of the proposed scheme footprint. Trees that were identified as having low roosting potential were not included in this scope or in any further surveys with the exception of those considered likely to be directly impacted by the proposed scheme at the time of survey.
- 8.5.41 As a result of these surveys, trees were re-classified (upgraded, downgraded, confirmation of classification of PRF and/or confirmation of the presence of bats

or evidence) according to roost potential and further assessed as to the potential to support hibernating bats.

- 8.5.42 Trees that were deemed unsafe to climb were not included but were subject to alternative survey methods such as emergence/re-entry or otherwise indicated as requiring further survey in 2021.
- 8.5.43 Targeted update aerial tree-climbing surveys are being undertaken in 2021. These surveys will focus upon areas within 0.06 miles (100 metres) of the proposed scheme where access was previously unavailable or to account for land now within the study area due to design changes. The results of these surveys will be reported in the ES.

*External building and structure inspections*

- 8.5.44 Buildings and structures (such as bridges and culverts) within 0.06 miles (100 metres) of the proposed scheme footprint at the time of the surveys were surveyed externally between 2017 and 2020, to obtain an initial judgement of PRF. Each building or structure was methodically surveyed in order to identify any potential access or egress points.
- 8.5.45 The buildings and structures were classified according to their potential to support roosting bats; as either negligible, low, moderate, high or confirmed roost, taking into account connectivity to the wider environment and position in the context of the landscape. Any evidence of bats (such as presence, droppings or staining) and the evidence of features with the potential to support hibernating bats were also recorded.
- 8.5.46 Targeted updated external building inspections are being undertaken in the 2021 survey season. These surveys will focus upon areas within 0.06 miles (100 metres) of the proposed scheme where access was previously unavailable or to account for land now within the study area due to design changes. Where an updated emergence/re-entry survey is anticipated to be required (see below) an external inspection will be undertaken prior to this to ascertain the current roosting potential. The results of these surveys will inform the requirement for further survey effort and will be reported in the ES.

*Internal building inspections*

- 8.5.47 Internal building inspections were undertaken in 2019. Buildings were selected based upon those with the potential to be directly impacted by the proposed scheme, confirmed roosts and within 0.06 miles (100 metres) of the proposed scheme footprint at the time of surveys. Surveyors accessed all areas (where possible to do so) and torches (with red filters), binoculars and endoscopes were used as appropriate, as per good practice guidance [38].
- 8.5.48 Where bat droppings were found that were characteristic of a species, and a positive identification could be made by an experienced and licenced bat worker, droppings were not sent for analysis. Otherwise, a small sample was collected and sent off for DNA analysis at the University of Warwick.
- 8.5.49 As a result of these surveys, buildings were subsequently re-classified according to roost potential and additional information on the type/significance of roost the building could support was gathered in addition to further assessment as to the potential to support hibernating bats.

8.5.50 Update internal building inspections will not generally be undertaken in 2021 due to ongoing access and Covid-19 restrictions. However, buildings within 0.06 miles (100 metres) of the proposed scheme where access was previously unavailable are subject to external inspections and emergence/re-entry surveys (see below) as appropriate.

*Dusk emergence and dawn re-entry surveys*

8.5.51 Trees, buildings and structures previously identified as of high (within 0.06 miles (100 metres) of the proposed scheme footprint) or moderate (within 0.01 miles (20 metres) roosting potential were subject to emergence/re-entry surveys between 2017 and 2020, to provide an assessment of the presence or likely absence of roosting bats by surveyors experienced in this survey type. In accordance with best practice guidelines and standard methodology [38], trees with low roost potential were not subject to further survey. Those with negligible or no roost potential were excluded from the surveys.

8.5.52 Survey effort was determined by roosting potential, outlined within best practice guidelines [38], three surveys for high potential, two for moderate and one for low (where applicable). Surveyor numbers were sufficient for each survey, ensuring all PRFs and identified access/ egress points were known and were visible by at least one surveyor throughout the duration of the survey. There was a minimum gap of two weeks between each survey repeat.

8.5.53 Evening emergence surveys commenced at least 30 minutes before sunset and ended between 90 and 120 minutes after. Dawn re-entry surveys commenced 90 minutes before sunset and extended to up to 15 minutes after. Surveys were carried out in suitable weather conditions between May and October with two surveys occurring within the core period (May to August) for high potential and one for moderate potential.

8.5.54 Full spectrum bat detectors (Anabat Walkabout or Elekon Batlogger) were used to record bat calls during the survey. Species were identified during the surveys and subsequently sound files were analysed using either Anabat Insight or BatExplorer software to confirm species (where possible, otherwise identified to genus level).

8.5.55 Further details on the methodology and limitations of all bat roost surveys (excluding hibernation surveys, below), including figures showing survey locations and classifications, can be found in Appendix 8.6 *Bat Roost Technical Report*.

8.5.56 Targeted update emergence/re-entry surveys are being undertaken in the 2021 survey season. These will focus upon trees, buildings and structures within 0.06 miles (100 metres) of the proposed scheme where access was previously unavailable, or to account for land now within the study area due to design changes, and where the survey information is now considered to be out of date. Previously confirmed roosts will be included within 0.06 miles (100 metres) of the proposed scheme. High and moderate trees, buildings and structures and low buildings and structures within the proposed scheme construction boundary will be included, as agreed in consultation with Natural England 2021. The results of these surveys will be reported in the ES.

*Hibernation surveys*

8.5.57 Based on the preliminary roost assessments undertaken between 2017 and 2020, several buildings and features were determined to have suitable hibernation

roosting potential. Features of high hibernation potential included buildings likely to have cellars or other structures likely to have stable cool and humid conditions.

- 8.5.58 Where suitable hibernation potential was identified, further surveys were proposed to be undertaken in January and February 2021, over a two-week period in each month. Surveys were led by a suitably qualified Natural England bat licenced ecologist. Static bat detectors (Wildlife Acoustic SM4 detectors) were also deployed where appropriate within structures classified with a moderate or high potential for roosting bats. Due to Covid-19 restrictions only one building was subject to surveys, therefore further surveys are proposed for the winter of 2021/2022.
- 8.5.59 Further details on the methodology and limitations of the hibernation surveys, including figures showing survey locations and classifications, can be found in Appendix 8.7 *Bat Hibernation Technical Report*.
- 8.5.60 Update hibernation surveys will be undertaken in the 2021/2022 winter survey season. The surveys will focus upon any trees, buildings and structures with features suitable for hibernating bats, within 0.06 miles (100 metres) of the proposed scheme. The results of these surveys will be reported in the ES.

#### *Bat activity surveys*

##### *Bat activity transect surveys*

- 8.5.61 Eleven transect routes were designed to provide adequate coverage (where access allowed) of all suitable bat foraging and commuting habitat within and nearby the proposed scheme as per good practice guidelines [38]. Each transect route was surveyed a total of seven times over the active periods of 2017 to 2020, with a transect undertaken for each of the active months (April to October), with the exception of transects 12 and 13 where access prevented the April survey and transect 14 where access was denied for the entirety of the survey period.
- 8.5.62 Dusk transects began at sunset and lasted for between two and three hours to account for late-emerging bat species; notably the horseshoe bat (*Rhinolophus* spp.). Three hours was the intention (as agreed with Natural England in 2017) however some were cut short due to differing constraints such as at the landowners' request or due to changes in weather conditions. Each of the July transects were subject to a single follow-up dawn survey, which was undertaken within the same 24-hour period as the dusk survey. Each transect was up to 3.1 miles (5 kilometres) in length and featured ten stopping points of five minutes, associated with habitat identified as being of potential importance for foraging or commuting. The direction of passage was alternated each survey to ensure that different areas of each transect were surveyed at different times before/after sunset.
- 8.5.63 Two full spectrum detector models were used (Anabat Walkabout and Elekon Batlogger M) to record sound files throughout the transect surveys. These were then analysed using their respective software (Anabat Insight and BatExplorer). Analysis of the bat passes was used to create heat maps of bat activity using ArcGIS and the Kernel density tool.
- 8.5.64 Further details on the methodology and limitations, including figures showing the transect routes and species heat maps, can be found in Appendix 8.8 *Bat Activity Surveys Technical Report*.

- 8.5.65 There have been no significant changes to the habitats within the study area since the previous activity transect surveys were undertaken, therefore in consultation with Natural England, it was proposed that instead of repeating all of the previous activity transect surveys a greater emphasis will be placed upon other survey methods. This includes an increased crossing point, static monitoring and advanced survey effort which is considered to comprise a more robust methodology and in keeping with the stage of development.
- 8.5.66 Transect 14 was not surveyed in previous years due to access restrictions and will therefore be subject to activity surveys in 2021. The activity surveys on this transect are being carried out on a monthly basis from June to October (due to the timing of land access being granted) over a period of approximately three hours (to identify late emerging species) using a full-spectrum detector (Elecon Batlogger M). The results of all of the 2021 activity transect surveys will be reported in the ES.

*Automated detector surveys*

- 8.5.67 Three static detectors were installed for each transect, in line with best practice guidance [38], resulting in a total deployment of 30 detectors. The static deployment did not follow the transect routes in all instances (for example transect ten and transect 11) due to changes in the availability of land access during the survey period. Each detector was deployed for one week per month between April and October within the bat active periods spread across different survey seasons between 2017 to 2020 due to access restrictions, to collect data over five consecutive nights per month.
- 8.5.68 Static detectors were set up to begin recording 30 minutes before sunset and stop recording 30 minutes after sunrise and were deployed within a range of suitable habitats considered to be directly or indirectly affected by the proposed scheme. Standardised equipment was used (Wildlife Acoustics SM4 full spectrum bat detectors) across the transects and analysis of recordings was analysed using Wildlife Acoustics Kaleidoscope Pro software. Comparison and analysis of data collected during static surveys was undertaken using Microsoft Excel spreadsheets and pivot tables. Additionally, the data was analysed using the Ecobat tool [52].
- 8.5.69 Further details on the methodology and limitations, including figures showing the location of static detectors, can be found in Appendix 8.8 *Bat Activity Surveys Technical Report*.
- 8.5.70 Targeted automated detector surveys are being undertaken in the 2021 survey season. These will comprise monthly (April to October inclusive) deployment of static detectors (Wildlife Acoustics SM4 full spectrum bat detectors) in key locations across the proposed scheme set to record for a minimum of five nights in each period with 24 locations proposed, in accordance with available land access. The results of these surveys will be reported in the ES.

*Bat crossing point surveys*

- 8.5.71 Fourteen bat crossing point locations were chosen along the proposed scheme alignment to determine potential fragmentation of bat foraging and commuting habitat, and direct mortality (in accordance with available land access).
- 8.5.72 Six surveys were carried out in 2017, 2019 and 2020 (spread between years due to access restrictions) in accordance with best practice guidelines and

methodology [39], adapted for pre-construction surveys. The surveys were undertaken in suitable weather conditions (where weather resulted in a cancelled survey a repeat was carried out), between May and September and with repeat surveys generally at monthly intervals throughout the survey period

- 8.5.73 The surveys consisted of visual observations of bats along linear habitat features to be crossed or severed by the proposed scheme over a 90-minute period (extended from the standard 60 minutes [53] due to the presence of barbastelle bats (*Barbastella barbastellus*) and other later emerging species such as horseshoe bat species).
- 8.5.74 Further details on the selection process for each location, methodology and limitations can be found in Appendix 8.8 *Bat Activity Surveys Technical Report*.
- 8.5.75 Update crossing point surveys are being undertaken in the 2021 survey season, which also includes additional crossing point locations identified to reflect design changes to the proposed scheme. Twenty-three crossing point locations are being surveyed, which include existing severances along the online section of the A358 where widening has the potential for impacts to bat passage, in addition to known crossing points (such as Griffin Lane underbridge) and proposed severances of potential bat habitat in the offline section to the north. As agreed, following consultation with Natural England, surveys are being undertaken once per month May to August during the peak activity period (i.e. a total of four surveys at each crossing point) using multiple surveyors equipped with full spectrum detectors (Batlogger M) and infrared cameras. This is reduced from the standard six surveys as the radiotracking surveys have also been designed to capture crossing point data of all species. The results of these surveys will be reported in the ES.

#### *Bat trapping and radio-tracking surveys (advanced surveys)*

- 8.5.76 In 2017 mist-netting surveys were undertaken in Huish Woods which under some route options would have been directly impacted. These surveys identified barbastelle and Bechstein's (*Myotis bechsteinii*) bat species. Further bat trapping and radio-tracking surveys were undertaken in 2018 in order to inform design route selection. In 2019 the proposed route option was selected, avoiding Huish Woods. However, the data gathered in 2018 (and in 2017) indicated the potential for impacts as a result of the proposed scheme upon local bat populations including barbastelle and Bechstein's bat species and as such further trapping and radio-tracking surveys were undertaken in 2020.
- 8.5.77 Trapping of bats using mist nets and harp traps (including the use of acoustic lures) and the fixing of radio transmitters (tags) was used in order to present a robust data set of the use of the site and surrounding areas by the target bat species (barbastelle and Bechstein's). The surveys were undertaken in July and August 2018 and June 2020. Trapping was carried out in accordance with the conditions of Natural England licence 2017-30599-SCI-SCI and in accordance with good practice guidelines [38].
- 8.5.78 Tagged bats were simultaneously or subsequently followed by radio-tracking teams during the survey session to locate and identify roost sites and to examine nocturnal flying activity of the tagged bats, with a focus on collecting activity data for bats within the proposed scheme's Zol and other key areas considered potentially important to Annex II bat population(s). Where access was possible to

roost sites, emergence counts were undertaken at identified roosts to determine the status/function of the roost.

- 8.5.79 An increased advanced survey effort is being undertaken in 2021. This comprises three capture and radio-tracking sessions spread across the season (May, July/August and August/September) at key identified locations (including Bickenhall Wood, Hatch Park Wood, Line Wood, Hurford's Plantation, Robert's Wood, Knowl Wood, Stoke Wood, Ashill Wood & Every's Copse, Huish Wood and unnamed woods near Griffin Lane). The results of these surveys will be reported in the ES.
- 8.5.80 Further details on the methods, trapping locations and radio-tracking analysis can be found in Appendix 8.9 *Bat Trapping and Radio Tracking Technical Report*.

#### Badger surveys

- 8.5.81 Habitats within 0.31 miles (500 metres) of the proposed scheme options for offline areas and within 0.16 miles (250 metres) of the proposed scheme for online areas were assessed for their capacity to support badger between 2017 and 2020. Areas of broadleaved woodland, scrub, hedgerow networks, and semi-improved and unimproved grassland provide excellent badger habitat for sett construction and foraging, with good connectivity to the wider landscape.
- 8.5.82 Initial walkover surveys between February 2017 and February 2020 were carried out to identify badger setts and other signs of habitat use. Incidental badger signs were also recorded throughout the 2017, 2018, 2019 and 2020 survey seasons. Evidence of setts, latrines, scratching, snuffle (foraging) holes, hairs, paths, runs, bedding material and footprints were searched for. The level of badger activity was also assessed and classified as well used, partially used, or disused. All connected and accessible land within 0.16 (250 metres) of the online section of the proposed scheme footprint, and within 0.31 miles (500 metres) of the offline section of the proposed scheme, was thoroughly searched for badger field signs, in line with best practice guidelines from DMRB [40] and Cresswell et al [41].
- 8.5.83 Following the identification of badger habitats and field signs, more detailed territory mapping was considered necessary to confirm activity within the proposed scheme footprint. Badger bait marking surveys of a number of main setts were undertaken in February and March 2020 to establish the territories of each badger clan and provide information on whether the new road would cause fragmentation to these territories.
- 8.5.84 Further details on the methodology and limitations, including figures, can be found in Appendix 8.10: *Badger Technical Report 2020 CONFIDENTIAL*.
- 8.5.85 Update badger surveys are being undertaken in the 2021/2022 survey season. Habitats within up to 0.16 miles (250 metres) of the proposed scheme will be surveyed to verify previously recorded field signs, re-confirming the classification of known setts, whilst new setts or other previously unrecorded field signs will also be noted. The findings of the update surveys will be used to inform a territory mapping (bait marking) analysis in spring 2022, the results of which will be reported in the ES.

## Bird surveys

### *Breeding bird surveys*

- 8.5.86 Habitats within 0.16 miles (250 metres) of the proposed scheme options at the time of the surveys in 2017 and 2020 were assessed for their capacity to support breeding bird assemblages. The majority of habitat within the survey boundary is typical of lowland farmland in southern England, dominated by arable, pasture and woodland.
- 8.5.87 Field surveys were undertaken along the length of the proposed scheme (where access allowed) in 2017. These comprised monthly visits in April, May and June. Field surveys, following guidance used for common bird census and breeding bird surveys [42], comprised 14 walked transects that covered all suitable habitats within 0.16 miles (250 metres) of the proposed scheme. Birds were identified by sight and sound, and evidence of breeding was determined by recording specific behavioural cues.
- 8.5.88 Due to the time elapsed, update surveys were undertaken in 2020 following the same methodology as above. However, due to the Covid-19 pandemic, only one visit to each transect was undertaken in June 2020.
- 8.5.89 Further details of the methodology and limitations, including figures can be found in Appendix 8.11 *Breeding bird Technical report*.
- 8.5.90 Updated breeding bird surveys are being undertaken during the 2021 survey season, with the scope and methodology of the surveys as described above, the results of which will be reported in the ES.

### *Wintering bird surveys*

- 8.5.91 Suitable habitats, primarily open farmland and grassland, within 0.6 miles (1 kilometre) of the proposed scheme were assessed for their capacity to support overwintering bird assemblages. The surveys were conducted between October 2020 and March 2021.
- 8.5.92 Field surveys, following guidance described by Bibby *et al* (2000) [42], comprised nine walked transects that covered the largest open farmland and grassland habitats within the survey area. Transects were walked at a constant pace, recording all notable or protected species observed within and utilising the survey area. Surveyors stopped periodically to scan open fields and listen to calls. Prominent hills were used as vantage points to increase survey coverage, with scans of 15 minutes at each suitable location.
- 8.5.93 Further details of the methodology and limitations, including figures, can be found in Appendix 8.12: *Wintering Birds Survey Technical Report*.

### *Barn owl surveys*

- 8.5.94 Habitats within 0.9 miles (1.5 kilometres) of the proposed scheme were assessed in 2017 for their capacity to support barn owl in. The surveys followed the best practice guidelines set out by Shawyer [43].
- 8.5.95 Stage 1 surveys, referred to as potential foraging habitat surveys, were undertaken in June and July 2017 to assess the suitability of foraging habitat within the survey area. Type 1 habitat is considered optimum habitat to support field vole (*Microtus agrestis*) and is usually permanent, unimproved or semi-improved grassland. Type 2 habitat is considered sub-optimal for field voles and

is usually semi-improved or improved grassland with a more homogenous, even-height sward. Type 3 habitat is considered very poor habitat for field vole, with a homogeneous sward and a high level of management.

- 8.5.96 Stage 2 surveys, referred to as potential nesting surveys, were undertaken in June and July 2017 to identify locations which could offer PNS. Trees located within hedgerows, open fields or on woodland edges, and possessing sufficient diameter, were considered suitable for nesting or roosting barn owls. Buildings were noted as PNS if there were entrance holes of at least 80 millimetres diameter and an internal nesting chamber of 250 millimetres x 250 millimetres.
- 8.5.97 Following the completion of stage 1 and 2 surveys, stage 3, referred to as nest verification surveys, were undertaken between August and November 2017. The identified PNS were subjected to inspections by an ornithologist with a Schedule 1 barn owl licence, who would inspect the sites for evidence of occupation including adult birds, chicks, moulted feathers, pellets or eggs. The sites were classified as OBS, ARS or TRS.
- 8.5.98 Further details on the methodology and limitations, including figures, can be found in Appendix 8.13: *Barn Owl Survey Technical Report*.
- 8.5.99 Update barn owl surveys are being undertaken in the 2021 survey season. Land within up to 0.31 miles (500 metres) of the proposed scheme will be subject to stage 1, stage 2 and stage 3 surveys as detailed above to supplement the existing survey data. The results of these surveys will be reported in the ES.

#### Dormouse surveys

- 8.5.100 Suitable hazel dormouse habitat was identified within 0.16 miles (250 metres) of the proposed scheme following a Phase 1 habitat survey in May 2016 and a desk study in 2017. Further details can be found in Appendix 8.2 *Preliminary Ecological Appraisal (PEA)*. Following habitat suitability assessment, 24 sites of potential dormouse habitat were identified, of which 18 sites were within 0.16 miles (250 metres) of the proposed scheme.
- 8.5.101 Due to access restrictions, presence/absence surveys were carried out at 11 of the 18 sites, with set-ups taking place between February and mid-May 2017 inclusive and return visits taking place between April and November 2017 inclusive, following good practice guidance [54]. A minimum of 50 nest tubes were deployed in suitable and connected habitat at each site and checked monthly during the active season until the presence of adult or juvenile dormice was confirmed, or until the required 20 survey points was reached.
- 8.5.102 Further details on the methodology and limitations, including figures, can be found in Appendix 8.14: *Hazel Dormouse Technical Report*.
- 8.5.103 Update dormouse surveys are being undertaken within the 2021 survey season throughout suitable habitat within up to 0.06 miles (100 metres) of the proposed scheme. Nest tubes and nest boxes are to be used to determine presence or likely absence and allow an assessment of likely population size, following good practice guidance [54]. The results of these update surveys will be reported in the ES.

#### Great crested newt surveys

- 8.5.104 Ponds and potentially suitable waterbodies within 0.31 miles (500 metres) of the proposed scheme were identified using MAGIC as part of a desk study exercise in 2017. All waterbodies identified during this desk study were put forward to be

assessed for their potential to support great crested newts using the standardised HSI methodology [24]. In April 2019, a meeting was held with Natural England which resulted in the survey buffer being reduced to 0.25 miles (400 metres). In June 2019 the preferred route option was announced and therefore the surveys from June 2019 onwards focussed on ponds within 0.25 miles (400 metres) of the preferred route for the proposed scheme.

- 8.5.105 In total, 180 waterbodies were identified during the desk study that were located within 0.25 miles (400 metres) of the proposed scheme. Of these, 82 were subject to HSI surveys, with the remainder assessed as being unsuitable for breeding great crested newt due to either being dry, isolated by significant dispersal barriers or supporting flowing water.
- 8.5.106 Great crested newt eDNA surveys were undertaken in June 2018, May 2019 and May 2020 on 40 waterbodies. All eDNA surveys were undertaken by experienced ecologists holding a Natural England great crested newt Class Licence (Level 1 CL08).
- 8.5.107 Twenty-two ponds identified as potentially suitable in 2017 (prior to eDNA surveys being undertaken) were subject to initial presence/absence surveys (four visits) and then population estimate surveys (additional two visits) if required. The surveys were undertaken in accordance with best practice guidelines [44]. At least three survey methods were utilised for each visit, with methods including bottle trapping, torching, egg searching and netting. Surveys were undertaken by a Natural England great crested newt Class Licence holder and an assistant, between March and mid-June 2017.
- 8.5.108 Further details on the methodology and limitations, including figures, can be found in Appendix 8.15: *A358 Great Crested Newt Technical Report*.
- 8.5.109 Update great crested newt surveys are being undertaken within the 2021 survey season. HSI surveys of all waterbodies within 0.16 miles (250 metres) of the online section and 0.31 miles (500 metres) of the offline section of the proposed scheme are being carried out. eDNA surveys are then being undertaken on all waterbodies within 0.03 miles (50 metres) of the proposed scheme and all of those within the described buffers of the online and offline sections of the proposed scheme with an HSI score of 0.5 or above. Population estimate surveys are being undertaken on all ponds that return a positive or inconclusive eDNA survey result. The results of these update surveys will be reported in the ES.

#### Reptile surveys

- 8.5.110 An assessment of the habitat suitability for reptiles were completed which identified all suitable reptile habitat within 0.06 miles (100 metres) of the proposed scheme options at the time of the surveys. 0.06 miles (100 metres) is the likely distance the proposed scheme impacts are considered to extend for reptiles. From this initial assessment in 2017, 27 sites within the study area were identified which required further investigation.
- 8.5.111 During the initial site visits in early 2017, 19 of the 27 sites were identified as offering suitable habitat to support common reptile populations. Of the 19 sites, 14 were located within 0.06 miles (100 metres) of the preferred route.
- 8.5.112 Of these 14 sites, 11 were subject to further presence/absence surveys carried out between April and October 2017. Three sites were not surveyed due to access restrictions.

- 8.5.113 Roofing felt tiles measuring 0.5m by 0.5m were deployed at each of the 11 accessible sites with potential to support reptiles, in areas of suitable habitat. Sites were subject to 20 visits in suitable weather conditions to provide an accurate estimation of the population size of reptile species where present. Population size and importance was assessed according to categories described under *Froglife Advice Sheet 10: Reptile Survey* [45].
- 8.5.114 Further details on the methodology and limitations, including figures, can be found in Appendix 8.16: *Reptile Technical Report*.
- 8.5.115 Update reptile surveys are being undertaken during the 2021 survey season. As previously, suitable habitat within up to 0.06 miles (100 metres) of the proposed scheme will be subject to survey. The majority of sites to be surveyed during 2021 were also surveyed in 2017. However, there are a small number of additional locations that have since been scoped in. The results of these surveys will be reported in the ES.

#### Otter surveys

- 8.5.116 Initial habitat suitability assessments were undertaken along all rivers and joining tributaries, including streams and ditches, within 1.2 miles (2 kilometres) of the proposed scheme options at the time of the surveys. Suitable watercourses were identified within 0.16 miles (250 metres) of the proposed scheme options, which were assessed for their potential to support otter.
- 8.5.117 The habitat suitability surveys assessed the quality of the watercourses and riparian habitat for supporting otters, based on physical properties (type of watercourse, depth, flow, channel width), presence of suitable terrestrial habitat, food supply, adjoining land use, disturbance, pollution, dispersal barriers and overall connectivity to the wider landscape. Watercourses identified within 0.16 miles (250 metres) of the proposed scheme were not scoped out of field sign surveys unless the entirety of a watercourse within the 1.2 miles (2 kilometres) study area was deemed unsuitable for otter. In total, 61 watercourses were identified within 1.2 miles (2 kilometres) of the proposed scheme. Of these watercourses, 38 were scoped out for being unsuitable for otter and two could not be accessed for habitat suitability assessments.
- 8.5.118 Each identified watercourse within 0.16 miles (250 metres) of the proposed scheme were surveyed along a 1.2 mile (2 kilometre) length, 0.6 miles (1 kilometre) upstream and 0.6 miles (1 kilometre) downstream of the proposed scheme. The survey followed standard methodology [46] and DMRB guidelines [47] (these were subsequently withdrawn in November 2019 after the surveys were undertaken, so were pertinent when used). This involved assessing the watercourses for signs of otter which included natural holts, couches, spraints, anal jelly, tracks, slides and feeding remains. All field signs were photographed and mapped with a GPS device.
- 8.5.119 Further details on the methodology and limitations, including figures, can be found in Appendix 8.17: *Otter Surveys Technical Report*.
- 8.5.120 Update otter surveys are being undertaken in 2021, with a reduced scope having been agreed with Natural England. Habitat suitability assessments are being undertaken on all watercourses that are located within the footprint of the proposed scheme and up to 0.16 miles (250 metres) from the construction boundary. Surveys for field signs of otter are being undertaken along watercourses within the construction boundary of the proposed scheme,

extending up to 0.06 miles (100 metres) upstream and downstream of the construction boundary. Where the habitat suitability assessments indicate low suitability for otter within the 0.06 mile (100 metre) buffer, but high suitability for otter beyond 0.06 miles (100 metres), then the field signs surveys may be extended accordingly, up to 0.16 miles (250 metres) upstream and downstream of the construction boundary. The results of these surveys will be reported in the ES.

#### Water vole surveys

- 8.5.121 Initial habitat suitability assessments were undertaken along all watercourses within 0.16 miles (250 metres) of the proposed scheme options at the time of the surveys during mid-April to June 2017. Suitable watercourses were identified based on this initial assessment. These watercourses were then assessed for their potential to support water voles.
- 8.5.122 The initial habitat suitability surveys assessed the quality of the watercourses and riparian habitat for supporting water voles based on physical properties (type of watercourse, depth, flow, channel width), presence of suitable terrestrial habitat, food supply, adjoining land use, disturbance, pollution, dispersal barriers and overall connectivity to the wider landscape. Watercourses were not scoped out of field sign surveys unless the entirety of a watercourse was deemed unsuitable for water voles.
- 8.5.123 Seventy-four watercourses were identified within 0.16 miles (250 metres) of the proposed scheme options at the time of the surveys. However, this was reduced to 42 watercourses within 0.16 miles (250 metres) of the proposed scheme. Of these 42 watercourses, 15 were subject to field sign surveys. Twenty-six watercourses were deemed unsuitable for water vole, whilst one watercourse could not be accessed for a habitat assessment.
- 8.5.124 Each watercourse identified as having potential to support water vole was surveyed along all accessible areas within a 0.16 mile (250 metre) survey area. Two presence surveys were undertaken; one during the early season (mid-April – June) and one during the late season (July – September). The survey followed standard methodology set out by the Water Vole Conservation Handbook 3<sup>rd</sup> Edition [48]. This involved assessing the watercourses for signs of water voles which included latrines, burrows, cropped vegetation, nests above ground, feeding remains, footprints, pathways, sightings and the distinctive sound of water voles entering water. All field signs were photographed and mapped with a GPS device.
- 8.5.125 Further details on the methodology and limitations, including figures, can be found in Appendix 8.18: *Water Vole Technical Report*.
- 8.5.126 Update water vole surveys are being undertaken in 2021, to a scope agreed with Natural England. Habitat suitability assessments will be undertaken on all watercourses that are located within the footprint of the proposed scheme and up to 0.16 miles (250 metres) from the construction boundary. Surveys for field signs of water vole are being undertaken along watercourses within the construction boundary of the proposed scheme, extending up to 0.06 miles (100 metres) upstream and downstream of the construction boundary. Where the habitat suitability assessments indicate low suitability for water vole within the 0.06 mile (100 metre) buffer, but high suitability for water vole beyond 0.06 miles (100 metres), then the field signs surveys may be extended accordingly, up to 0.16 miles (250 metres) upstream and downstream of the construction boundary. In addition, field signs surveys will be further extended to up to 0.31 miles (500

metres) upstream and downstream of the construction boundary where potential river diversions are proposed. The results of these surveys will be reported in the ES.

#### White-clawed crayfish surveys

- 8.5.127 Initial habitat suitability assessments were undertaken along all rivers and joining tributaries within 0.16 miles (250 metres) of the proposed scheme options at the time of the surveys in October 2017. Suitable watercourses were identified based on this initial assessment. These watercourses were then assessed for their potential to support white-clawed crayfish.
- 8.5.128 The initial habitat suitability surveys assessed the quality of the watercourses and riparian habitat for supporting white-clawed crayfish based on physical properties (type of watercourse, depth, flow, channel width), refuges in the channel or bank, substrate composition, pollution, erosion and presence of invasive crayfish or bullhead (*Cottus gobio*). Watercourses were not scoped out of field sign surveys unless the entirety of the watercourse within the study area was deemed unsuitable for white-clawed crayfish. Habitat assessments were conducted across a 0.06 mile (100 metre) length of each watercourse, centred on the point at which the proposed scheme was anticipated to cross. If no suitable, white-clawed crayfish habitat was found within 0.06 miles (100 metres), the survey area was extended up to 0.31 miles (500 metres) from the proposed scheme, or until a length of at least 0.06 miles (100 metres) was identified.
- 8.5.129 Ten watercourses were identified within 0.16 miles (250 metres) of the proposed scheme. Of these, nine were assessed for their suitability to support white-clawed crayfish, whilst access was refused for one. Manual search surveys were undertaken at the same time if the watercourse was deemed suitable to support crayfish. Each watercourse was divided into five patches of habitat that appeared favourable for white-clawed crayfish, where a search of ten potential refuges was undertaken in each patch. The survey methodology is outlined in the JNCC guidance [49] (Protocol 2), based on Peay (2003) [50]. A hand net was used during manual searches to catch any smaller crayfish during searches in shallow water.
- 8.5.130 Further details on the methodology and limitations, including figures, can be found in Appendix 8.19: *White-clawed Crayfish Technical Report*.
- 8.5.131 Update white-clawed crayfish surveys are being undertaken in 2021, with the scope and methodology of the surveys as described above. The results of which will be reported in the ES.

#### Terrestrial invertebrate surveys

- 8.5.132 A total of 13 grassland sites were identified during the Phase 1 Habitat surveys in 2016 as habitats with potential to support notable invertebrate species. Further details can be found in Appendix 8.2 *Preliminary Ecological Appraisal (PEA)*. Targeted terrestrial invertebrate surveys were undertaken between July 2017 and June 2019 at these habitat locations within 0.06 miles (100 metres) of the proposed scheme at the time of the surveys. Of the 13 sites, eight are located within 0.06 miles (100 metres) of the proposed scheme.
- 8.5.133 Each site was visited in the late part of the season in 2017 and in the early part of the season in 2019, with each suitable site being visited twice during the main invertebrate survey period, where access was possible. Survey methods used at all sites involved visual searching of nectaring sites and basking areas, the use of

a hand net or pooter to capture individual species, sweeping vegetation, beating foliage and grubbing.

- 8.5.134 Additionally, the use of pitfall traps was employed at Site 9 as this site provided the optimum habitat type for this technique. This site supported short and diverse grassland likely to provide habitat for scarcer species, whilst other sites consisted largely of taller rank grassland of poor quality.
- 8.5.135 The use of pan-traps was employed at Site 2. Site 2 was selected, as this was a tall woodland site with very few low-level flowering plants and therefore visual searching was ineffective. Other sites had a sufficient diversity of flowering plants to make visual survey methods effective.
- 8.5.136 At Site 1, a battery-powered 20-watt moth light trap was deployed on 10 August to sample for the rare tortrix moth (*Celypha woodiana*) which is associated with mistletoe (*Viscum album*). No other sites were selected for deployment of light traps as there were no others likely to support scarce species or were sufficiently botanically diverse and therefore likely to support a high diversity of moth species.
- 8.5.137 This range of techniques allowed the sampling of a range of species. Species requiring further identification were collected and identified under microscope.
- 8.5.138 Further details on the methodology and limitations, including figures, can be found in Appendix 8.20 *Terrestrial Invertebrate Technical Report*.
- 8.5.139 Update terrestrial invertebrate surveys are being undertaken in the 2021 survey season, with surveys being carried out across suitable habitat within 0.06 miles (100 metres) of the proposed scheme. The results of which will be reported in the ES.

#### *Brown hairstreak surveys*

- 8.5.140 Hedgerow habitats within the proposed scheme area were identified as being potentially suitable for brown hairstreak (*Thecla betulae*), a declining butterfly listed under Section 41 of the NERC Act 2006 as a SPI in England.
- 8.5.141 A field survey was undertaken between December 2020 and March 2021 to search for the eggs of this species. The field survey followed the standard technique for brown hairstreak egg searches following The UK Butterfly Monitoring Scheme (UKBMS) surveying guidelines [51].
- 8.5.142 All accessible hedgerows within a 0.03 mile (50 metre) buffer either side of the proposed scheme were surveyed. For each hedgerow, presence/absence of brown hairstreak eggs was recorded, and each was given a score based on blackthorn percentage (the larval foodplant) and hedgerow condition.
- 8.5.143 Further details on the methodology and limitations, including figures, can be found in Appendix 8.21: *Brown Hairstreak Technical Report*.

#### Aquatic invertebrate surveys

- 8.5.144 Aquatic invertebrate kick sampling surveys were undertaken in May and September 2017 at 16 representative sampling locations in watercourses crossed by the proposed scheme. Two survey sites were sampled on each of the watercourses, one approximately 0.06 miles (100 metres) upstream and a second 0.06 miles (100 metres) downstream of the point at which the proposed scheme options at the time of the surveys crossed each watercourse.

- 8.5.145 Under laboratory conditions, macroinvertebrate samples were analysed to River Level 5 (TL5). For each given sample, the taxa present, and their abundance was recorded to inform the metrics.
- 8.5.146 The following biological indices were calculated to analyse the invertebrate community data; Whalley Hawkes Paisley Trigg (WHPT), Average Score Per Taxon (ASPT), Number of Scoring Taxa (NTAXA), Lotic-invertebrate Index for Flow Evaluation (LIFE), Proportion of Sediment-sensitive Invertebrates (PSI) and Community Conservation Index (CCI).
- 8.5.147 Further details on the survey, including methodology and limitations, can be found in Appendix 8.22: *Macroinvertebrates Technical Report*.
- 8.5.148 Update aquatic invertebrate surveys are being undertaken in 2021 with the scope and methodology described above. The results of which will be reported in the ES.

#### Fish surveys

- 8.5.149 A single fish survey was undertaken along the River Ding, as a section of this watercourse will require diversion as part of the proposed scheme. A fully quantitative three-run electric fishing survey was carried out along a 0.06 mile 100 metre length of the river, demarcated by stop nets.
- 8.5.150 A battery powered E-Fish 500W backpack electric fishing system was used to attract and stun fish, which allow operators to remove them from the water to identify the species and measure the fish.
- 8.5.151 Further details on the survey, including methodology and limitations, can be found in Appendix 8.23: *Fish Technical Report*.
- 8.5.152 Fish surveys are being undertaken within the 2021 survey season, with the scope expanded to include up to 0.06 miles (100 metres) upstream and downstream of all locations where the proposed scheme crosses a watercourse, including crossing points of the existing A358 carriageway. The results of these surveys will be reported in the ES.

#### Other section 41 Species of Principal Importance (SPI)

- 8.5.153 Species specific surveys were not undertaken for the remaining SPIs. However, desk study records, incidental sightings and knowledge of the presence of suitable habitat gathered during other habitat surveys has informed professional judgement and confirmed the likely presence of a range of SPI species occurring throughout the proposed scheme, which will be reported in the ES.

## **8.6 Baseline conditions**

- 8.6.1 Desk study data for each habitat and protected species has been summarised here within each relevant sub-heading, which is followed by the field survey results.
- 8.6.2 Within this section, the receptors within the study area determined through the baseline conditions are valued in accordance with DMRB *LA 108 Biodiversity* [1] which assigns a geographical value.

## Designated sites

### Statutory designated sites

- 8.6.3 Statutory designated sites within the study area are summarised in Table 8-6. Figure 8-1A and Figure 8-1B show the location of these sites in relation to the proposed scheme.
- 8.6.4 Internationally important statutory designated sites include Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites. Nationally important statutory designations include Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs), and locally important statutory designations are termed Local Nature Reserves (LNRs).
- 8.6.5 There are five internationally designated sites within the study area of the proposed scheme. These are the Somerset Levels and Moors SPA and Ramsar Site, which is hydrologically connected to the proposed scheme; Hestercombe House, Exmoor and Quantock Oakwoods SAC, Beer and Quarry Caves SAC and Bracket's Coppice SAC, which are all designated for their bat populations and located within 18.6 miles (30 kilometres) of the proposed scheme. These sites are of international importance. There are no potential SPAs or candidate SAC within the study area of the proposed scheme.
- 8.6.6 The Severn Estuary SAC and Ramsar site is located beyond the 1.2 mile (2 kilometre) study area; however is approximately 15.5 miles (25 kilometres) downstream of the proposed scheme along the River Tone and River Parrett, and is for the purposes of this assessment, therefore, considered hydrologically linked to the proposed scheme.
- 8.6.7 There are three nationally designated sites of national importance within the 1.2 miles (2 kilometres) study area. These are Thurlbear Woods and Quarrylands SSSI, Barrington Hill Meadows SSSI and Barrington Hill NNR.
- 8.6.8 A further 13 nationally designated sites of national importance are located over 1.2 miles (2 kilometres) from the proposed scheme but fall within 0.12 miles (200 metres) of the ARN, as shown on Figure 8-1A. These are:
- Ruttersleigh SSSI
  - North Moor SSSI
  - Langport Railway Cutting SSSI
  - Maiden Down SSSI
  - Deadman SSSI
  - Long Lye SSSI
  - Long Lye Meadow SSSI
  - Wet Moor SSSI
  - Prior's Park and Adcombe Wood SSSI
  - Millwater SSSI
  - Killerton SSSI
  - Southlake Moor SSSI
  - Huntspill River NNR
- 8.6.9 There are four statutory designated sites of county importance within the 1.2 mile (2 kilometre) study area. These are Bickenhall Orchard LNR, South Taunton Streams LNR, Children's Wood/Riverside Park LNR and Herne Hill LNR.

8.6.10 A further two LNR's are located over 1.2 miles (2 kilometres) from the proposed scheme but fall within 0.12 miles (200 metres) of the ARN, as shown on Figure 8-1A. These are:

- Grand Western Canal Country Park and LNR
- Screech Owl LNR

8.6.11 All measurements of distances to designated sites, habitats and protected species have been calculated from the proposed scheme boundary.

**Table 8-6 Statutory designated sites within the study area**

Site	Reasons for designation	Distance and directions from proposed scheme
<b>Statutory sites of international importance</b>		
Somerset Levels and Moors SPA and Ramsar	<p>This site is designated for being the largest area of lowland wet grassland and associated wetland habitats remaining in Britain, formed by the floodplains of the rivers Axe, Brue, Parret, Tone and their respective tributaries. The SPA encompasses a total of 12 SSSIs. Flooding affects extensive areas during the winter, which provides conditions for overwintering waterfowl that form the primary designation features under both SPA and Ramsar criteria as described below.</p> <p>SPA qualifying features:</p> <ul style="list-style-type: none"> <li>• Nationally important numbers of Annex 1 Bewick's swan (<i>Cygnus columbianus bewickii</i>) and golden plover (<i>Pluvialis apricaria</i>).</li> <li>• Regularly supporting over 20,000 wintering waterfowl.</li> <li>• Supports internationally important numbers of migratory Eurasian teal (<i>Anas crecca</i>) and northern lapwing (<i>Vanellus vanellus</i>).</li> </ul> <p>Ramsar qualifying criteria:</p> <ul style="list-style-type: none"> <li>• Supports 17 species of British Red Data Book invertebrates.</li> <li>• Assemblages of wintering birds of international importance.</li> <li>• Species/populations of birds occurring at levels of international importance, with qualifying species including: <ul style="list-style-type: none"> <li>○ Bewick's swan</li> <li>○ Eurasian teal</li> <li>○ Northern lapwing</li> </ul> </li> </ul> <p>In addition to these qualifying features, the site is also notable for nationally important wintering numbers of gadwall (<i>Anas strepera</i>), widgeon (<i>Anas Penelope</i>) and shoveler (<i>Anas clypeata</i>), with further Annex 1 species marsh harrier (<i>Circus aeruginosus</i>), bittern (<i>Botaurus stellaris</i>), merlin (<i>Falco columbarius</i>), peregrine falcon (<i>Falco peregrinus</i>), hen harrier (<i>Circus cyaneus</i>) and short-eared owl (<i>Asio flammeus</i>) present in breeding or wintering capacity.</p>	2.1 miles (3.5 kilometres) east ARN is 0.04 miles (60 metres) east of SPA and Ramsar boundary at closest point
Hestercombe House SAC	The primary reason for designation is the presence of lesser horseshoe bats. Hestercombe house supports a large maternity colony of lesser horseshoe bats within former stable blocks and domestic outbuildings. A small hibernation roost is also present.	2.4 miles (3.8 kilometres) north-west
Exmoor and Quantock	The primary reasons for designation are the presence of 'Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in conjunction with heath' and its maternity colonies of barbastelle bat. The qualifying features include	9.9 miles (16.0

Site	Reasons for designation	Distance and directions from proposed scheme
Oakwoods SAC	Alluvial forests with alder ( <i>Alnus glutinosa</i> ) and ash ( <i>Fraxinus excelsior</i> ) and the presence of Bechstein's bats and otters.	kilometres) north-west
Bracket's Coppice SAC	The primary reason for designation is the presence of a maternity colony of Bechstein's bat. The qualifying features include habitats such as <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils.	11.4 miles (18.3 kilometres) south-east
Severn Estuary SAC and Ramsar	<p>The site is characterised by the presence of tidal rivers, estuaries, mud flats, sand flats, lagoons, salt marshes, salt pasture and salt steppes. The primary designation features under both SAC and Ramsar criteria as described below.</p> <p>SAC qualifying features:</p> <ul style="list-style-type: none"> <li>• The presence of estuaries, mudflats and sandflats not covered by seawater at low tide, sandbanks which are slightly covered by seawater all the time, reefs and Atlantic salt meadows.</li> <li>• The site supports sea lamprey (<i>Petromyzon marinus</i>), river lamprey (<i>Lampetra fluviatilis</i>) and twaite shad (<i>Alosa fallax</i>).</li> </ul> <p>Ramsar qualifying criteria:</p> <ul style="list-style-type: none"> <li>• Unusual estuarine communities with reduced diversity and high productivity.</li> <li>• Assemblage of migratory first species including sea lamprey, river lamprey, twaite shad, allis shad (<i>Alosa alosa</i>), salmon (<i>Salmo salar</i>), sea trout (<i>Salmo trutta</i>) and eel.</li> <li>• Supports an important feeding and nursery ground for fish species such as allis shad and twaite shad.</li> <li>• Internationally important assemblage of waterfowl including Bewick's swan, European white-fronted goose (<i>Anser albifrons</i>), dunlin (<i>Calidris alpina</i>), redshank (<i>Tringa tetanus</i>), shelduck (<i>Tadorna tadorna</i>) and gadwall.</li> </ul> <p>In addition to the primary reason for designation, the site also supports sandbanks which are slightly covered by sea water all the time and reefs, which are qualifying features of the SAC.</p>	15.5 miles (25 kilometres) downstream along the River Tone and River Parrett
Beer Quarry and Caves SAC	The primary reason for designation is the presence of a hibernation roost for Bechstein's bats. The site comprises a complex of mines, with greater horseshoe bat ( <i>Rhinolophus ferrumequinum</i> ) and lesser horseshoe bat present as qualifying features but are not a primary reason for site selection.	17.6 miles (28.4 kilometres) south
<b>Statutory sites of national importance</b>		
Thurlbear Woods and Quarrylands SSSI	This site is of special interest due to species-rich woodland, formerly managed in a traditional coppice-with-standards system and situated on soils derived from Rhaetic shales and limestones. The recorded history of the site is of Medieval origin - embankments and the presence of several plants normally confined to primary woods, which all suggest that Thurlbear Wood is of considerable antiquity.	0.8 miles (1.3 kilometres) west
Barrington Hill Meadows SSSI and Barrington Hill NNR	The site is an outstanding example of traditionally managed unimproved neutral grassland supporting a diverse range of botanical species including the extremely rare French oat-grass ( <i>Gaudinia fragilis</i> ).	1.1 miles (1.0 kilometres) south west

Site	Reasons for designation	Distance and directions from proposed scheme
Ruttersleigh SSSI	The site comprises a mosaic of broadleaved, mixed and yew woodland, scrub, bracken, mires and unimproved grassland which provides the habitat for several species of butterfly which are now scarce in Britain. Many of the habitats have restricted distribution both nationally and in the South West. The site is also important for its lichens.	2.1 miles (3.4 kilometres) west. ARN is adjacent in parts to SSSI boundary
Deadman SSSI	The site contains a rich mosaic of wet heath, bog pools and birch/willow carr grading into acid, marshy grassland. Lowland neutral grassland is also present. These habitats support several species of plant which are rare in the county.	3.8 miles (6.0 kilometres) west. ARN is adjacent in parts to SSSI boundary
Prior's Park and Adcombe Wood SSSI	The site supports lowland, broadleaved, semi-natural woodland habitat, including ancient woodland, as well as area of unimproved marshy grassland.	4 miles (6.5 kilometres) west. ARN is 0.06 miles (90 metres) south of SSSI boundary
North Moor SSSI	The site is a nationally important grazing marsh and ditch system on the Somerset Levels and Moors. A range of neutral grassland types supporting common and scarce plants has developed, mainly due to variations in soils and management practices. Aquatic plant communities are exceptionally diverse, with good populations of nationally scarce species. The site supports otter and an important assemblage of birds.	4.2 miles (6.8 kilometres) north east. ARN is adjacent in parts to SSSI boundary
Long Lye SSSI	The site supports a traditionally-managed, herb-rich, neutral grassland, with wet flush communities and mature broadleaved woodland.	4.7 miles (7.6 kilometres) south west. ARN is adjacent in parts to SSSI boundary
Long Lye Meadow SSSI	The site supports a lowland hay meadow; the neutral grassland varies in character and is herb-rich. The site is nationally important for supporting a crested dog's tail ( <i>Cynosurus cristatus</i> ) – common knapweed ( <i>Centaurea nigra</i> ) community.	5 miles (8.0 kilometres) south west. ARN is adjacent in parts to SSSI boundary
Southlake Moor SSSI	This site is part of the grazing marsh grassland and ditch system of the Somerset Levels and Moors SPA and Ramsar Site. Southlake Moor SSSI supports a variety of grassland habitats, including lowland neutral grassland as well as standing open water. Important assemblages of aquatic invertebrates and wildfowl have been recorded at the site, with regular field signs of otter also present.	6.4 miles (10.3 kilometres) north east. ARN is 0.08 miles (130 metres) west of SSSI boundary
Millwater SSSI	The site supports a complex mosaic of habitats, including pasture, wet grassland, tall-herb fen, standing and running water and alder and	6.7 miles (10.8

Site	Reasons for designation	Distance and directions from proposed scheme
	willow carr. There is an important assemblage of invertebrates, including many nationally scarce species as well as a nationally scarce species of sedge.	kilometres) south east. ARN is 0.06 miles (100 metres) west of SSSI boundary
Wet Moor SSSI	This site is part of the grazing marsh grassland and ditch system of the Somerset Levels and Moors SPA and Ramsar Site. Wet Moor SSSI supports neutral grassland habitat, with extensive winter flooding providing habitat for an important assemblage of wildfowl and birds. Common frog ( <i>Rana temporaria</i> ) are present throughout.	7.7 miles (12.4 kilometres) north east. ARN is 0.06 miles 60 metres east of SSSI boundary
Langport Railway Cutting SSSI	The site is designated for its geological interest as it is one of the few permanently exposed localities for cold-stage Pleistocene gravels in south Somerset.	8.8 miles (14.1 kilometres) east. ARN crosses SSSI
Maiden Down SSSI	The site is of interest for its lowland heath plant and animal communities. The site supports a rich invertebrate fauna which includes several nationally scarce species of insect.	11.3 miles (18.2 kilometres) west. ARN is adjacent in parts to SSSI boundary
Huntspill River NNR	This artificial river (created in 1940) holds a large stock of coarse fish, is home to otters and is a breeding area for barn owls. The main habitat types are woodland, open water and lowland grassland.	12.6 miles (20 kilometres) north east. ARN crosses LNR
Killerton SSSI	The site is designated for its geological interest as it contains Permian basalt-like rocks, known as lamprophyres.	22.6 miles (36.4 kilometres) south west. ARN is 0.07 miles (120 metres) east of SSSI boundary
<b>Statutory sites of local importance</b>		
Children's Wood/ Riverside Park LNR	The reserve is an important habitat and movement corridor for a host of animals with otter and a number of bats being recorded. A large number of bird species occur including kingfisher, dipper ( <i>Cinclus cinclus</i> ), grey wagtail ( <i>Motacilla cinerea</i> ), mute swan ( <i>Cygnus olor</i> ), grey heron ( <i>Ardea cinerea</i> ) and reed warbler ( <i>Acrocephalus scirpaceus</i> ). Butterflies include small skipper ( <i>Thymelicus sylvestris</i> ) and large skipper ( <i>Ochlodes sylvanus</i> ), marbled white ( <i>Melanargia galathea</i> ), small heath	0.1 miles (210 metres) north. ARN is adjacent in parts to LNR

Site	Reasons for designation	Distance and directions from proposed scheme
	( <i>Coenonympha pamphilus</i> ) and small copper ( <i>Lycaena phlaeas</i> ). Also good for dragonflies and damselflies.	
South Taunton Streams LNR	This reserve supports a wide range flora and fauna including water vole, otters, kingfisher ( <i>Alcedo atthis</i> ), sand martin ( <i>Riparia riparia</i> ) and bats including pipistrelle species, lesser horseshoe and noctule.	0.2 miles 260 metres west. ARN is adjacent in parts to LNR
Bickenhall Orchard LNR	A traditional orchard supporting a rich bryophyte community and herb rich grasslands supporting a diverse invertebrate population, badgers and slow worm.	0.3 miles (440 metres) south west
Herne Hill LNR	This reserve supports woodland, grassland and scrub habitats. A large number of invertebrate species occur, including two nationally rare species. The reserve is also recorded to support a large population of badgers, as well as bats and birds.	0.8 miles (1.3 kilometres) south east
Screech Owl LNR	The reserve comprises a mosaic of ponds, reed beds, scrub and grassland. The site supports notable assemblages of wetland birds as well as water voles, otter, bats and grass snake.	7.1 miles (11.4 kilometres) ARN is 0.1 miles (160 metres) west of LNR boundary
Grand Western Canal Country Park LNR	Wholly manmade canal winding through a rural landscape within Mid-Devon, forming an important wildlife corridor. Species present include otter and the scarce chaser dragonfly ( <i>libellula fulva</i> ).	11.5 miles (18.6 kilometres) south west

#### Non-statutory designated sites

- 8.6.12 There are 46 non-statutory sites within a 1.2 mile (2 kilometre) study area, all of which are Local Wildlife Sites (LWS).
- 8.6.13 These non-statutory sites have been designated by the local planning authorities and are protected through local planning policies as they support locally important habitats and/or species of nature conservation value within the county. As such, all of the non-statutory sites designated within the study area are considered to be of county importance, with the exception of those that are component parts of SSSIs, in which case these are of national importance.
- 8.6.14 The LWSs within the study area are summarised in Table 8-7. Figure 8.2 shows the location of these sites in relation to the proposed scheme.
- 8.6.15 A further 110 non-statutory LWS (in Somerset) and County Wildlife Sites (in Devon) are located over 1.2 miles (2 kilometres) from the proposed scheme but fall within 0.12 miles (200 metres) of the ARN. The potential for air quality effects upon these sites will be assessed and reported in the ES.

**Table 8-7 Non-statutory designated sites within the study area**

<b>Site</b>	<b>Reasons for designation</b>	<b>Distance and direction from proposed scheme boundary</b>
Road Verges West of Hatch Beauchamp LWS	Supports important assemblage of vascular plants including notable species within the county.	Within the footprint of the proposed scheme
Bickenhall Wood LWS	Supports woodland (including ancient woodland) habitats and an important assemblage of vascular plants.	Within the footprint of the proposed scheme
Saltfield Copse LWS	Supports woodland (including ancient woodland).	Within the footprint of the proposed scheme
River Rag LWS	Supports freshwater habitats.	Within the footprint of the proposed scheme
Jordans Park LWS	Supports parkland with an important assemblage of veteran trees.	Within the footprint of the proposed scheme
Every's Copse LWS	Supports predominantly broadleaved semi-natural woodland (including ancient woodland).	Adjacent to proposed scheme boundary
Ashill Wood LWS	Supports predominantly broadleaved semi-natural woodland (including ancient woodland).	Adjacent to proposed scheme boundary
Huish Woods LWS	Supports broadleaved semi-natural woodland (including ancient woodland).	Adjacent to proposed scheme boundary
River Isle LWS	Supports freshwater habitats and an important assemblage of vascular plants.	0.04 miles (80 metres) south
River Tone and Tributaries LWS	Supports freshwater habitats and otter.	0.06 miles (100 metres) west
Huish Copse East LWS	Supports broadleaved semi-natural woodland (including ancient woodland).	0.07 miles (120 metres) south
Hatch Green Fields LWS	Supports unimproved calcareous and neutral grassland with an important assemblage of vascular plants.	0.1 miles (160 metres) north
Thorn Clump LWS	Supports semi-improved grassland and an important assemblage of vascular plants, including notable species within the county.	0.2 miles (260 metres) north east
Scutty Benches Copse LWS	Supports woodland (including ancient woodland).	0.2 miles (400 metres) north
Stoke Wood LWS	Supports mixed broadleaved woodland (including ancient woodland) and an important assemblage of vascular plants.	0.2 miles (400 metres) south
Bens Copse LWS	Supports woodland (including ancient woodland).	0.3 miles (430 metres) west
Forest Orchard LWS	Supports unimproved grassland habitat and orchard trees.	0.3 miles (440 metres) south

Site	Reasons for designation	Distance and direction from proposed scheme boundary
Oldway Bridge Field and Spring LWS	Supports unimproved neutral grassland with an important assemblage of invertebrates.	0.3 miles (450 metres) south
Abbey Hill Farm Meadow LWS	Supports an important grassland community.	0.3 miles (450 metres) south west
Curry Mallet Drove LWS	A green lane supporting grassland habitat and an important assemblage of vascular plants.	0.3 miles (470 metres) south west
Knowl Wood LWS	Supports woodland (including ancient woodland).	0.3 miles (500 metres) south west
Hatch Court Park LWS	Supports parkland habitat within an important assemblage of veteran trees.	0.3 miles (530 metres) east
Southtown Farm LWS	Supports neutral, wet unimproved grassland with an important assemblage of vascular plants including notable species within the county.	0.3 miles (560 metres) west
Merryfield Airfield LWS	Supports semi-natural mesotrophic/calcareous/calcifugous grassland with at least five vascular plant species that are notable within the county.	0.4 miles (680 metres) north-east
Close Park LWS	Supports parkland habitat within an important assemblage of veteran trees.	0.4 miles (700 metres) north east
Donyatt Railway Cutting LWS	Supports a mosaic of habitats and a good bird population.	0.4 miles (720 metres) south east
Boon's Copse LWS	Designated for the presence of ancient woodland.	0.4 miles (720 metres) west
Near Myrtle Farm LWS	A green lane which supports a mosaic of habitats, including species-rich rough grassland, scrub and secondary woodland. Supports an important assemblage of vascular plants including notable species within the county.	0.5 miles (760 metres) south west
Blackbrook Pavilion LWS	Designated for the presence of hedgerows which support a dormouse population.	0.5 miles (790 metres) south west
Bridgwater and Taunton Canal LWS	Supports standing water with a higher-than-average number of submerged floating and emergent plant species and at least five vascular plant species that are notable in the county.	0.5 miles (880 metres) north-east
Line Wood LWS	Supports broadleaved semi-natural woodland (including ancient woodland).	0.6 miles (900 metres) north east
Ten Acre Copse LWS	Designated for the presence of ancient woodland.	0.6 miles (1.0 kilometres) west
Meadows at West Hatch LWS	Supports an important assemblage of vascular plants, including two or more species that are notable within the county and which make up a semi-natural mesotrophic/	0.6 miles (1.0 kilometres) west

Site	Reasons for designation	Distance and direction from proposed scheme boundary
	calcareous/calcifugous grassland community. Supports an important assemblage of amphibians,	
Wright's Copse LWS	Designated for the presence of ancient woodland.	0.7 miles (1.1 kilometres) west
Newlands Plantation and Extensions LWS	Supports semi-natural mesotrophic/calcareous/calcifugous grassland with at least five vascular plant species that are notable within the county.	0.7 miles (1.2 kilometres) north-east
Herne Hill LWS	Supports at least eight species of flora and fauna that are notable within the county, across at least two species groups and supports broadleaved woodland on ancient woodland sites.	0.8 miles (1.3 kilometres) south
Forest Farm Drove LWS	Supports semi-natural mesotrophic/calcareous/calcifugous grassland.	0.9 miles (1.4 kilometres) west
Quarrylands North LWS	Supports a mosaic of at least two semi-natural habitats	1.0 miles (1.6 kilometres) west
Crimson Hill Tunnel LWS	Supports a winter roost of at least five horseshoe <i>Rhinolophus sp.</i> bats.	1.0 miles (1.6 kilometres) east
Crimson Hill Farm Fields LWS	Supports semi-natural mesotrophic/calcareous/calcifugous grassland.	1.0 miles (1.6 kilometres) east
Wrantage Covert LWS	Designated for the presence of ancient woodland.	1.1 miles (1.7 kilometres) east
Dillington Park LWS	Supports broadleaved woodland on ancient woodland sites, with veteran trees present.	1.1 miles (1.7 kilometres) east
Fieldgate Lane Fields LWS	Supports at least one Red Data Book vascular plant.	1.1 miles (1.8 kilometres) east
Drakes Meadow and Weir LWS	Supports semi-natural mesotrophic/calcareous/calcifugous grassland, a mosaic of at least two semi-natural habitats and at least two species of vascular plant that are notable within the county.	1.2 miles (1.9 kilometres) west
Staple Farm Area LWS	Supports the breeding sites of avian species notable within the county.	1.2 miles (1.9 kilometres) west
Three Ponds, Dunpole LWS	Supports an important assemblage of amphibian species, including a 'good' population of great crested newt.	1.2 miles (1.9 kilometres) south

### Ancient woodland and veteran trees

- 8.6.16 Ancient woodland is considered to be any area that has been continuously wooded since 1600 AD [55]. Ancient woodlands are considered to be irreplaceable habitat and are of national importance, irrespective of whether they are listed on Natural England's Ancient Woodland Inventory.
- 8.6.17 There are ten Ancient Woodland sites listed on Natural England's Ancient Woodland Inventory within 1.2 miles (2 kilometres) of the proposed scheme as shown in Table 8-8. The majority of these are also LWSs as shown in Table 8-7 above. Figure 8.3 shows the location of these woodlands in relation to the proposed scheme.

- 8.6.18 Saltfield Copse LWS is not listed on Natural England's Ancient Woodland Inventory, however the LWS citation states that it is ancient woodland. For the purposes of this assessment Saltfield Copse LWS is considered to be ancient woodland. Further assessment of the status of this woodland will be undertaken and reported in the ES.
- 8.6.19 A further ten Ancient Woodland sites listed on the Ancient Woodland Inventory and located over 1.2 miles (2 kilometres) from the proposed scheme but fall within 0.12 miles (200 metres) of the ARN. These are:
- Unnamed ancient woodland 1/2/3/4 (north of the A30 at Coombe, West Crewkerne)
  - Unnamed ancient woodland 5 (north of the A30 at Lower Coombe, West Crewkerne)
  - Unnamed ancient woodland 6 (north of A303 at Boxstone Hill, Whitelackington)
  - Helliars Copse
  - Higher Ash/Long Woods
  - Knights Wood
  - Parsonage Wood
  - Parsons Steeple
  - Staple Park Wood
  - Warren Hill Wood

**Table 8-8 Ancient woodland within the study area**

Site	Distance and direction from proposed scheme
Bickenhall Wood	Adjacent to proposed scheme, and 0.01 miles (10 metres) west of the ARN
Ashill Wood/Every's Copse	Adjacent to proposed scheme
Huish Coppice	0.01 miles (20 metres) west, and 0.13 miles (200 metres) west of the ARN
Stoke Wood	0.2 miles (400 metres) south
Line Wood	0.3 miles (470 metres) east 0.07 miles (110 metres) north of the ARN
An unnamed site listed as 'ancient replanted woodland'	0.3 miles (550 metres) north
Knowl Wood	0.4 miles (600 metres) south
Boons Copse	0.5 miles (880 metres) west
Ten-Acre Coppices	0.6 miles (1.0 kilometres) west
Thurlbear Wood	1.0 miles (1.6 kilometres) west

- 8.6.20 As defined in the Natural England and Forestry Commission Standing advice, ancient and veteran trees<sup>3</sup> can be individual trees or groups of trees within habitat such as wood pasture. Ancient trees are exceptionally valuable and include attributes such as great age, size, conditions and biodiversity value as a result of significant wood decay and ageing. All ancient trees are veteran but not all veteran trees are ancient. A veteran tree may not be very old but has decay

<sup>3</sup> For the purpose of this report, a veteran tree is defined as: "a tree that is of interest biologically, culturally or aesthetically because of its age, size or condition" (refer to the following link for further details: <http://publications.naturalengland.org.uk/file/113006>)

features such as branch death and hollowing that contribute to its biodiversity value. Ancient and veteran trees are both irreplaceable habitat features that are each of national importance and afforded the same level of policy protection.

8.6.21 Veteran trees are located within and adjacent to the proposed scheme, including those at Jordans Park LWS. An arboricultural survey has been undertaken in accordance with available land access, and confirmed the presence of five veteran trees within the proposed scheme:

- A black poplar (T142) alongside Venner's Water.
- A pedunculate oak (T265) adjacent to access track at Jordans Park LWS.
- A pedunculate oak (T306) adjacent to the Back Stream at Jordans Park LWS.
- Two pedunculate oaks (T315, T316) within a hedgerow dividing fields immediately to the south of Jordans Park LWS.

### **Notable plant and fungi species**

8.6.22 Notable plant species records were returned from data searches with Somerset Environmental Records Centre (SERC). The updated 2021 data search returned numerous records of notable plant species within the study area of the proposed scheme. Key areas of notable records include:

- Red listed autumn lady's-tresses (*Spiranthes spiralis*) and green-winged orchid (*Anacamptis morio*) at Barrington Hill Meadows SSSI and Barrington Hill NNR.
- Red listed dwarf spurge (*Euphorbia exigua*), greater butterfly-orchid (*Platanthera chlorantha*), box (*Buxus sempervirens*) within woodland to the west of the proposed scheme.
- Red listed dwarf spurge, dodder (*Cuscuta epithymum*), greater butterfly-orchid, bird's-nest orchid (*Neottia nidus-avis*), as well as basil thyme (*Clinopodium acinos*) and lesser butterfly-orchid (*Platanthera bifolia*) which are additionally SPIs, from the area within and surrounding Thurlbear woods and quarrylands SSSI.

8.6.23 Numerous other records of locally notable plant and fungi species (Local Biodiversity Action Plan and/or County notable) were also returned from various locations within the Zol.

8.6.24 Field surveys have confirmed the presence of large numbers of pyramidal orchids (*Anacamptis pyramidalis*) and common spotted orchid (*Dactylorhiza fuchsia*) and occasional greater butterfly orchid within a woodland edge and grassland field margins either side of the A358 near Griffin Lane. Greater butterfly-orchid is a red listed species classified as being Near Threatened; however, along with pyramidal and common spotted orchids, remains widespread within southern counties of England. Given the large numbers present within the study area the orchid assemblage is classified as of local importance.

### **Invasive non-native species**

8.6.25 No records of Invasive Non-Native Species (INNS) listed on Schedule 9 of the Wildlife and Countryside Act 1981 or the Invasive Alien Species (Enforcement and Permitting) Order 2019, were returned from the updated data search or identified during the 2016 Extended Phase 1 habitats survey.

8.6.26 However, the National Vegetation Classification (NVC) survey identified invasive giant hogweed (*Heracleum mantegazzianum*) within an area of grassland in the western section of the proposed scheme, and the River Habitat Survey (RHS)

identified Himalayan balsam (*Impatiens glandulifera*) within the River Ding riparian corridor. Additionally, while not listed as a Schedule 9 species, invasive winter heliotrope (*Petasites fragrans*) was also identified within the study area on road verges surrounding Ashill and on an earth bank near Thickthorn Cross.

### Habitats

- 8.6.27 The desk study identified seven HPI within the study area. These are lowland mixed deciduous woodland, coastal and floodplain grazing marsh, hedgerows, traditional orchards, ponds, rivers and streams, wood-pasture and parkland.
- 8.6.28 A total of 27 different habitats were recorded in the study area of the proposed scheme during the Phase 1 Habitat Survey in 2016. Of these, the proposed scheme passes predominantly through arable land, improved grassland and poor semi-improved grassland, which are associated with agricultural practices. The proposed scheme also passes through significant blocks of semi-natural broadleaved woodland, as well as scattered trees associated with riparian corridors where the proposed scheme crosses numerous small watercourses. Further habitats of more limited extent within the study area include mixed semi-natural woodland, broadleaved plantation, scrub (dense and scattered), semi-improved neutral grassland, marshy grassland, standing and running water, and numerous hedgerows ranging in character.
- 8.6.29 All habitats surveyed are described below using information from the Phase 1 Habitat Survey as indicated on the Phase 1 Habitat Map which can be found in Appendix 8.2 *Preliminary Ecological Appraisal (PEA)*. Further hedgerow surveys were undertaken during 2017, 2019 and 2020 to identify important hedgerows in accordance with the Hedgerow Regulations 1997, and NVC botanical surveys were conducted on 12 areas of grassland initially identified during the Phase 1 survey as semi-improved neutral grassland that would be directly impacted by the proposed scheme. Woodland NVCs were also undertaken on 15 areas of woodland to be impacted by the proposed scheme. Information from these surveys informs the habitat valuation and classifications discussed below.
- 8.6.30 Full results of the hedgerow survey can be found in Appendix 8.4 *Hedgerow Technical Report*.
- 8.6.31 Full results of NVC surveys, can be found in Appendix 8.5: *National Vegetation Classification Technical Report*.

### Semi-natural broadleaved woodland

- 8.6.32 There are a number of areas of semi-natural broadleaved woodland within the study area, including woodlands listed on the ancient woodland inventory. Generally, these are small scattered copses within the agricultural landscape, particularly centred on small waterbodies. Several riparian corridors within the study area are also wooded to varying degrees. Additionally, several extensive areas of continuous woodland are present within the study area, particularly along the central and eastern sections of the proposed scheme. These large areas are generally named sites also classified as ancient woodland, including Huish Woods, Ashill Wood and Every's Copse.
- 8.6.33 The majority of the woodlands are dominated by canopy trees, varying in the density and complexity of the understorey and ground layer. Dominant canopy species present in the majority of broadleaved woodlands include ash and pedunculate oak (*Quercus robur*), with primary understorey species including hazel (*Corylus avellana*), elder (*Sambucus nigra*), hawthorn (*Crataegus*

*monogyna*), field maple (*Acer campestre*), wild privet (*Ligustrum vulgare*), holly (*Ilex aquifolium*) and occasional willow (*Salix spp.*). Ground flora composition and richness is also variable between each woodland, with some woodlands displaying a relatively sparse ground flora and others a relatively diverse community, though frequently still with some signs of enrichment such as common nettle (*Urtica dioica*) and cleavers (*Galium aparine L.*). The ground flora of several larger woodlands, such as Every's Copse and sections of Bickenhall Wood, indicate dampness.

8.6.34 NVC surveys to identify woodland plant communities assigned three separate plant communities to the eight woodland sites surveyed, however the majority of these fell into several subcommunities of the W8 *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* grouping.

8.6.35 Semi-natural broadleaved woodland is lowland mixed deciduous woodland HPI and the areas of this habitat within the study area are therefore of national importance.

#### Plantation woodland – broadleaved

8.6.36 Broadleaved plantation woodland is present within a number of areas throughout the study area, with significant blocks present at the western extent of the proposed scheme, including a block adjacent to Knowl Wood, which comprises planted and coppiced hazel. Further areas of broadleaved plantation woodland are also present at various other locations across the proposed scheme, including a number that are managed by Forestry England.

8.6.37 Broadleaved plantation woodland within the study area is of county importance.

#### Mixed semi-natural woodland

8.6.38 Areas of mixed semi-natural woodland are primarily located at the central section of the proposed scheme, with named examples including Bickenhall Wood and Saltfield Copse. The canopy of these woodlands is primarily deciduous and dominated by ash, though with frequent Douglas fir (*Pseudotsuga menziesii*) and silver birch (*Betula pendula*). Both of these woodlands are contiguous with the belts of woodland and scrub that form the highway planting along the A358.

8.6.39 Both woodlands have been subject to NVC survey to classify the woodland communities and identified each as subcommunities of *Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis*. Both were found to have developed understories including species such as wild privet, field maple, hawthorn, hazel and service-tree (*Sorbus domestica*). The ground flora in each area of mixed semi-natural woodland was found to be sparse but relatively diverse, with evidence of regeneration and standing deadwood.

8.6.40 A number of these woodland parcels would be directly impacted by the proposed scheme, resulting in habitat loss and/or fragmentation.

8.6.41 Mixed semi-natural woodland within the study area is of county importance.

#### Scattered broadleaved trees

8.6.42 Scattered broadleaved trees are present at several locations throughout the study area, primarily associated with riparian corridors, although a number are also associated with hedgerows, in fields and in gardens. Frequent species identified include ash, pedunculate oak and sycamore. A number of scattered trees

identified throughout the study area are highly mature, with five veterans identified as described in 8.6.21

8.6.43 Scattered trees within the study area are of local importance.

#### Scrub

8.6.44 Small areas of dense and scattered scrub are widespread, both forming their own habitat and in mosaic with other habitats which are frequently too small to be mapped. Key areas of scrub include within the existing highways verge and surrounding Broughton Brook at Junction 25 of the M5 and surrounding Taunton Gateway Park & Ride facility. Such areas are generally being colonised by dense bramble (*Rubus fruticosus agg.*) and dog rose (*Rosa canina*), although with some areas forming more complex mixed habitats, occasionally with buddleia (*Buddleja davidii*).

8.6.45 Scrub habitat comprising common species such as hawthorn and blackthorn within the study area is of less than local importance.

#### Acid grassland

8.6.46 One area of semi-improved acid grassland was noted at Thornhill which was rabbit-grazed with anthills, gorse (*Ulex europaeus*) stands are present. Ground flora comprises of frequent lesser celandine (*Ranunculus ficaria*), clover species, ribwort plantain (*Plantago lanceolata*), occasional creeping thistle (*Cirsium arvense*), red dead-nettle (*Lamium purpureum*), lords and ladies (*Arum maculatum*) and dock (*Rumex spp.*).

8.6.47 Lowland dry acid grassland is a HPI within the study area and is, therefore, of national importance.

#### Semi-improved neutral grassland

8.6.48 Semi-improved neutral grassland is only present in small, isolated areas of the study area adjacent to the eastern section of the proposed scheme and north of the A358 at Ashill. Four of these fields were connected, whilst two were isolated south of West View Farm between a species poor semi-improved grassland field, an arable field and the A358. Species identified include dominant false oat grass (*Arrhenatherum elatius*), meadow fescue (*Festuca pratensis*), tall fescue (*Festuca arundinacea*) and cock's-foot (*Dactylis glomerata*) with occasional perennial rye grass (*Lolium perenne*), dock, nettle and creeping buttercup (*Ranunculus repens*) and rare herb-Robert (*Geranium robertianum*), spear thistle (*Cirsium vulgare*) and dove's-foot crane's-bill (*Geranium mole*).

8.6.49 These fields were subject to additional NVC survey which identified them as being grasslands of MG7 *Lolium perenne* dominated subcommunities, with influences of seasonal flooding from Venners Water and active cattle grazing contributing to a more improved sward. Each is characterised by a species-poor sward with a low abundance and richness of forbs.

8.6.50 Neutral grassland may qualify as lowland meadow, a priority habitat, and is therefore of national importance, however no areas qualifying as priority habitat have been identified to date.

8.6.51 Other areas of neutral semi-improved grassland within the study area are of local importance.

### Semi-improved species-poor grassland

- 8.6.52 Areas of semi-improved, species-poor grassland are frequent throughout the study area. The majority of fields are intensively grazed by livestock including horses, sheep and chickens. Species identified comprised dominant cock's-foot, Yorkshire fog (*Holcus lanatus*) and fescues, with occasional white clover (*Trifolium repens*), dandelion (*Taraxacum spp.*), dock, red clover (*Trifolium pratense*), perennial rye grass, yarrow (*Achillea millefolium*) and teasel (*Dipsacus fullonum*).
- 8.6.53 Whilst these areas of grassland are generally of low diversity, small areas are locally herb-rich.
- 8.6.54 Semi-improved species-poor grassland within the study area is of local importance.

### Improved grassland

- 8.6.55 A number of large fields of agriculturally improved grassland are present across the study area, particularly the central section of the route around West Hatch. These grasslands were observed to have a lush bright green and even sward and were dominated by perennial rye grass and white clover, likely resulting from intensive sheep grazing.
- 8.6.56 Improved grassland within the study area is of less than local importance.

### Marshy grassland

- 8.6.57 Marshy grassland is present throughout the study area, though with a patchy distribution. In the western and central sections of the proposed scheme, this habitat is generally limited to smaller, isolated fields associated with watercourses and wet ditches. Marshy grasslands become more prevalent in the eastern section of the proposed scheme, particularly east of the A303, where four marshy grassland areas are associated with the River Isle, west of Winterhay Green.
- 8.6.58 Marshy grassland areas throughout the proposed scheme are characterised by a prevalence of soft rush (*Juncus effusus*) and hard rush (*Juncus inflexus*), with occasional stands of great willowherb (*Epilobium hirsutum*).
- 8.6.59 One area of marshy grassland located west of Henlade within the footprint of the proposed scheme was subject to further NVC assessment. NVC assessment found this grassland area to be of the MG1a *Arrhenatherum elatius* grassland - *Festuca rubra* sub-community, resulting from livestock grazing in recent years followed by a period without management. The sward is dominated by grasses such as Yorkshire fog and cock's-foot, with additional species including smooth meadow-grass (*Poa pratensis*), false oat-grass and red fescue. The abundance and richness of forbs within the grassland was also found to be poor, including small patches of invasive giant hogweed.
- 8.6.60 Areas of marshy grassland within the study area are considered to be of local importance.

### Arable

- 8.6.61 Extensive areas of land within the study area are occupied by large arable fields, comprising a large proportion of land within the proposed scheme. The majority of these fields are sown with winter wheat crop (*Triticum sp.*). However, some cultivated daffodil (*Narcissus sp.*) fields, located near Taunton Racecourse were

also present. Whilst variable, a number of these large arable fields contained wide field margins or areas of set aside grassland.

- 8.6.62 Arable land provides suitable foraging ground for a number of species and species groups such as birds and badgers and also provides breeding habitat for ground nesting bird species.
- 8.6.63 Arable land within the study area is considered to be of less than local importance.

#### Hedgerows

- 8.6.64 Reflecting the large proportion of land within the study area given over to agricultural production, an extensive network of hedgerows is present, acting as boundary features throughout each section. This includes a variety of intact and defunct hedgerows, both native species-rich and native species-poor hedgerows, many of which are associated with ecologically important features such as mature standard trees and banks or ditches.
- 8.6.65 Many of the hedgerows within the study area are managed through hedge laying, creating thick, species diverse corridors. Hedgerows providing important habitat linkages to watercourses and woodland are numerous throughout the study area and likely to contribute to landscape connectivity for wildlife movement and dispersal.
- 8.6.66 Frequently encountered species across all hedgerows included blackthorn and hawthorn, with elder, field maple and ash among other species present. More species rich examples additionally include species such as pedunculate oak, hazel, wild privet and horse chestnut (*Aesculus hippocastanum*).
- 8.6.67 Detailed hedgerow surveys were also undertaken on all hedgerows up to 0.03 miles (50 metres) from the proposed scheme, over half of which were identified as species rich. Further high proportions of the hedgerows not qualifying as important through species richness, qualified through other hedgerow features, such as having an adjacent 'by-way open to all traffic'. Forty-eight hedgerows qualified as important through records of species protected under 1, 5 or 8 of the Wildlife and Countryside Act 1981, primarily through supporting hazel dormice.
- 8.6.68 Intact hedgerows conforming with the priority habitat description [56], i.e. over 20 metres long, less than 5 metres wide and where gaps are less than 20 metres wide, are of national importance as are all hedgerows assessed as important hedgerows covered by the Hedgerows Regulations 1997 and qualifying as priority habitats.
- 8.6.69 All other hedgerows within the study area are of local importance.
- 8.6.70 Further details on the methodology, limitations and results can be found in Appendix 8.4 *Hedgerow Technical Report*.

#### Tall ruderal

- 8.6.71 Tall ruderal habitat is prevalent throughout the proposed scheme, but most often as a mosaic in association with other broad habitat types, frequently in small patches too limited to map. However, significant stands of tall ruderal vegetation are present as the dominant habitat in several locations within the study area. This includes patches adjacent to the M5 Junction 25 at the western extent, by the disused railway track in the central section and within three isolated fields north and south of the A303 at the eastern extent.

8.6.72 All tall ruderal areas are characterised by the presence of species such as nettles and dock, with occasional rosebay willowherb (*Chamerion angustifolium*).

8.6.73 Ruderal habitat within the study area is considered to be of less than local importance.

#### Standing water

8.6.74 Numerous standing waterbodies are present throughout the study area, though few were accessible during the Extended Phase 1 survey in 2016. The majority of these waterbodies appear to be small ponds, generally associated with woodlands or arable set-aside land and are unlikely to qualify as priority habitats. Further surveys are being undertaken of waterbodies during 2021 and will inform the assessment of these habitats in the ES.

8.6.75 The majority of the freshwater ponds within the study area do not meet the criteria for priority habitat on the basis of flora/habitat type. Due to the relative rarity of ponds within the area, freshwater ponds are considered of local importance.

8.6.76 Any fauna of conservation importance that ponds support, such as great crested newts, are valued separately in the subsequent sections.

#### Running water

8.6.77 Small watercourses are present throughout the study area of the proposed scheme, many of which are intersected by the current path of the A358. The surface watercourses located in the study area are described in Table 13-6 of Chapter 13 Road Drainage and the Water Environment and are shown on Figure 13.1.

8.6.78 A summary of the key watercourses identified during the Extended Phase 1 survey is presented below:

- Broughton Brook is a fast-flowing stream with a silt and pebble substrate, running over a weir in Orchard Portman. The stream has a variety of features including small waterfalls, debris dams and side bars.
- Black Brook, flows into Broughton Brook, is a moderate flowing stream with steep sided banks, located to the west of Henlade and north-east of Haydon.
- Thornwater Stream, east of Henlade is a tributary of the River Tone. The watercourse is lined with mature scattered trees and patches of scrub; access was not granted at the time of survey so a detailed description of the watercourse was not able to be obtained.
- Meare Stream, south of Meare Green, is a tributary of the West Sedgemoor Main Drain. South of the A358 the watercourse is lined with mature trees; however, access was not granted at the time of survey so a detailed description of the watercourse was not able to be obtained.
- Fivehead River runs through the central section of the study area from Bickenhall past Hatch Beauchamp. It is noted as an important riparian habitat corridor. The river has been managed at Brandy Bridge by reinforced brick sides and a weir. Its flow was observed to be smooth with debris dams, pools, and side bars present along its length. The rivers channel appears to have been historically altered, with a dry ditch present where it once flowed south of Hatch Beauchamp.
- Venner's Water, north of Ashill, is noted as an important riparian habitat corridor with scattered mature trees and broadleaved woodland bordering its edges. The stream's flow is smooth and its banks are steep with exposed

earth and roots in areas. South of Ashill Wood, a wet ditch was observed running along the southern boundary at Park Barn lane.

- Back Stream runs south of Cad Green. This stream is noted as generally fast flowing and clear.
- Cad Brook is a medium flowing stream with gravel substrate and vertical earth banks in areas.
- The River Isle displays a variety of features including side bars, reinforced banks and an effluent outflow.

- 8.6.79 RHS and River Corridor Surveys (RCS) were undertaken along the River Ding as this was, at the time of the survey, the only river known to require diversionary works as part of the proposed scheme. Further surveys are being undertaken during 2021 of all 21 locations where the proposed scheme will cross a watercourse, the results of which will inform the ES. Due to dense vegetation growth, it was not possible to undertake the surveys in the direct vicinity of the bridge on the existing A358. Instead, the surveys were undertaken upstream of the bridge, over a 0.31 mile (500 metre) reach which ended 0.04 miles (60 metres) upstream of the bridge.
- 8.6.80 The surveyed reach of the River Ding has already been historically realigned and over-deepened. Two 'major' weirs were identified, causing some impoundment of flow and potentially impeding fish passage. Alongside several bridges, these modifications generated an RHS Habitat Modification Score of 3,745, which equates to the highest modification class of 'severely modified'.
- 8.6.81 Despite the River Dings' modified nature, considerable recovery has taken place, resulting in a range of semi-natural bank profiles. The surveyed reach contained an abundance of habitat features related, in part, to several fallen trees which added morphological complexity. Features noted included channel features such as riffles, pools, mid-channel bars and side bars.
- 8.6.82 The banks are colonised by a mixture of tall herbs, scrub and trees, offering abundant shade, and a range of related habitat features such as woody debris, tree roots, and overhanging boughs. Aquatic plants were generally sparse, as expected for a river of this type and level of shading. Taxa observed included fool's watercress, water starwort (*Callitriche sp.*), branched bur-reed (*Sparganium erectum*), duckweed (*Lemna sp.*), and brooklime (*Veronica beccabunga*), all of which were only observed in isolated patches.
- 8.6.83 No protected or otherwise notable species were recorded, with the exception of the invasive non-native plant species Himalayan balsam, which was present (sparsely colonised) on both the bank face and top.
- 8.6.84 Based on the results of the RHS and RCS along the River Ding and aquatic macroinvertebrate surveys of all watercourses crossed by the proposed scheme, running water is considered to be of local importance.

## **Bats**

### Desk study

- 8.6.85 There are four European SAC designations for bats located within 18.6 miles (30 kilometres) of the proposed scheme, these include Hestercombe House SAC, Exmoor and Quantock Oakwoods SAC, Bracket's Coppice SAC and Beers Quarry and Caves SAC (see Table 8-6 above for further details).

- 8.6.86 Several other local and national statutory designated sites within 1.2 miles 2 kilometres of the proposed scheme also contain habitats that could support bats. These include Thurlbear Wood and Quarrylands SSSI, Herne Hill LNR, Bickenhall Orchard LNR, Children's Wood/Riverside LNR, and South Taunton Streams LNR.
- 8.6.87 Data provided by SERC in 2021 identified records of at least 16 species of bat within 6.2 miles (10 kilometres) of the proposed scheme, four of which are listed under Annex II of the Habitats Directive. These comprise barbastelle, Bechstein's, lesser horseshoe and greater horseshoe bats.
- 8.6.88 Geospatial analysis of the SERC data indicates the importance of the area for rarer species, including lesser horseshoe, which was the second most frequently recorded species (after common pipistrelle) within 6.2 miles (10 kilometres) of the proposed scheme. A breakdown of bats accurately identified to species level and their overall percentage frequency within the SERC data set has been provided in Table 8-9.

**Table 8-9 Summary of bat records provided by SERC**

Species	Number of records within SERC data set	% Occurrence within SERC data set	Notes on significant records
Bats (indeterminate)	-	-	Indeterminate roosts
Long-eared (indeterminate)	-	-	Maternity, day, feeding, indeterminate roost.
Pipistrellus	-	-	Maternity, day, indeterminate roost.
Unidentified species	-	-	Indeterminate roost
Whiskered/Brant's	-	-	-
Common pipistrelle	794	32.13%	Day, night, maternity, indeterminate roosts,
Lesser horseshoe	391	15.82%	Maternity, day, transitional, night and indeterminate roost
Soprano pipistrelle	339	13.72%	Day, night, indeterminate roost
Serotine	235	9.51%	Maternity, day, indeterminate roost
Brown long-eared	194	7.85%	Maternity, day, night, indeterminate roost.
Noctule	180	7.28%	-
Natterer's	82	3.32%	Maternity, day, indeterminate roost
Daubenton's	71	2.87%	Day roost
Greater horseshoe	60	2.43%	Day, indeterminate roost
Barbastelle	59	2.39%	Aural observation/ recording only.
Leisler's	24	0.97%	-
Nathusius' pipistrelle	17	0.69%	-

Species	Number of records within SERC data set	% Occurrence within SERC data set	Notes on significant records
Bats (indeterminate)	-	-	Indeterminate roosts
Long-eared (indeterminate)	-	-	Maternity, day, feeding, indeterminate roost.
Pipistrellus	-	-	Maternity, day, indeterminate roost.
Unidentified species	-	-	Indeterminate roost
Whiskered/Brant's	-	-	-
Whiskered	14	0.57%	Day, indeterminate roost
Bechstein's	7	0.28%	Aural observation/recording only.
Brant's	3	0.12%	-
Grey long-eared	1	0.04%	-
Total	2471	100%	

- 8.6.89 Of the four Annex II species recorded, only lesser and greater horseshoe were confirmed to be roosting within 6.2 miles (10 kilometres) of the proposed scheme. Barbastelle and Bechstein's records pertained to aural observation/recording only.
- 8.6.90 Twenty-nine confirmed lesser horseshoe roosts were recorded within 6.2 miles (10 kilometres) of the proposed scheme. Roost types included; day, night, maternity, indeterminate (droppings only) and transitional roosts. The closest lesser horseshoe roosts were located 0.31 miles (500 metres) east of the proposed scheme at Thornfalcon, 0.19 miles (300 metres) south-east at Ilminster and 0.37 miles (600 metres) west at Bickenhall. All other roost records were located over 1.9 miles (3 kilometres) from the proposed scheme and were primarily located to the north and south of Taunton.
- 8.6.91 Greater horseshoe records are largely located to the north and south of the proposed scheme, with the majority located to the north of Taunton and to the west of the M5 motorway. Records of a greater horseshoe roost (recorded annually from 2016 – 2019) are located 3.7 miles (6 kilometres) north-east of the proposed scheme at Butcher's Hill, Fivehead (roost type unknown). Two further roosts are located approximately 2.5 miles (4 kilometres) and 6.2 miles (10 kilometres) to the north, respectively.
- 8.6.92 The majority of the barbastelle records were located to the north of Taunton and the M5 motorway. Smaller secondary clusters were recorded to the south of the proposed scheme adjacent to the roundabout which is part of the Nexus 25 development and several off-site woodland blocks. The second closest records were located at Bickenhall, 0.43 miles (700 metres) west of the proposed scheme.
- 8.6.93 Bechstein's records were primarily located in association with large woodland blocks to the south and west of the proposed scheme. The closest records pertained to two separate observations 1.2 miles (2 kilometres) south-west of the proposed scheme boundary.

- 8.6.94 Other common and more notable species, including common and soprano pipistrelle, serotine, brown long-eared, noctule, Natterer's, Daubenton's, and whiskered bat, were also recorded roosting within 6.2 miles (10 kilometres) of the proposed scheme.

#### Field surveys – roosts

##### *Tree surveys*

- 8.6.95 As a result of the ground-level assessments a total of 144 trees were identified within 0.06 miles (100 metres) of the proposed scheme footprint at the time of survey as having the potential to support roosting bats (high, moderate and low). Upon completion of the aerial tree-climbing surveys 34 trees were classified with high potential, 46 moderate, 45 low and 19 negligible.
- 8.6.96 As a result of the emergence/re-entry surveys, six trees were identified within 0.06 miles (100 metres) of the proposed scheme footprint as confirmed bat roosts, all with low numbers of common species, in addition to four possible/unconfirmed roosts. As all of the roosts identified comprise low numbers of common species the tree roosts are valued at local importance.
- 8.6.97 Full results can be found in Appendix 8.6 *Bat Roost Technical Report*.

##### *Building surveys*

- 8.6.98 A total of 193 buildings and six bridges/culverts were identified within 0.06 miles (100 metres) of the proposed scheme footprint at the time of the surveys. As a result of the external building assessments two confirmed roosts were identified, in addition to 39 buildings with high potential, 29 moderate, 34 low and 79 negligible potential. The roost potential of 16 buildings were unable to be determined due to access issues or buildings being found to no longer exist. Update surveys during 2021 will focus on areas within 0.06 miles (100 metres) of the proposed scheme where access was previously unavailable, as detailed in paragraph 8.5.46 above. Where access is not possible, appropriate assumptions will be made for mitigation design.
- 8.6.99 Internal inspections of buildings within 0.06 miles (100 metres) of the proposed scheme footprint at the time of the surveys were carried out in accordance with available land access. This comprised 22 buildings, of which evidence (droppings) was identified in 12. Following emergence/re-entry surveys 27 buildings were confirmed as bat roosts and a further seven with possible emergences that fall within 0.06 miles (100 metres) of the proposed scheme. The buildings with possible emergences comprised buildings 74, 119A and 175 (anecdotal reports of bats by landowners) and buildings 196, 205, 206 and 274 (possible emergences of common pipistrelle), as set out in Appendix 8.6 *Bat Roost Technical Report*.
- 8.6.100 Buildings 226 and 230 are considered likely to be maternity colonies of common pipistrelle and are therefore considered to be of county importance. Building 210/201SE is identified as a potential maternity roost for lesser horseshoe bats (on the basis of droppings identified during internal inspections, not verified as a result of emergence/re-entry surveys). On a precautionary basis, this building is assigned county importance. All other confirmed roosts are likely to comprise day roosts of low numbers of common species, which are valued at local importance.
- 8.6.101 Full results can be found in Appendix 8.6 *Bat Roost Technical Report*.

### *Hibernation surveys*

- 8.6.102 The initial preliminary roost assessments undertaken in 2017 and 2019 identified several buildings and structures as being suitable for hibernation roosts within 0.06 miles (100 metres) of the proposed scheme. Further hibernation specific surveys included internal inspections where possible, and deployment of static detectors for a two-week period in December 2020.
- 8.6.103 A total of five buildings and two bridges were subject to external assessments. Four buildings were also inspected internally, one of which was later subject to static detector surveys.
- 8.6.104 No evidence of hibernating bats was found during the internal inspections and single static detector deployment in December 2020.
- 8.6.105 Full results can be found in Appendix 8.7 *Bat Hibernation Technical Report* and Appendix 8.6 *Bat Roost Technical Report*.

### Field surveys – activity

#### *Bat activity transects and automated detector surveys*

- 8.6.106 Bat activity surveys have confirmed the presence of at least 11 species of bat within and around the footprint of the proposed scheme. These comprised common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii*), barbastelle, greater horseshoe, lesser horseshoe, noctule, serotine, Leisler's (*Nyctalus leisleri*), long-eared *Plecotus sp.* and *Myotis sp.*
- 8.6.107 The majority of bats recorded during the activity surveys were common pipistrelle (total calls = 4,045, ~ 61%), followed by soprano pipistrelle (total calls = 1,049, ~ 16%) for transects and *Pipistrellus* species (79%), (excluding Nathusius' pipistrelle) for the static surveys. The three Annex II species noted above (barbastelle, greater horseshoe, lesser horseshoe) were encountered in low numbers during the transect surveys.
- 8.6.108 Key areas of high activity were identified during these surveys. Activity was concentrated along transect route two between Henlade and Taunton Gateway Park & Ride, transect six adjacent to Ashill, and transect nine adjacent to Bickenhall Wood. Each of these transects covered a mixture of arable, pasture, and woodland edge habitats with linear features including hedgerows and streams. Activity surveys have highlighted the importance of these linear features within the landscape for commuting and foraging bats, including Annex II species.
- 8.6.109 Static detectors placed along transect route eight at Henlade recorded the highest levels of activity overall, followed by transect route two between Henlade and Taunton Gateway Park & Ride. Both locations displayed high *Pipistrelle sp.* activity. Activity levels for the three Annex II species was also low during the static surveys, totalling <1% of the overall dataset. The highest numbers of barbastelle calls were recorded at transect route eight and both greater and lesser horseshoe bat calls were identified in low numbers along transect route ten near Capland and no other routes with relatively high (45 calls) of lesser horseshoe bats within Hatch Park Wood, adjacent to Griffin Lane.
- 8.6.110 Full results including bat activity maps can be found in Appendix 8.8 *Bat Activity Surveys Technical Report*.

### *Bat crossing point surveys*

- 8.6.111 As a result of the crossing point surveys, two crossing points (22 and 23) at Griffin Lane were identified as being of high value due to usage of the associated features by Annex II species including barbastelle and lesser horseshoe. Three further crossing points (16 at Hatch Green, 20 at Capland and 34b at Mattock's Tree Green) were identified as being of moderate value due to the quantity of bats (primarily common and soprano pipistrelle bats) crossing and the presence of greater horseshoe, an Annex II species. All other crossing point locations were considered to be of low value with assemblages of common species in low numbers.
- 8.6.112 Full results including bat activity maps can be found in Appendix 8.8 *Bat Activity Surveys Technical Report*.

### *Bat trapping and radio-tracking surveys*

- 8.6.113 Radio-tracking surveys were undertaken in 2018 at Huish Woods and Henlade Woods, and in 2020 at Bickenhall Woods under licence from Natural England (2018-34894-SCI-SCI and 2020-46855-SCI-SCI). A total of 73 bats were captured between 2018 and 2020, with at least nine species encountered overall. Species included Natterer's, whiskered/Brant's/alcahloe, serotine, Bechstein's, common pipistrelle, soprano pipistrelle, barbastelle, noctule and brown long-eared.
- 8.6.114 Breeding Bechstein's, barbastelle, Natterer's, common pipistrelle and brown long-eared were all confirmed as a result of the trapping surveys.
- 8.6.115 In 2018, the majority of captures during surveys were from Huish Wood, and were predominantly Bechstein's bats. The most frequently caught species during the 2020 surveys at Bickenhall Woods were Natterer's and brown long-eared, however, Bechstein's and barbastelle were also caught at this location in low numbers.
- 8.6.116 Radio-tracking surveys (no.= nine bats (seven Bechstein's, one Natterer's, one barbastelle)) confirmed the exact locations of five separate tree roosts. Of the five confirmed roosts, two were used by Bechstein's with a total of 21 and 19 bats recorded respectively in former woodpecker holes. Two roosts were used by barbastelle, with a total of 11 bats recorded behind a bark plate and within split wood. One roost was used by an individual Natterer's within a split limb.
- 8.6.117 An assessment of home ranges confirmed that the majority of radio-tagged bats had home ranges of 27-28ha and small core areas of <0.8ha. Most tracked bats stayed close to either within Huish Woods and Bickenhall Woods, however, several were recorded crossing the A358 to roost sites.
- 8.6.118 Huish Woods and the network of woodlands nearby (Bickenhall Wood and Hatch Beauchamp) were concluded to be of national significance for Bechstein's bat and of regional significance for barbastelle bats.
- 8.6.119 A Natural England research licence (2021-52521-SCI-SCI) was obtained to facilitate the 2021 advanced bat surveys. Initial findings from surveys undertaken in May and July indicate a higher level of activity, particularly by Annex II bats, than recorded during the previous radiotracking studies described above. Early indications are that there are three separate colonies of Bechstein's bat present in proximity to the proposed scheme and at least one colony of barbastelle bats.

Advanced bat surveys are ongoing, and the results of these surveys will be reported in the ES.

- 8.6.120 Full results of the surveys completed to date including bat activity maps can be found in Appendix 8.9 *Bat Trapping and Radio Tracking Technical Report*.
- 8.6.121 In conclusion, taking into account the presence of all four Annex II species, the early findings of the 2021 advanced surveys, it is considered that the assemblage of bats within the study area are of national importance.

## **Badger**

### Desk study

- 8.6.122 Data returned from SERC in 2021 identified 43 records attributable to badger within 1.2 miles (2 kilometres) of the proposed scheme. Thirty seven of these records are for deceased individuals. Fourteen records are located within 0.31 miles (500 metres) of the offline proposed scheme and 0.16 miles (250 metres) of the online proposed scheme, with four of these records being badger setts.

### Field surveys

- 8.6.123 Targeted badger walkover surveys were undertaken (where access allowed) between February 2017 and February 2020 within 0.31 miles (500 metres) of the offline proposed scheme and within 0.16 miles (250 metres) of the online proposed scheme. During these surveys, 72 setts were recorded within the study area, including 14 setts classified as partially used or well used main setts.
- 8.6.124 Badger bait marking surveys of 11 of the 14 identified main setts were undertaken in February and March 2020 to identify territories associated with these setts. Fresh latrines were found for each bait-marked sett throughout the survey period. Based on the results from the bait marking surveys, the proposed scheme severs six of the eleven territories and impacts upon the boundaries of the known territory of a further two.
- 8.6.125 Three main setts were not included in the bait marking surveys. Access was refused for one of these setts. The two other setts are located north of the current A358; the first sett has connectivity to land to the south of the current A358 towards the proposed scheme, but this land is under construction and is currently considered unsuitable for badger activity. The second sett is located on a section likely impermeable to badger movement, and moreover is separated from the proposed scheme by an additional main sett (which is included in the bait marking surveys), and its associated territory.
- 8.6.126 Badgers are a common and widespread species and are afforded protection due to historical issues of persecution rather than because of their conservation status. However, due to their intrinsic appeal and role in an ecosystem badgers are considered to be of local importance within the context of the study area.
- 8.6.127 Further details on the results including maps showing the various territories can be found in Appendix 8.10: *Badger Technical Report CONFIDENTIAL*.

## Birds

### Desk study

#### *Breeding and wintering birds*

- 8.6.128 Data returned from SERC in 2021 identified 1250 records of avian species within 1.2 miles (2 kilometres) of the proposed scheme. Of these records 64 species were regarded as notable; i.e. listed in Schedule 1 of the Wildlife and Countryside Act 1981, Section 41 of the NERC Act 2006, the South Somerset or Taunton Deane Biodiversity Action Plans or the Amber/Red List of Birds of Conservation Concern (BoCC).
- 8.6.129 The Somerset Levels and Moors SPA and Ramsar Site is located approximately 2.2 miles (3.5 kilometres) north-east of the proposed scheme at its closest point. One of the primary reasons for the designation of the Somerset Levels and Moors SPA is the presence of nationally important numbers of golden plover, a highly mobile species of wader which, within the SPA, primarily uses wet grassland but will readily make use of open farmland.
- 8.6.130 Five statutory and non-statutory designated sites are located within 1.2 miles (2 kilometres) of the proposed scheme which mention birds in their reason for designation, comprising; Barrington Hill NNR, South Taunton Streams LNR, Children's Wood/Riverside Park LNR, Donyatt Railway Cutting LWS and Staple Farm Area LWS.

#### *Barn owl*

- 8.6.131 Forty-three records of barn owl were returned by the 2021 data search within the study area, with the most recent record dated 2016. The closest record is a 2002 record from adjacent to the A303 at the eastern end of the proposed scheme. Two records, dating to 1995 and 2000 pertained to confirmed breeding and possible breeding were located 0.9 miles (1.5 kilometres) and 0.09 miles (150 metres) away from the proposed scheme respectively.

### Field surveys

#### *Breeding birds*

- 8.6.132 A total of 66 species were recorded within the survey area during the two years of survey effort. Twenty-six of the species recorded were notable species, including two Schedule 1 species; kingfisher and Cetti's warbler (*Cettia cetti*). Furthermore, twelve species recorded were listed on Section 41 of the NERC Act 2006, twelve species were on the Red list and eleven species were on the Amber list of the BoCC.
- 8.6.133 A single Cetti's warbler was recorded singing in June 2020 along the River Isle at Ilminster, approximately 0.12 miles (200 metres) south of the A303. A pair of kingfisher were recorded at Batten's Green, Bickenhall on a tributary of the Fivehead River in May 2017. Single birds were also recorded at the River Isle at Ilminster, the sewage works at Horton Cross and the Fivehead River tributary at Batten's Green.
- 8.6.134 The overall bird assemblage comprises common species for the habitats present and is considered to be of local importance within the context of the study area.

8.6.135 Further details on the results, including maps showing the various territories, can be found in Appendix 8.11 *Breeding Bird Technical report*.

#### *Wintering birds*

- 8.6.136 Twenty-nine notable species were recorded during survey counts between October 2020 and March 2021, including six Schedule 1 species; brambling (*Fringilla montifringilla*), fieldfare (*Turdus pilaris*), green sandpiper (*Tringa ochropus*), peregrine falcon (*Falco peregrinus*), red kite (*Milvus milvus*) and red wing (*Turdus iliacus*). Furthermore, 11 species recorded were listed on Section 41 of the NERC Act 2006, 12 species were on the Red list and 13 species were on the Amber list of the BoCC.
- 8.6.137 Regarding the Schedule 1 species recorded, fieldfare and redwing were observed regularly throughout the survey area, utilising agricultural margins, boundary features and orchards. A peregrine falcon was observed over the Fivehead River and surrounding grassland, approximately 0.47 miles (750 metres) south-east of the proposed scheme. A single red kite was recorded flying overhead between Horton Cross and the Southfields Roundabout at the eastern end of the proposed scheme. Single observations of brambling and green sandpiper were recorded 0.31 miles (500 metres) and 0.19 miles (300 metres) north-east of the proposed scheme respectively.
- 8.6.138 Golden plover, a qualifying species for the Somerset Levels and Moors SPA, was only recorded on one occasion during the survey period; a flock of 47 was observed feeding in an arable field between Horton Cross and Broadway, approximately 0.04 miles (70 metres) west of the proposed scheme. Counts of other species cited as part of the qualifying wintering bird assemblage, namely common snipe (*Gallinago gallinago*) and mute swan, equated to <1% of the populations cited in the Ramsar Information Sheet which can be found in Appendix 8.1: *Habitats Regulation Assessment*.
- 8.6.139 The wintering bird assemblage comprises common species for the habitats present and is considered to be of local importance within the context of the study area.
- 8.6.140 Further details on the results can be found in Appendix 8.12: *Wintering Birds Survey Technical Report*.

#### *Barn Owl*

- 8.6.141 Areas of Type 1 habitat are found across the proposed scheme but are generally restricted to field margins. There were no significant areas of extensive rough grassland as the majority of land is intensively managed.
- 8.6.142 Areas of Type 2 habitat were, more often, found as whole fields along the proposed scheme, in areas where grazing pressure is moderate and some thatch has formed. There are large areas of Type 2 habitat around Henlade, Haydon, Horton Cross and West Hatch to the west of the A358 and around Hatch Beauchamp and Stewley to the east.
- 8.6.143 Fifty sites identified as a Potential Nest Site (PNS) during the stage 2 investigative field surveys, of which four sites were identified as Occupied Breeding Site (OBS), five as an Active Roost Site (ARS) and one Temporary Roost Site (TRS). All four OBS were located in boxes on trees on the western side of the A358. Of the four OBS, juvenile birds were present in three of them.

- 8.6.144 Barn owl is a Schedule 1 species and susceptible to sharp population declines as a result of prolonged poor weather conditions, low prey availability and habitat loss. Given the presence of multiple occupied, active and potential nesting sites and areas of suitable foraging habitat, the barn owl population within the study area is considered to be of county importance.
- 8.6.145 Further details on the results can be found in Appendix 8.13 *Barn Owl Survey Technical Report*.

### **Dormouse**

#### Desk study

- 8.6.146 Historical data from 2021 provided by SERC identified 78 records of dormouse within 1.2 miles (2 kilometres) of the proposed scheme. The most recent record is dated October 2018 and located on the north-western edge of Ilminster, approximately 0.25 miles (400 metres) south-east of the proposed scheme.

#### Field surveys

- 8.6.147 Suitable habitat is present within the study area of the proposed scheme, including hedgerows comprising native species and ancient semi-natural woodland. Hedgerows provide connectivity to additional suitable habitat in the wider landscape.
- 8.6.148 Habitats suitable for dormouse (identified following a Phase 1 survey and a desk study) were subject to presence/absence surveys using nest tubes in 2017. In total, 11 sites were surveyed, with a minimum of 50 tubes deployed at each site.
- 8.6.149 Hazel dormouse was confirmed to be present at ten of the eleven surveyed sites, through the presence of adults, juveniles and/or nests. An additional seven sites supporting suitable habitat, but where access was not provided for the presence/absence surveys, are connected to those sites with confirmed presence. As such, dormouse are assumed to be present in these seven additional locations.
- 8.6.150 Hazel dormouse is a European Protected Species. They are common across Somerset, however suffering significant declines nationally. Therefore, in the context of the range of suitable habitats within the proposed scheme, hazel dormouse are considered to be of county importance.
- 8.6.151 Further details on the results, including figures, can be found in Appendix 8.14: *Hazel Dormouse Technical Report*.

### **Great crested newt**

#### Desk study

- 8.6.152 Historical data provided by SERC identified a total of 22 records for great crested newt within the 1.2 mile (2 kilometre) study area. The most recent records were dated March-June 2018 and were for surveys undertaken at a pond located in farmland outside of Ilminster, 0.53 miles (850 metres) south-west of the proposed scheme. The surveys produced a peak count of four male and ten female great crested newt.

- 8.6.153 One record for great crested newt included within the desk study is located on the proposed scheme boundary north of West Hatch, whilst a second record is located within the footprint of the proposed scheme north of Ash.
- 8.6.154 Records for other amphibian species were also returned by SERC. Nine records related to common toad (*Bufo bufo*), the most recent of which was dated August 2018, whilst there were also six records of palmate newt (*Lissotriton helveiticus*), the most recent of which was dated June 2018.

#### Field surveys

- 8.6.155 A total of 180 waterbodies were identified within 0.25 miles (400 meters) of the proposed scheme, of which 82 were subject to a Habitat Suitability Index (HSI) survey as they were considered suitable for supporting breeding great crested newt. The remaining 98 ponds were not subject to HSI due to either being dry, being isolated by significant dispersal barriers or supporting flowing water.
- 8.6.156 Presence/absence surveys were conducted on 22 ponds between March and mid-June 2017. Of these surveyed ponds, great crested newt were recorded to be present within two. Population size class surveys were subsequently undertaken at these ponds. One pond was recorded to support a medium population of great crested newt, whilst the other was recorded to support a small population.
- 8.6.157 Environmental DNA surveys were undertaken on 40 waterbodies, of which five returned positive results indicating presence of great crested newt. One of the ponds with a positive result is located within the footprint of the proposed scheme.
- 8.6.158 The presence of great crested newts has been confirmed within four distinct clusters of ponds within the study area considered likely to represent distinct populations, as detailed below:
- One pond was confirmed as supporting a small population south of Thornfalcon approximately 0.22 miles (350 metres) from the proposed scheme.
  - Two ponds were confirmed as supporting a medium population of great crested newts south west of Meare Green, one of these ponds falls within the land required for the proposed scheme.
  - A single pond was confirmed as positive for great crested newts but population size not yet confirmed, to the west of Capland approximately 0.25 miles (400 metres) from the proposed scheme.
  - A cluster of four ponds confirmed as positive for great crested newts but population size not yet confirmed, spanning either side of the existing A358 to the west of Rapps.
- 8.6.159 Great crested newts are a European Protected Species, and at the edge of its range in south west England, however still relatively widespread across the east of Somerset. Therefore, in the context of the large areas of suitable terrestrial habitats and ponds confirmed as supporting breeding populations within the land required for the proposed scheme, great crested newts are considered to be of county importance.
- 8.6.160 Further details on the results, including figures, can be found in Appendix 8.15: *Great Crested Newt Technical Report*.

## Reptiles

### Desk study

8.6.161 Data returned from SERC in 2021 indicated the presence of slow worm (*Anguis fragilis*), grass snake (*Natrix helvetica*), adder (*Vipera berus*) and common lizard (*Zootoca vivipara*) within the 1.2 mile (2 kilometre) study area. The most recent record is for three adult slow worm, dated September 2018 and located to the east of the village of Broadway approximately 0.7 miles (1.1 kilometres) west of the proposed scheme. Three records are located within the footprint of the western end of the proposed scheme, in proximity to J25 of the M5 and are for slow worm and grass snake.

### Field surveys

- 8.6.162 All habitats within 0.06 miles (100 metres) of the proposed scheme were assessed for their suitability to support reptiles. Twenty-seven sites were originally identified during the desk study in 2016 as requiring further assessment.
- 8.6.163 During Phase 1 habitat surveys in 2016, 19 of the 27 sites were identified as offering suitable habitat to support common reptile populations. Of these 19, 14 were located within 0.06 miles (100 metres) of the proposed scheme and ten were considered to be of high potential and four to be of moderate potential to support reptiles. All 14 sites were therefore put forward for population size surveys, although access was refused for three. Surveys were undertaken across 20 visits in suitable weather conditions, between April and October 2017.
- 8.6.164 Reptile species were recorded at nine of the 11 sites that were subject to population size surveys. Of the two sites where reptiles were not recorded, one was not visited on twenty occasions as access was withdrawn after the fourteenth visit, however seven survey visits in suitable conditions is considered sufficient to establish presence/likely absence.
- 8.6.165 Slow worm was recorded at all nine sites, whilst grass snake was recorded at three. Four sites were classified as supporting a 'low' population of slow worm, whilst the remainder were classified as supporting a 'good' population, with a peak count of 17 adults across all sites and visits. No adult grass snake were recorded during the surveys (two sites identified juveniles whilst the third identified a single sub-adult) and therefore population size class classifications could not be carried out for this species.
- 8.6.166 Common and widespread reptile species have been recorded in suitable habitats throughout the study area, however in relatively low numbers. Given this context and the prevalence of suitable habitats in the form of field margins, highway verges and scrub mosaic within the wider landscape, the reptile populations within the study area are considered to be of local importance.
- 8.6.167 Further detail on the results, including figures, can be found in Appendix 8.16: *Reptile Technical Report*.

## Otter

### Desk study

8.6.168 Data provided by SERC in 2021 identified a total of 366 otter records within the 1.2 mile (2 kilometre) study area. The most recent record was from December

2017, located at Eames Mill Bridge, approximately 0.9 miles (1.5 kilometres) north-east of the proposed scheme.

#### Field surveys

- 8.6.169 A total of 61 watercourses were found to exist within 1.2 miles (2 kilometres) of the proposed scheme. Thirty-eight of these watercourses were scoped out for their unsuitability for otters due to being dry, isolated, lacking in food supply or being subject to high levels of disturbance. Additionally, a number of sites could not be accessed for an initial habitat assessment.
- 8.6.170 Field sign surveys were carried out on 21 watercourses and presence of otter was confirmed on 14 of these. Three potential holts/couches were identified within 0.02 miles (30 metres) of the proposed scheme.
- 8.6.171 Otter have large home ranges and are found in most counties throughout the country. However, the confirmed presence of otter on 14 watercourses, and three potential holt sites, within the study area would indicate that the loss of these habitats could be felt beyond the local area. Therefore, the otter population within the study area are considered to be of county importance.
- 8.6.172 Further details on the results, including maps, can be found in Appendix 8.17: *Otter Surveys Technical Report*.

#### **Water vole**

##### Desk study

- 8.6.173 Two designated sites are located within 1.2 miles (2 kilometre) of the proposed scheme that have water voles as a qualifying feature; South Taunton Streams LNR and Bridgewater and Taunton Canal LWS, see Table 8-6 and Table 8-7 for details.
- 8.6.174 Data provided by SERC in 2021 identified a total of 14 water vole records within the 1.2 mile (2 kilometre) study area. This included four sightings, as well as droppings, feeding signs and tracks. The most recent record was from 2015, located in the village of Ham, approximately 1 mile (1.7 kilometres) from the proposed scheme.

##### Field surveys

- 8.6.175 A total of 26 watercourses were scoped out based on their unsuitability for water vole due to lack of available food resources and/or lack of water. Additionally, one site could not be assessed due to a lack of access.
- 8.6.176 Field sign surveys were carried out on 15 watercourses. Presence of water vole was confirmed on three of the waterbodies due to either presence of latrines or a combination of field signs in close proximity to each other. Potential evidence of water vole was recorded on a further five watercourses but this could not be confirmed.
- 8.6.177 Water vole are a SPI and, and have suffered significant declines in recent year as a result of predation and habitat loss. The study area supports suitable habitat, confirmed to be supporting water vole, therefore the population within the study area is considered to be of county importance.

8.6.178 Further details on the results, including maps, can be found in Appendix 8.18: *Water Vole Technical Report*.

### **White-clawed crayfish**

#### Desk study

8.6.179 Data provided by SERC in 2021 identified no records for white-clawed crayfish within the study area. Furthermore, no records of signal crayfish (*Pacifastacus leniusculus*) were returned from the search, making it difficult to rule out white-clawed crayfish presence with any confidence based on desk study data alone.

#### Field surveys

8.6.180 Habitat assessments were undertaken between the 10th and 12th October 2017 on nine watercourses. Of these nine watercourses, two were deemed unsuitable for white-clawed crayfish due to poor habitat quality.

8.6.181 Manual searches were carried out on the seven watercourses deemed suitable enough to support white-clawed crayfish. None of the manual searches identified evidence of crayfish species. It was determined that the methodology employed was sufficiently robust to determine likely absence without the need for further trapping surveys to assess the deeper sections of the watercourses.

8.6.182 Further details on the results, including maps, can be found in Appendix 8.19: *White-clawed Crayfish Technical Report*.

8.6.183 Further surveys will be undertaken between July and September 2021 to confirm presence/absence of this species. These will be reported in the ES which accompanies the DCO application. If white-clawed crayfish were to be confirmed to be present the population within the study area would be of national importance.

### **Terrestrial invertebrates**

#### Desk study

8.6.184 Data returned from SERC in 2021 identified 949 records of invertebrate species between 2011 and present day. Records returned included nine SPI butterflies with butterflies comprising 672 of the records. Notable species include local colonies of Duke of Burgundy (*Hamearis lucina*), brown hairstreak, grizzled skipper (*Pyrgus malvae*) and dingy skipper (*Erynnis tages*).

8.6.185 Moth records numbered 229 and included 37 SPI, though many of these are widespread species included on the SPI lists for long-term trend research only. The majority of records for butterflies and moths are from Thurlbear Quarrylands and nearby gardens where light traps have been run.

8.6.186 The remainder of the invertebrate records returned included scattered records of widespread dragonflies and damselflies (Odonata), bees (Hymenoptera), beetles (Coleoptera) and true flies (Diptera). No further SPIs were included within these records.

#### Field surveys

8.6.187 The communities of invertebrates recorded during the field surveys were generally of low diversity and lacked significant numbers of particularly rare or

scarce species. Across the surveyed sites in 2017 and 2019, a limited total of rare, scarce and SPI invertebrates were recorded. In summary, one Red Data book species, six Nationally Scarce species and two SPI were recorded.

- 8.6.188 The single Red Data Book species recorded was a picture-winged fly (*Campiglossa malaris*) (RDB 1) recorded from a single site in July 2018. This species has rapidly expanded its range in Britain in recent years. The site this species was recorded at (Site 1) is no longer within 0.06 miles (100 metres) of the proposed scheme.
- 8.6.189 Nationally scarce species recorded included the mistletoe bug (*Anthocoris visci*), Jersey tiger moth (*Euplagia quadripunctaria*), a picture-winged fly (*Acanthiophilus helianthin*), the mining bees (*Lasioglossum malachurum*) and (*L. pauxilium*) and the provisionally nationally scarce brown-banded carder bee (*Bombus humilis*).
- 8.6.190 As for *Campiglossa malaris*, the status of three of the nationally scarce species identified, Jersey tiger moth and the two mining bees mentioned above, requires review as all are more widespread than previously considered.
- 8.6.191 The SPI invertebrates recorded included brown-banded carder bee and cinnabar moth (*Tyria jacobaeae*). The latter species was included on the previous UK biodiversity action plan for research purposes only and remains widespread and frequent throughout much of the British Isles.
- 8.6.192 Given the presence of relatively widespread species and lack of high valued habitats within the study area, the terrestrial invertebrate assemblage is of local importance.
- 8.6.193 Further details on the results, including figures and site locations, can be found in Appendix 8.20: *Terrestrial Invertebrate Technical Report*.

#### *Brown hairstreak*

- 8.6.194 Brown hairstreak eggs were recorded in 108 hedgerows, out of a total of 223 surveyed. Approximately 48% of hedgerows within the search area are confirmed to support brown hairstreak.
- 8.6.195 Of the brown hairstreak eggs identified during the surveys, 53% were located south of the proposed scheme, with 47% to the north. Approximately 30% of the hedgerows surveyed where brown hairstreak were confirmed present were of high-quality habitat, with over 20% blackthorn presence recorded. Unsuitable habitat, where less than 5% of blackthorn was present within the hedgerow, recorded the lowest rate of brown hairstreak presence, accounting for only 18 of the 108 confirmed hedgerows. Brown hairstreak were not generally present on any hedgerows that had been recently flailed. This is likely due to the fact that flailing removes the shoots and suckers where brown hairstreak will lay their eggs.
- 8.6.196 Brown hairstreak butterfly is a SPI, and Somerset and Devon are strongholds for this species. Given the prevalence of blackthorn containing hedgerows and scrub within the wider landscape around the proposed scheme, the population of brown hairstreak in the study area is considered to be of local importance.
- 8.6.197 Further details on the results, including figures and site locations, can be found in Appendix 8.21: *Brown Hairstreak Technical Report*.

## Aquatic invertebrates

### Desk study

- 8.6.198 Data provided by SERC in 2021 identified no records of protected and/or notable aquatic invertebrate species within the 1.2 mile (2 kilometre) study area.
- 8.6.199 A total of eight Environment Agency (EA) invertebrate survey sites were identified within 1.2 miles (2 kilometres) of the proposed scheme (1998-2017). Sites were identified on Fivehead River Main Channel 1 (Site 10221, Site 10236 and Site 77544), River Isle (Site 10311), River Tone (Site 10534), Broughton Brook (Site 10542), Venners Water (Site 71682) and Old River Tone (Site 160521).
- 8.6.200 Surveys conducted after 2014 (sites 10534 and 10542 and 160521), identified taxa to species level (TL5) and provided a Community Conservation Index (CCI) for the site. The older data at the other sites precluded the use of this metric.
- 8.6.201 Where available, the conservation values of the macroinvertebrate communities (based on desk study records) were typically of 'moderate' value (Broughton Brook and Allen's Brook), as defined by CCI scores. The River Tone was shown to have a 'fairly high' conservation value.
- 8.6.202 No legally protected species or SPIs were identified at any of the EA sites. However, where available the conservation values of the macroinvertebrate communities (based on desk study records) were typically of 'moderate' value (Broughton Brook and Allen's Brook), as defined by CCI scores.

### Field (laboratory) surveys

- 8.6.203 Monitoring was undertaken in the Black Brook, Thornwater Stream, Meare Stream, Fivehead River Tributary 1, Fivehead River Main Channel 2, Venner's Water, the Cad Brook and the River Ding.
- 8.6.204 A total of six species of 'local' conservation value (conservation score of five on the CCI Index) were found across all sites: the caddisflies (*Athripsodes bilineatus*, *Beraeodes minutus* and *Silo nigricornis*), the demoiselle damselfly (*Calopteryx virgo*), the minnow mayfly (*Procladius pennulatum*) and the birch-fly species (*Simulium reptans*).
- 8.6.205 Overall, conservation values of macroinvertebrate communities were typically of 'low' and 'moderate' value throughout the proposed scheme, as defined by CCI scores. Notable occurrences of 'fairly high' conservation value communities were calculated for Site F1 (Fivehead River Tributary 1) in spring 2017 and Site D2 (Thornwater Stream) in autumn 2017. Individual species of 'local' conservation value were not identified at either site, indicating that the higher CCI score at these sites reflects a high number of taxa.
- 8.6.206 Due to the overall limited diversity of notable macroinvertebrates recorded, the assemblages of aquatic invertebrates within the study area are considered to be of local importance.
- 8.6.207 Further details on the aquatic invertebrate survey results and analysis can be found in Appendix 8.22: *Macroinvertebrates Technical Report*.

## Fish surveys

### Desk study

- 8.6.208 The SERC biological records search in February 2021 returned records of two protected and/or notable fish species; European eel from the Meare Stream (near West Hatch, approximately 0.6 miles (1 kilometre) upstream of the proposed scheme) and brown/sea trout *Salmo trutta* from Boughton Brook (near Little Broughton, approximately 1.5 miles (2.5 kilometres) upstream of the proposed scheme).
- 8.6.209 A desk study was undertaken to collate any fish data held on the Environment Agency - Ecology and fish data explorer [57] for the River Ding. Fish survey records within 1.8 miles (3 kilometres) upstream and downstream of the proposed scheme were included.
- 8.6.210 A single EA fish survey was identified (Site 64363, located approximately 0.8 miles (1.4 kilometres) upstream of the proposed scheme). European eel, European bullhead, stone loach (*Barbatula barbatula*) and minnow (*Phoxinus phoxinus*) were recorded.
- 8.6.211 Two notable species were recorded in the desk study; European eel (Critically Endangered [58] and NERC SPI) which is a catadromous migrant and European bullhead (Habitats Directive Annex II), which is a resident species.

### Field surveys

- 8.6.212 An electric fishing survey of the River Ding was undertaken in heterogeneous habitat characterised by riffle/run sequences and pools, with varied substrates and the presence of woody debris.
- 8.6.213 A total of five fish species were recorded during the electric fishing survey, European bullhead, brown trout, stone loach, minnow and 3-spined stickleback (*Gasterosteus aculeatus*). Further surveys are proposed on other watercourses along the proposed scheme in 2021.
- 8.6.214 The size distribution of the European bullhead population (individuals ranged from approximately 25 millimetres to approximately 75 millimetres) reflects the habitat types present (riffle/run) and demonstrates that the watercourse supports all life stages of this species.
- 8.6.215 The size distribution of the brown trout population (individuals ranged from approximately 35 millimetres to approximately 75 millimetres) indicates the presence of parr and not adult fish within the study area at the time of survey. However, it is considered likely that the site is used for spawning during winter flows (as well as rearing) and as such is of key importance for the brown trout population of the River Ding.
- 8.6.216 The fish populations within the study area are considered to be of local importance.
- 8.6.217 Further details on the fish survey results and analysis can be found in Appendix 8.23 *Fish Technical Report*.

### **Other section 41 Species of Principal Importance (SPI)**

- 8.6.218 The 2016 and 2021 data searches undertaken as part of this assessment returned 53 records of hedgehog (*Erinaceus europaeus*) within 1.2 miles (2 kilometres) of the proposed scheme. The most recent record is dated July 2019

and is for two deceased individuals located immediately adjacent to the eastern extent of the proposed scheme. The data search returned records for a number of other SPIs within the past ten years, namely three for polecat (*Mustela putorius*), seven for brown hare (*Lepus europaeus*) and four for harvest mouse (*Micromys minutus*).

8.6.219 Populations of Section 41 species are considered to be of local importance.

### Summary

8.6.220 Table 8-10 below provides a summary of the importance of the ecological receptors detailed in Section 8.6.

**Table 8-10 Summary of importance of ecological receptors**

Ecological receptor	Importance value
SPA / SAC / Ramsar Site	International
SSSI / NNR	National
LNR	County
LWS (not associated with SSSI)	County
Ancient woodland	National
Orchid assemblage	Local
Semi-natural broadleaved woodland	National
Broadleaved plantation woodland	County
Mixed semi-natural woodland	County
Veteran trees	National
Scattered trees	Local
Scrub	Less than local
Lowland dry acid grassland	National
Neutral semi-improved grassland	Local
Semi-improved species-poor grassland	Local
Improved grassland	Less than local
Marshy grassland	Local
Arable	Less than local
Hedgerows (priority)	National
Hedgerows (all other)	Local
Tall ruderal	Less than local
Freshwater ponds	Local
Running water	Local
Bats (tree roosts)	Local
Bats (assemblage)	National
Badger	Local
Breeding birds	Local
Wintering birds	Local
Barn owl	County

Ecological receptor	Importance value
Hazel dormouse	County
Great crested newt	County
Reptiles	Local
Otter	County
Water vole	County
White-clawed crayfish	National
Terrestrial invertebrates	Local
Brown hairstreak	Local
Aquatic invertebrates	Local
Fish	Local
Section 41 species	Local

### Future baseline

- 8.6.221 As set out in Chapter 4 Environmental Assessment Methodology, the ‘Do Minimum’ and ‘Do Something’ scenarios have been set out, with the ‘Do Minimum’ scenario representing the future baseline with minimal interventions and without new infrastructure.
- 8.6.222 The ecological baseline conditions described above represent those which currently exist in the absence of the proposed scheme and at the time of survey. As stated in section 3 of the CIEEM guidelines [20], potential changes in baseline conditions also need to be identified in order to assess impacts.
- 8.6.223 Based on the above information and current land use, the future baseline in the absence of the proposed scheme is unlikely to change significantly by 2040. Subtle changes are expected due to climate change, such as some movements of certain species and local population changes. However, the overall habitats and species composition in the study area are expected to be broadly similar to that of the existing baseline. Therefore, the future baseline would remain the same as set out in the existing baseline.

## 8.7 Potential impacts

- 8.7.1 A highway scheme can impact biodiversity in a number of ways during construction and operation. The potential impacts to habitats and species could be permanent or temporary, and direct or indirect.
- 8.7.2 The direct impacts are of habitat loss and severance, species mortality through vehicle collisions, disturbance due to noise and habitat degradation due to changes in air quality, dust deposition, surface run-off and pollution events.
- 8.7.3 Indirect effects could include displaced individuals or the occupancy of alternative habitat, including reduced foraging success, increased competition and predation, genetic isolation and inbreeding, which can lead to local extinctions. It is possible that there would be indirect impacts of the proposed scheme due to hydrological changes affecting other habitats and areas of vegetation.

## Construction impacts

### Habitat loss and fragmentation

- 8.7.4 The proposed scheme would require the temporary and permanent loss of terrestrial and aquatic habitats, including priority habitats and habitats likely to be used by, or to support, protected and notable species.
- 8.7.5 Habitat loss would be restricted to areas cleared to make way for highway construction, including borrow pits, temporary compounds or temporary access roads.
- 8.7.6 Temporary and/or permanent loss and fragmentation of watercourses would occur with the installation or modification of culverts and bridge crossings and diversion or realignments.
- 8.7.7 Further habitat fragmentation would potentially result from the severance of other linear habitat features such as hedgerows, lines of trees and woodland edge. This could potentially affect protected or notable species that rely upon such habitats for sheltering, foraging, commuting or dispersal.
- 8.7.8 Fragmentation of habitat can sever dispersal corridors and lead to isolation both within and between populations and from specific resources vital for survival. This can result in reduced gene flow, resulting in less genetic diversity within the isolated population, making it less able to adapt to disease or environmental change, and at its extreme reduces the chances of encountering a mate and successfully breeding. In the absence of mitigation habitat fragmentation can lead to the decline and ultimately the extinction of local populations.
- 8.7.9 The impact associated with severance of habitats would be greatest within the offline section of the proposed scheme; however, the online section would also be subject to severance as a result of the loss of the habitat belts that run alongside the existing A358.

### Habitat damage or degradation

- 8.7.10 Air quality changes could occur through releases of dust and changes in local pollutant concentrations caused by emissions from construction plant and machinery, earthworks and delivery of materials, with resulting effects on sensitive habitats. Air quality modelling assessment is required to assess the impact of N deposition on sensitive habitats. More details on air quality can be found in Chapter 5 Air Quality.
- 8.7.11 Where the new alignment passes through cuttings, there is potential for hydrological change to cause effects during construction where works would directly or indirectly affect watercourses. Hydrological changes include changes to both groundwater quality and surface water quantity within nearby watercourses. Changes in hydrology, fluvial geomorphology and hydrogeology are important to terrestrial and freshwater ecology due to the following factors:
- Water quantity has an important role in structuring the floral and faunal communities in watercourses, ponds and wetlands.
  - Sediment and other pollutant releases have the potential to adversely affect sensitive ecological receptors.
  - Ecological receptors can be sensitive to alterations of runoff regimes changing the quality of surface and groundwater.

8.7.12 Any introduction or spread of Invasive Non-Native Species (INNS) would potentially cause significant adverse effects to sensitive habitats and may result in an offence under the Wildlife and Countryside Act 1981. This is because of the dominance that these species can have over native species. During construction works, topsoil and subsoil potentially containing floral INNS would be disturbed. Such soil or seed and 'propagules' could be spread during construction activities, including excavation and machinery movements. Works within water can also introduce and spread faunal INNS.

#### Disturbance

8.7.13 Disturbance to important receptors could result from changes in noise, light, vibration or visual stimuli. During construction, disturbance could arise from the following activities: vegetation clearance, site hoarding and fencing installation, establishment of site compounds including laydown areas and facilities, utility diversions, bulk earthworks including excavation of cuttings and creation of embankments, and drainage works.

8.7.14 Impacts from visual disturbance (including human activity and artificial lighting) and noise disturbance could have significant effects on sensitive species. This could lead to abandonment of territory or of young, increased predation risk and use of critical energy reserves. Disturbance resulting from lighting can also lead to significant effects on nocturnal species such as bats.

#### Species mortality and injury

8.7.15 The following activities could potentially result in mortality and injury of species receptors: vegetation clearance, site establishment, bulk earthworks, drainage works affecting watercourses and other temporary works that may result in entrapment in excavations for example.

8.7.16 Significant effects could arise if protected or notable species are present within the draft DCO boundary, especially if they are not able to avoid works, or are attracted to disturbed land to forage (e.g. badgers).

8.7.17 The physical interaction between species and elements of the proposed scheme, machinery or activities would be limited to areas within the draft DCO boundary and areas immediately outside the draft DCO boundary due to construction traffic approaching or leaving the site.

8.7.18 Initial vegetation clearance works associated with the construction phase, particularly for the offline section of the proposed scheme, have the potential to attract foraging birds including gull and corvid species. Birds often gather to forage during vegetation clearance and earthworks as insects are disturbed and exposed during the movement of vegetation and soil. There is the potential for larger flocks of birds to represent a bird strike risk to planes using the nearby Royal Navy Air Service (RNAS) Merryfield airbase. However, given the arable dominated landscape within and adjacent to the proposed scheme, this risk is considered to be low. A bird strike risk assessment will, however, be undertaken on a precautionary basis and reported as part of the ES.

### **Operational impacts**

#### Habitat loss and severance

8.7.19 Impacts from operational road lighting are most likely to affect bat species along the proposed scheme (although it could also affect birds, invertebrates and

nocturnal mammals, such as dormice, badger, otter and hedgehog). The effects of road lighting are complex but include severance and loss of habitat due to light spill for light-shy species such as brown long-eared bat. Habitats where the impact of lighting can be particularly severe include along river corridors, woodland edges and hedgerows. Lighting of the proposed scheme will be restricted to the roundabouts at either end of the proposed scheme. Therefore the impact of lighting on adjacent habitats will be restricted.

- 8.7.20 The drainage design of the proposed scheme has the potential to form a barrier to dispersal of amphibian populations. Drainage ditches in times of flood may have a flow rate too fast for amphibians to swim against therefore representing a barrier.
- 8.7.21 Severance leads to isolation both within and between populations and from specific resources separated spatially and temporally. The effects of this include reduced foraging range and success, increased competition, genetic isolation and inbreeding, which can lead to local extinctions.

#### Habitat damage or degradation

- 8.7.22 The key receptors that may be sensitive to changes in vehicle emissions are the designated sites noted for their floristic importance, sensitive priority habitats and ancient woodland habitats, and any species that depend on these. Elevated N deposition is generally considered to be the main threat to vegetation from vehicle emissions.
- 8.7.23 Operational effects to watercourses are possible in relation to surface water road drainage and unexpected, accidental, pollution events. Impacts affecting watercourses may have a wide zone of influence, particularly on sensitive receptors downstream of the proposed scheme. The Water Framework Directive assessment undertaken as part of the ES would determine the effects of the proposed scheme on ecological quality, identifying any potential impacts that could cause deterioration in the assigned status of a water body or prevent a water body from meeting its WFD objectives.
- 8.7.24 Impacts from operational road lighting and vehicle headlights are most likely to affect bat species through a decline in airborne invertebrate prey available to light-shy species, as insects are attracted to lights.

#### Disturbance

- 8.7.25 Sources of disturbance in the operational phase also relate to road noise and lighting. Noise has the potential to impact upon local populations of breeding and wintering birds, potentially reducing the suitability of habitat close to the road and therefore reducing the availability of suitable habitat in the vicinity of the proposed scheme. Many mammal species are also susceptible to disturbance through the introduction of noise and vibration, particularly where this impacts upon their resting sites. Such noise and vibration disturbance may cause animals to abandon their resting sites.
- 8.7.26 The sensitivity of resting sites to disturbance may vary depending on the time of year e.g. bats occupying maternity roosts may have greater sensitivity to disturbance than those in summer day roosts.
- 8.7.27 Impacts from operational road lighting are most likely to affect bat species through roost disturbance and abandonment.
- 8.7.28 It is also acknowledged that there would be a greater impact to animals adjacent to the offline section of the proposed scheme, where they will not be as

habituated to vehicular related noise and vibration as those animals utilising habitats along the online section where there is an existing level of noise and vibration from vehicular movement.

### Species mortality and injury

- 8.7.29 In the absence of mitigation the operation of a widened online section and new offline stretch of road could increase the risk of vehicle related mortality for a range of fauna species, such as bats, badger, otter, barn owl and other bird species. Animals would be required to cross a wider section of road along the online section of the proposed scheme, resulting in greater potential for collision with vehicles and injury or mortality. The offline section of the proposed scheme would introduce a new hazard source into a section of the landscape, with the introduction of a wide and high-speed road into a rural area, again increasing the potential for vehicle related injury or mortality. The risk of direct mortality through operation of the proposed scheme is permanent, unlike the vehicle collision risk posed by the construction phase.
- 8.7.30 Impacts from operational road lighting are most likely to affect bat species through increased traffic collisions for species such as pipistrelle that will actively forage on insects attracted to lighting.
- 8.7.31 The drainage system of the proposed scheme has the potential to increase the risk of amphibians being trapped by curb structures along the proposed scheme and falling into, or being washed into, gully pots positioned adjacent to curbs.
- 8.7.32 Highways balancing ponds, or ecological mitigation ponds, associated with the proposed scheme have the potential to attract waterfowl, which may represent a bird strike risk to planes using the nearby RNAS Merryfield airbase.

## **8.8 Design, mitigation and enhancement measures**

- 8.8.1 The mitigation hierarchy is described in Chapter 4 Environmental Assessment Methodology Table 4-4 of the PEI report. The first stage of the mitigation hierarchy is to avoid or prevent adverse potential impacts through embedded mitigation. These would seek to avoid or eliminate the potential impacts identified in Section 8.7. Impacts can be avoided for instance, through changes to the horizontal or vertical alignment of the proposed scheme, junction strategy, structures or other aspects of the proposed scheme layout; or through changes in the timing, methods and/or materials to be used in construction. This is referred to as embedded mitigation. Where it is not possible to avoid an impact entirely, the design should seek to reduce the magnitude of the impact and provide essential mitigation.
- 8.8.2 The proposed scheme assessed within this PEI report includes a number of engineering design measures that have been incorporated to avoid significant adverse environmental effects arising, such as habitat loss, habitat fragmentation, habitat degradation and species disturbance and mortality, where practical.
- 8.8.3 These measures have been identified and are being further developed through the design process. These measures form part of the proposed scheme design and will be reported in the ES Chapter 2 The Project.
- 8.8.4 The proposed scheme also includes embedded mitigation within working practices during the construction phase which would avoid or reduce impacts such as habitat loss, habitat severance, habitat damage, disturbance and species mortality.

- 8.8.5 Where possible, enhancement measures have also been included, going above and beyond what is required to directly mitigate the adverse effects of the proposed scheme.
- 8.8.6 The following sections outline these measures and how they would reduce the impact of the proposed scheme on biodiversity. Details would be provided in the Environmental Mitigation Plan (Figure 7-8) and would be provided in a Landscape and Ecology Management Plan (LEMP) which would be provided as part of the Environmental Management Plan (EMP) submitted with the ES.

#### **Embedded construction mitigation**

- 8.8.7 Embedded mitigation during the construction phase would be identified in the Register of Environmental Actions and Commitments (REAC), contained within the EMP. This would be developed to avoid or reduce the potential construction impacts on habitats and species and would seek to employ best-practice methods for dealing with habitat loss, habitat severance, disturbance and species mortality.
- 8.8.8 The EMP presented with the ES to support the DCO application, would include specific construction phase method statements that would address potential impacts on habitats and species and would detail the timing of works, roles and responsibilities of the contractors, control measures, training and briefing procedures, risk assessments and monitoring systems to be employed during planning and construction for all relevant environmental factor areas. Prior to construction the EMP would be updated to include additional items identified in the DCO process, and additional input from the contractor.
- 8.8.9 The EMP would include site-specific methods, for example temporary use of silt busters or bales which would be used to prevent silt or contaminants from being released into watercourses during construction. Such precautions would be undertaken in accordance with relevant legislation and undertaken in compliance with the relevant Guidance for Pollution Prevention (GPPs) and industry best practice (GPP5, CIRIA).

#### Ancient woodland and veteran trees

- 8.8.10 Additional mitigation to protect ancient woodland habitat will be applied and will include a buffer zone of at least 0.01 miles (15 metres) between the works and the woodland edge in accordance with Natural England guidelines [55]. There are two locations where this buffer cannot be achieved due to the proximity of the ancient woodland to the existing A358; these are at Bickenhall Wood and Saltfield Copse. In these instances, further assessment of root protection areas and refinement of the proposed scheme design will be undertaken to reduce potential impacts to root protection areas.
- 8.8.11 The root protection areas and canopies of hedgerows, scattered trees, and woodland to be retained within the proposed scheme, will be protected during construction in accordance with BS5837: Trees in relation to design, demolition and construction [59]. Measures for protection would be included in the EMP and would refer to root protection areas as defined within the Arboricultural Impact Assessment (AIA) that will be presented with the ES. Consideration will be given to the retention and management of edge habitats, within the protected root protection areas, for the benefit of wildlife during construction. It is acknowledged that some overhanging branches from trees adjacent to construction areas may need to be subject to pruning in order to protect trees from accidental damage by construction machinery. Such works would be avoided through careful design of

construction logistics where possible, and where required would be carried out by suitably experienced arboriculturalists to maintain the health of the trees.

#### Protected and notable species

- 8.8.12 It is anticipated that the effects of disturbance or risk of mortality to species during construction would be mitigated through specific construction phase method statements detailing best practice that would address potential impacts on species and prevent committing offences in relation to the Wildlife and Countryside Act 1981. General best practice measures that address multiple ecological receptors are detailed below.
- 8.8.13 Construction activities could result in individual birds and/or their active nests being injured/killed and/or destroyed, respectively. For this reason, vegetation clearance would be planned to be undertaken between September and February outside of the core breeding bird season, which is considered as March-August, inclusive. If this is not possible and works are required within this period, vegetation clearance works would adopt a precautionary working method including nesting bird surveys to identify nesting birds within 24 hours of the commencement of clearance, and a watching brief by a suitably experienced ecologist during all vegetation clearance where visibility (for nest detection) is limited on the pre-works surveys. If nesting birds are encountered, a suitable working buffer distance from the nest would be devised, by a suitably experienced ecologist, and the nest left until all young have fledged.
- 8.8.14 Sensitive programming of construction works would be implemented to avoid or reduce potential impacts such as mortality or disturbance to species. Details would be incorporated in the EMP and could include:
- sensitive timing of works involving watercourse realignment to reduce impacts upon riparian mammals, aquatic macroinvertebrates and fish translocation
  - sensitive timing and methodologies of vegetation clearance and manipulation regard to nesting birds, hazel dormouse and other species such as reptiles and amphibians to be overseen by a suitably experienced ecologist
  - avoidance of ground works in key reptile and dormouse habitat between October and April to prevent harm to hibernating animals
- 8.8.15 Restrictions on working hours to avoid night working (taken as the period 30 minutes before sunset to 30 minutes after sunrise) would be implemented in key locations so that there is no light spill in the vicinity of watercourses and key bat flight lines or roosts and adjacent habitats. Any temporary task requiring lighting would use directional lighting and would be designed to ensure that there is no light spill over 0.5 Lux on any identified bat commuting and foraging areas, roosting habitat or water courses with regard to bats and otters. Detailed lighting restrictions would be detailed in the EMP. Lighting designed to be sensitive to bats and otters, would also benefit other nocturnal wildlife such as owls and badgers.
- 8.8.16 All excavations would be closed overnight, or ramps provided to reduce risk of trapping or injuring wildlife in them.
- 8.8.17 A pre-construction check for invasive plant species, both terrestrial and aquatic, would be undertaken at the appropriate time of year to inform and requirement to avoid or remove invasive species.
- 8.8.18 The implementation of biosecurity best practice described as 'check, clean, dry' would help to mitigate any potential mobilisation of invasive aquatic plant species

and also chytrid fungus which effects amphibians. Measures for dealing with invasive species and implementing biosecurity measures would be incorporated in the EMP.

### **Essential mitigation**

- 8.8.19 Essential mitigation would be implemented in order to mitigate for the potential impacts as described in Section 8.7 that cannot be avoided through the embedded mitigation within design or construction working practices detailed above.

#### Veteran trees

- 8.8.20 Veteran trees are located within and adjacent to the proposed scheme, including at Jordans Park Local Wildlife Site. An arboricultural survey has been undertaken and this has confirmed the presence of five veteran trees within the land required for the proposed scheme.
- 8.8.21 Further design refinement will be undertaken to avoid or reduce the loss of veteran trees where possible. However, at this stage it is currently anticipated that veteran trees would be lost due to construction of the proposed scheme. Where veteran trees fall within land required temporarily for construction, or only within areas proposed for habitat creation, and it is possible to retain the trees alongside the proposed scheme they would require protection of their root and canopy extents. Trees that can be retained would be protected in accordance with the *British Standards BS 5837:2012* [59]. Measures for protection would be further detailed in the EMP and would include reference to root protection areas stated in the AIA report. Both documents would be provided with the ES supporting the submission of the DCO application.
- 8.8.22 Opportunities will be sought to implement sensitive management of veteran trees within the wider landscape, this may include measures such as thinning of young trees around veteran trees to reduce stresses upon the tree and their root zones. Opportunities will also be explored to undertake 'veteranisation' of mature trees retained within the proposed scheme and wider landscape, this involves wounding the tree to encourage rot features to form and replicate the beneficial features of naturally occurring veteran trees.

#### Woodland and scattered trees

- 8.8.23 Semi-natural broadleaved woodland accounts for the majority of woodland to be lost to the proposed scheme, this loss does not include any areas of ancient woodland. The majority of this is as a result of the expansion of the existing A358, between Henlade and Horton Cross, to the east and the associated loss of woodland within the verges and embankments. These losses include part of the belt of mature woodland that runs through the landscape and is bisected by the A358 between Griffin Lane and Bickenhall Lane. Smaller areas of semi-natural broadleaved woodland would also be lost to the construction of Village Road Overbridge (near Capland) and at Ashill junction, as well as associated with the River Ding and Black Brook Tributary realignments.
- 8.8.24 New broadleaved woodland species of local provenance characteristic of existing woodland would be planted along the A358 to provide new habitat, compliment retained areas of woodland and connect into the wider landscape via hedgerow and tree belt habitat creation along both the online and offline sections of the A358. Large areas of woodland planting are also proposed to the south of Griffin

Lane, connecting the woodland blocks that form the ridge line woodland belt which includes Bickenhall Wood. Large areas of woodland are also proposed adjacent to Every's Copse and Ashill Wood. These areas of planting would help to buffer the ancient woodlands at Bickenhall, Every's Copse and Ashill Wood.

- 8.8.25 Planting of new woodland either adjacent to existing high value habitat such as Bickenhall Wood, Every's Copse, Ashill Wood and Saltfield Copse or where woodland is lost or fragmented would provide valuable edge habitat to protect the core areas of woodland from variable environmental factors and stresses such as varied light conditions increased wind exposure and pollution. The diverse species mix proposed and structure of edge habitat provides a transition between two habitat types, usually woodland and grassland, and therefore supports a wider array of species. Planting of edge habitat would maximise biodiversity delivery and increase the resilience of existing woodland to climate change.
- 8.8.26 Species selection for new planting would include a diverse mix of native trees of local provenance and characteristic of the local area to ensure woodlands are resilient to climate change. Where appropriate, the use of non-native species would be considered to provide resilience against the effects of climate change. No ash would be replanted due to the spread of ash die-back disease; however, species would be selected that offer similar habitat for lichens and invertebrates, have similar pollen and nectar production or provide similar food resource. No one species can replace all the characteristics of ash but using aspen, alder, field maple, disease resistant elm, sycamore, oak, hazel and rowan in the landscape planting would provide many of the habitat niches provided by ash [60]. Woodland planting is shown on the Environmental Mitigation Plan (Figure 7-8).
- 8.8.27 The landscape in the study area is characterised by hedgerows with standard trees. New hedgerow planting (described below) along the proposed scheme would include the use of standard trees in keeping with the local landscape, namely oak and field maple.
- 8.8.28 Efforts would be made to retain scattered trees alongside the proposed scheme where they fall within or directly adjacent to the draft DCO Boundary. Measures for protection would be included in the EMP and include reference to root protection areas stated in the AIA report which will be provided with the ES supporting the submission of the DCO application.
- 8.8.29 Specimen trees would be included within the hedgerow planting along the length of the proposed scheme, the hedgerows would be managed to allow trees to mature as standards out of the hedgerow. Additional trees would be planted within areas of grassland creation and, as described above, mosaic areas of woodland and grassland planting with scattered trees would be provided, in particular around junction features where a more open habitat may be appropriate for visibility of road users.
- 8.8.30 Select sections of mature trees felled as part of the construction work would be retained for incorporation into habitat creation areas to provide a dead wood resource, and shelter opportunities for wildlife, while newly planted trees establish.

### Grassland

- 8.8.31 The majority of grassland to be lost to the proposed scheme comprises improved grasslands and species poor semi-improved grassland characteristic of the agricultural landscape alongside the A358, and the verges of the A358 itself.

Smaller areas of neutral semi-improved grassland and marshy grassland will also be lost to the proposed scheme.

- 8.8.32 The proposed scheme would include the creation of areas of species rich grassland. These grasslands would be designed and managed to ensure their target condition exceeds that of the grassland habitat lost. The location of species rich grassland habitat creation has been designed to reconnect and compliment retained grasslands, or other valuable habitats, along the proposed scheme for example alongside the offline section of the proposed scheme around the Black Brook tributaries, around Mattock's Tree Green Junction, along the Stewley Link, with additional marshy grassland creation and restoration around the Village Road overbridge and along the Southfields Link.
- 8.8.33 Areas of grassland habitat creation have also been proposed in the landscape and ecology design at locations where they may be a requirement to provide receptor areas for protected species, such as great crested newts and reptiles, that would be displaced from the draft DCO boundary.

#### Hedgerows

- 8.8.34 Well-established and species-rich hedgerows will be lost to construction of the proposed scheme. New hedgerows with standard trees would be planted along the proposed scheme and would connect areas of retained woodland to areas of woodland and grassland habitat creation, while also connecting into the wider retained hedgerow network. Bolstering of hedgerows through gap filling, additional planting to increase species diversity and sensitive management is proposed on key hedgerows leading away from the proposed scheme to provide vital dispersal corridors for wildlife into the wider landscape. This planting would mitigate hedgerow loss and habitat fragmentation. Newly planted hedgerow would be species-rich comprising a mix of at least seven woody species of local provenance in keeping with the species recorded in the area. Planting would also include species such as hazel and honeysuckle to provide food and nesting resource for species such as hazel dormice which are present throughout the study area. Where land is not required for construction of the proposed scheme, hedgerow planting would occur in the first suitable season prior to commencement of works to allow some establishment in advance of habitat loss.
- 8.8.35 In locations where hedgerows of particular note for their age, and species diversity, have been recorded, or in key locations for protected faunal species such as hazel dormouse, opportunities to undertake hedgerow translocation would be explored. Translocated hedgerows can quickly provide structure, connectivity and foraging opportunities while newly created habitats establish, and continuity of habitat resource is required. The details of translocation methods would be included within the EMP as part of the ES supporting the submission of the DCO application.

#### Waterbodies

- 8.8.36 Ponds and ditches would be lost to construction of the proposed scheme. For every pond lost to construction of the proposed scheme at least one would be created. Ponds would be incorporated into larger areas of habitat creation so that associated terrestrial habitats, utilised by species within the pond, can be managed accordingly. Ponds would be designed for wildlife in line with best practice and incorporate aquatic species of local provenance and reflect those species found in the pond to be lost. New ponds would be established prior to

construction, where possible, to allow the translocation of flora and fauna from the lost pond where the risk of spreading INNS can be mitigated.

8.8.37 A new network of drainage ditches and channels would be established along the proposed scheme as part of the drainage strategy, where possible these would incorporate aquatic planting to maximise their benefit to wildlife.

8.8.38 The location of proposed ponds and ditches and requirements for their design would be detailed within the EMP as part of the ES supporting the submission of the DCO application.

#### Orchids

8.8.39 Orchids would be lost to construction of the proposed scheme. A translocation exercise is proposed to relocate orchids and their associated soils to pre-prepared grassland and woodland edge receptor sites. Orchids have an intricate relationship with their soil and the fungi they support, therefore the receptor sites would be established as close to their original location as possible to try to replicate these conditions, and the receptor sites would be carefully prepared to ensure the soil, geology, aspect and hydrological conditions replicate those lost to construction of the proposed scheme. The details of translocation methods would be included within the EMP as part of the ES supporting the submission of the DCO application.

#### Bats

8.8.40 The details of the essential mitigation would be agreed with Natural England through the licencing process, but a summary of the likely key measures is provided below:

- The loss of day roosts utilised by low numbers of bats, such as the five common pipistrelle day roosts currently identified within the draft DCO boundary, are considered of low value to the population. These roosts would be removed under a mitigation licence obtained from Natural England. Suitable alternative roosting habitat would be provided close to the existing foraging and commuting routes. The nature and location of roosts, timing of the exclusion (where appropriate) and timing of the tree felling or building demolition, in the case of building roosts, would all be in accordance with the licence method statement which would be developed in consultation with Natural England. Draft Protected Species Licences will be submitted separately from the DCO application and will be detailed in the Consents and Agreements Position Statement.
- The removal of roosts would take place at an appropriate time of year when the bats are least vulnerable.
- Given the update surveys to be undertaken in the 2021/2022 survey season and the known presence of Annex II species (barbastelle, Bechstein's, greater and lesser horseshoe bats) the potential exists for the loss of significant or important roosts. These will be reported in the ES and any mitigation measures required to be undertaken under licence from Natural England reported.
- Pre-construction surveys to be undertaken prior to any tree clearance and demolition of buildings, in particular if more than one year has passed since the last surveys, to ensure there are no new bat roost in trees and buildings to be cleared. If any new roosts are identified these would need to be included

within the proposed scheme bat mitigation licence and mitigation agreed with Natural England.

- Following pre-construction surveys, any trees where the potential for roosting bats cannot be ruled out after survey would be soft felled. This process will be detailed in the EMP.
- Provision of a mix of bat boxes on retained trees within the vicinity of roosts likely to be disturbed by construction activity to compensate for disturbance to these roosts.
- Existing tree roosting features would be salvaged where possible through careful section-felling and strapped onto nearby trees of the same species and at a similar height and orientation to that of the original tree roost, or erected as standing deadwood in a suitable, safe location. Such features would be retained within Highways England ownership and as close as possible to their original locations.
- Use of veteranisation techniques to create habitats in younger trees that are otherwise found on older more mature trees.

8.8.41 Any building or tree roosts within 0.03 miles (50 metres), depending on type of roost, environmental factors and type of construction activity within the area, could also require a disturbance mitigation licence from Natural England and associated method statements drawn up to reduce potential disturbance impacts, such as noise and lighting on these roosts during construction (to be detailed within the EMP).

8.8.42 Key commuting routes for bats would be retained for as long as possible in the works programme. Dead hedges would be used to allow bats to continue using commuting routes. It is likely that temporary screening would also be required to enable safe passage of bats across the works area along commuting and foraging routes. The location of such features would be detailed within the EMP as part of the ES.

8.8.43 If temporary construction lighting is required during the bat activity season, at compound areas for example, or for health and safety requirements, this would consist of directional lighting designed to ensure no light spill over 0.5 Lux on to any identified commuting and foraging areas, as well as roosting habitats. This will be detailed within the EMP and secured through the DCO.

#### Hazel dormouse

8.8.44 The details of the essential mitigation would be agreed through the licencing process, discussions are ongoing with Natural England about the most appropriate mitigation approach given the extent of the hazel dormouse habitat lost to construction of the proposed scheme, but a summary of the likely key measures has been provided below:

- Habitats within the draft DCO boundary utilised by dormouse would be removed under a mitigation licence obtained from Natural England.
- Habitat manipulation would be required to gradually displace dormice from these habitats into adjacent habitats where they have the carrying capacity to receive them. Where such habitats are not present, or larger areas of habitat removal are required, a translocation exercise to an offsite receptor area, agreed with NE and the local landowner, may be required.
- Displacement would comprise a two-stage clearance exercise, with vegetation reduces to stump level over winter while dormice are hibernating, followed by

stump removal in the following spring when dormice are active and will have moved to adjacent retained habitat in full leaf.

- Adjacent habitats or offsite receptor areas receiving displaced/translocated dormice would need to be subject to habitat creation in advance of any habitat clearance works to ensure they could support the displaced dormice and a long-term management strategy would be required to ensure maintenance of the favourable conservation status of the dormice population. The environmental mitigation for the proposed scheme has been designed to include areas outside of the land required for construction to ensure habitats are able to be established in advance of, and without disturbance by, construction activities.
- Areas of advanced planting may be supplemented with 'dead hedging' to establish habitat structure and maintain habitat connectivity while planting establishes.
- Deployment of nesting boxes may be required within retained adjacent habitats and habitat creation areas to ensure sufficient shelter opportunities for dormice while these habitats mature.
- Habitats have been designed to improve connectivity through the landscape for dormice, however additional measures such as dormouse bridges are likely to be required to mitigate habitat fragmentation and severance, particularly in the offline section of the proposed scheme.

8.8.45 The extent of time required to establish the planting within dormouse habitat creation areas in advance of clearance for construction will depend on the mitigation strategy to be adopted i.e. displacement is much more dependent on the establishment of substantial areas of habitat in advance. As a minimum, advanced planting should be provided at least one year in advance of construction works, and preferably two years to allow two full growing seasons. Where practical, established hedgerows and coppice stools, that would otherwise be lost to the proposed scheme, would be translocated into areas of dormouse and hedgerow habitat creation and 'dead hedging' used to provide shelter, connectivity and foraging resource while habitats establish, this will be particularly important in the early years of habitat establishment.

#### Breeding birds

- 8.8.46 Notable bird species have been recorded within the proposed scheme and adjacent land, this includes Schedule 1 species and those listed on the Red and Amber lists of birds of conservation concern.
- 8.8.47 Pre-construction surveys for Schedule 1 birds would be undertaken. If Schedule 1 birds are found breeding on site or within a distance from the construction work's and determined to be susceptible to disturbance, then advice should be sought from a suitably qualified ecologist and a method statement developed for works within proximity to Schedule 1 birds to mitigate any effect; this may include:
- restrictions on the timings of works
  - restrictions on the types of work that can be undertaken
  - installation of screening between construction works and adjacent habitats supporting Schedule 1 species to reduce visual disturbance
- 8.8.48 As described above, the sensitive timing of works including vegetation clearance during site preparation are crucial to avoid impacts upon breeding birds. Where ground-nesting species would lose habitat, e.g. skylark (*Alauda arvensis*), the

timing of vegetation removal or modification would also be considered, i.e. no cutting of grassland until birds have fledged.

- 8.8.49 Nesting bird boxes would be provided for a range of species. Notable species would have nest boxes installed for them, including marsh tit (*Poecile palustris*), spotted flycatcher (*Muscicapa striata*), kestrel (*Falco tinnunculus*) and stock dove (*Columba oenas*). Boxes would be installed prior to the bird nesting season to provide opportunities for displaced birds (from loss of breeding habitat) to relocate and nest where possible.
- 8.8.50 Details of all mitigation measures including the location of bird boxes would be included within the EMP supporting the submission of the DCO application.

#### Wintering birds

- 8.8.51 A number of notable wintering bird species were identified within the survey area, including the Schedule 1 species and those listed on the Red and Amber lists of birds of conservation concern.
- 8.8.52 The proposed scheme incorporates large areas of habitat creation to mitigate that lost to construction of the proposed scheme. These comprise a combination of woodland edge, grassland, hedgerows and pond habitat creation, which would complement the habitats within the wider agricultural landscape and provide foraging resources for overwintering birds. Details about the provision and management of habitats would be provided within the EMP supporting the submission of the DCO application.

#### Barn owl

- 8.8.53 The evidence from baseline surveys and incidental sightings of this species have confirmed the presence of suitable barn owl foraging habitats and roost sites along the length of the proposed scheme, with four occupied breeding sites identified to the west of the proposed scheme at West Hatch, near Kenny and at Capland.
- 8.8.54 In addition to the embedded construction mitigation the following mitigation would be implemented:
- A pre-construction survey for roosting or nesting barn owl would be undertaken in all suitable habitat within 0.06 miles (100 metres) of the proposed scheme.
  - Habitat manipulation techniques would be employed to deter barn owls from entering construction areas, to include mowing long grass to reduce foraging potential.
  - Strategic planting of woody species - dense structure planting (to include shrubs and five-year-old trees characteristic of the local area) should be introduced alongside the proposed road, especially along the offline section and adjacent to complex junctions such as Mattocks Tree Green and Ashill. Planting height should be at least 3 metres to encourage barn owls to fly over the road at a safe distance above traffic.
  - Grass verge management - Where possible, and especially in high risk barn owl mortality areas the verges would be managed to support a species diverse but short grassland sward in order to reduce the potential for grass to support barn owl prey species and therefore decrease the foraging potential and collision risks to barn owls.

### Great crested newt

- 8.8.55 Great crested newts have been identified in two distinct areas within 0.16 miles (250 metres) of the proposed scheme; to the west of Meare Green and either side of the A358 across ponds at Thornfalcon and Rapps. The construction of the proposed scheme would result in the loss of ponds and associated terrestrial habitats that are used by these populations of great crested newt, therefore a mitigation licence would be required from Natural England to permit the works. The details of the essential mitigation would be agreed through the licencing process, but a summary of the likely key measures are provided below:
- Two mitigation ponds would be provided for each pond lost to construction, these ponds would be at least equal size to the pond lost. The ponds would be designed in line with best practice guidance for great crested newts and include a size and profile to encourage the long-term use by great crested newts and support a range of other wildlife.
  - Mitigation ponds would be provided within an area of suitable terrestrial habitat that would be subject to a management regime to optimise their value to great crested newts for foraging and shelter.
  - A capture, exclusion and translocation exercise may be required, including the establishment of areas of habitat creation to use as receptor areas and deployment of exclusion fencing around construction areas providing suitable terrestrial habitats within 0.31 miles (500 metres) of a known great crested newt pond.
  - Restrictions may apply on the timing of ground works to lower the risk of killing or injuring great crested newts, in particular avoiding the period when newts are hibernating taken as October to March inclusive.

### Otter

- 8.8.56 Otters have been confirmed to be present on multiple watercourses crossed by the proposed scheme.
- 8.8.57 Where otter are present on the watercourse, mammal ledges would be incorporated into the design of new culvert structures, either as suitably high ledges within the structures or as separate adjacent mammal underpasses. This would reduce any habitat severance effect upon otter populations. These features would be at least 500 millimetres wide and installed above the flood level to ensure otter can continue to cross beneath the proposed scheme in times of high flow/ flood. These crossing features need to be used in conjunction with otter fencing within 0.06 miles (100 metres) of the structures to stop otters preferentially crossing the road and to funnel them towards the culvert or dry underpass.
- 8.8.58 Potential otter holt sites have been identified within the study area. Such resting sites are legally protected and any works which could disturb otter using these sites must be covered by a Natural England mitigation licence. Construction works for the proposed scheme have the potential to disturb otters utilising such resting sites. Given the transient nature of otter, a pre-construction survey of all wooded and scrub areas adjacent to watercourses within the proposed scheme would be undertaken to confirm the presence or absence of any otter holts within the construction area and to inform the requirement for any Natural England mitigation licence. If an otter holt were to be destroyed, or rendered unusable, as a result of the construction of the proposed scheme, an artificial holt may need to be provided as part of the mitigation strategy.

8.8.59 Working within 0.03 miles (50 metres) of a watercourse could cause disturbance to otters. Details of working time restrictions to reduce potential disturbance to dispersing and foraging otter would depend upon the pre-construction surveys and mitigation licence requirements (if required). Any required restriction would be detailed within the EMP to be provided with the ES supporting the submission of the DCO application.

#### Water vole

8.8.60 Water vole have been confirmed to be present on watercourses crossed by the proposed scheme, including on tributaries of the Black Brook which would be subject to realignment and culverting as part of the proposed scheme.

8.8.61 Construction works to watercourses, their channels and banks, or works adjacent to watercourses have the potential to directly destroy habitats used by water vole for foraging, shelter and dispersal. A detailed mitigation strategy would need to be developed and agreed with Natural England prior to commencement of works, and a conservation licence may be required from Natural England to permit the works. Where construction works are on a small scale and targeted to specific areas, vegetation manipulation could be used to displace any water voles present out of the construction area where they would be at risk of killing or injury. Where larger scale works are required a translocation exercise may be necessary. Any displacement or translocation exercise would require habitat creation, or enhancement of the existing habitats, into which the water voles are to be displaced or translocated.

8.8.62 As described above in relation to otters, mammal ledges would be incorporated into new culvert structures to ensure water vole can continue to pass beneath the proposed scheme and move between habitats on either side of the proposed scheme, even in times of high flow/flood.

#### Badger

8.8.63 Badger have been found to be active across the proposed scheme. In addition to embedded mitigation measures and best working practice the following mitigation for badgers would be undertaken;

- A pre-construction survey for badgers (activity and setts) would be carried out (this would be detailed within the EMP).
- No works or tracking of heavy machinery would occur within 0.02 miles (30 metres) of active badger setts.
- Any active setts to be lost or predicted to be affected as a result of the proposed scheme construction would be closed under a Natural England development licence between the months of July and November (inclusive) prior to commencement of construction. These setts would be determined following the pre-construction survey.
- Loss of main setts would be mitigated for with the provision of alternative artificial setts in suitable habitat within 0.6 miles (250 metres) of the main sett to be closed under licence from Natural England. This would be undertaken in advance of the main sett closure.

8.8.64 Where key badger movement corridors are identified that would be severed by the offline sections of the proposed scheme, badger tunnels will be incorporated to allow safe passage beneath the proposed scheme. As described for otter, mammal ledges or dry tunnels will be incorporated into selected culverts to maintain crossing points beneath the proposed scheme. Planting will be designed

in combination with badger fencing to 'funnel' mammals to safe crossing points beneath the proposed scheme.

### Reptiles

- 8.8.65 Populations of slow worm and grass snake have been identified at locations along the proposed scheme, including within the grass verges of the existing A358. Construction activities could result in the individual reptiles being injured or killed in the absence of mitigation or suitable working practices.
- 8.8.66 The landscape design for the proposed scheme includes areas of habitat creation including grassland, woodland, hedgerow and ponds which would be managed for wildlife and offer foraging and shelter opportunities for reptiles. Log piles and artificial hibernacula would be provided at discrete locations within the habitat creation areas to provide shelter points for reptiles (and a range of other species). These measures would be further detailed in the EMP to be provided with the ES.
- 8.8.67 In areas that support large populations of reptiles a capture and exclusion exercise may be required, with the installation of reptile exclusion fencing around construction areas and individual reptiles translocated to a receptor area within retained existing habitats or to an offsite suitable receptor area. This translocation would need to occur in advance of any construction works which would impact upon habitats utilised by reptiles. This approach is likely to be required within the existing verges of the proposed scheme where populations of reptiles are impinged by the road on one side and agricultural land to the other, with no suitable habitats to displace reptiles into.
- 8.8.68 In areas where low numbers of reptiles were recorded habitat manipulation using phased and directional strimming to displace reptiles to retained habitat would be undertaken in suitable weather and within the reptile active season of April to October prior to construction. This habitat would then be maintained as short grassland to render it unsuitable for reptiles for the duration of the construction phase. Reptile exclusion fencing may be required around construction areas for the duration of the works. The exact requirements will be detailed in the EMP and take account of update surveys being completed in 2021.

### Terrestrial invertebrates

- 8.8.69 The assemblage of invertebrates recorded along the proposed scheme includes notable and nationally scarce species including the brown hairstreak.
- 8.8.70 Construction of the proposed scheme would result in the loss of habitats utilised by invertebrates. The areas of habitat creation included within proposed scheme would be designed to replace those habitats lost and incorporate features beneficial to invertebrates. This would include species-rich grassland with species beneficial to insects including pollinators. Species mixes should seek to include plants that provide a food source for scarce species identified. Habitat creation would include south facing slopes, log piles, deadwood and sheltered areas for invertebrates.
- 8.8.71 Felled trees should be retained on-site where possible as habitat piles/log piles. Deadwood found in areas that are being cleared for the proposed scheme would be moved to suitable areas of retained habitat on site to ensure maintenance of some invertebrate habitat, in particular for wood-decay (saproxylic) invertebrates, e.g. beetles. These habitat piles/log piles will be supplemented with additional felled wood/deadwood removed during the operation of the proposed scheme e.g.

where decayed trees are felled for health and safety purposes to avoid risk of falling onto road users.

#### *Brown hairstreak*

- 8.8.72 Brown hairstreak butterfly are present within the land required for construction of the proposed scheme. A low intensity management regime would be implemented on newly created and retained hedgerows within the proposed scheme to mitigate the brown hairstreak habitats lost, this would include:
- Hedgerows being cut once every 3-5years on a rotational basis.
  - Avoidance of chemical spraying up to the field edges, and ideally the provision of ruderal field margins between crops and hedgerows.
  - Hedgerows to be cut as late as possible in the season and ideally during January and February.
  - Landscape planting scheme to include a high proportion of blackthorn.

#### Fish

- 8.8.73 The proposed scheme design includes the realignment of watercourses including; the Back Stream which forms part of the River Ding, tributaries of the Black Brook, Thornwater Stream, Five Head River Main Channel 2 and Venner's Water. It is likely that most adverse effects would be mitigated by standard mitigation such as the provision of alternative aquatic habitat in the realigned length of channel and a fish translocation prior to dewatering and river diversion. A Section 27a exception permit is required from the Environment Agency to catch fish by means other than rod and line during the translocation.
- 8.8.74 Pre-construction fish surveys would be undertaken for all channels that require diversion. This would inform the strategy and methodology for the fish translocation and also the design of the realigned channel, which would be tailored to the specific species present. Surveys would include potential receptor sites where fish are to be translocated prior to construction.
- 8.8.75 Pollution prevention best practice would be employed during construction, as detailed in the EMP to be submitted with the ES, with specific measures at points where the proposed scheme is being constructed near or over watercourses to reduce the potential for impacts upon the fish assemblage.

#### Aquatic macroinvertebrates

- 8.8.76 The proposed scheme design includes the realignment of Back Stream, which forms part of the River Ding, and the realignment of tributaries of the Black Brook. It is likely that most adverse direct impacts relate to water quality during construction. These impacts would be mitigated through best practice pollution prevention during construction, as detailed in the EMP, with specific measures at points where the proposed scheme is being constructed near or over watercourses to reduce the potential for impacts upon the aquatic invertebrate assemblage.

#### Other section 41 species

- 8.8.77 Habitat clearance and habitat manipulation techniques would be designed to be sensitive to other SPIs and to deter species away from construction areas. Suitable alternative habitat would be identified and provided for any SPIs found during construction. SPIs would be moved to these areas by a suitably

experienced ecologist where possible. Habitat clearance and manipulation techniques, as well as the role of any Ecological watching brief would be detailed and method statements to be provided with within the EMP to avoid or reduce the risk of mortality.

### **Operational mitigation**

- 8.8.78 An assessment of the potential air quality impacts of vehicular emissions upon sensitive statutory and non-statutory designated sites has been undertaken, as described in Chapter 5 Air Quality, and will inform the detailed mitigation proposals to be published within the EMP to be provided with the ES supporting the submission of the DCO application. Such proposals may include contributions to the management of sites at risk of air quality related habitat degradation, or habitat creation measures beyond the area impacted by emissions related air pollution. The Habitats Regulations Assessment will include an assessment of air quality impacts upon European sites and include mitigation measures as required.
- 8.8.79 The operational scheme has the potential to increase road related injury and mortality through an increase in traffic, and through operation of the new offline section of the proposed scheme through what is currently open countryside. In the absence of mitigation this would create a barrier to dispersal for many species, effectively fragmenting the habitat. The Environmental Masterplan (see Figure 7.8) has been designed to connect the habitats within the local area, and to mitigate the effects of habitat fragmentation. The landscape includes natural barriers in key locations to force bats and birds up over the carriageway to reduce the risk of collision with vehicles. Hedgerow and tree belt planting along the road has been designed in combination with the fencing strategy to channel species to culverts and underbridge crossing points.
- 8.8.80 In the absence of mature trees during early habitat establishment, it is likely that temporary screening would be required in some locations to force bats (particularly low flying species) up over the carriageway. The location of such features is dependent on the crossing point and advanced bat surveys being undertaken during 2021, which will be reported in the ES. Detailed proposals for temporary screening for bats will be published within the EMP to be provided with the ES.
- 8.8.81 Lighting along the proposed scheme has the potential to create disturbance to nocturnal species that are present within adjacent habitats or who would cross over/under the proposed scheme i.e. bats, dormice, birds, badger, otter, hedgehog and invertebrates. The lighting assessment has confirmed that lighting will only be required at the junctions with the roundabouts at the eastern and western ends of the proposed scheme, therefore restricting the level of potential disturbance. Further surveys are being undertaken in these locations to establish how sensitive species, such as bats, are using these areas and how they may be impacted by the light. The results of these surveys will be reported in the ES. Further restrictions may be required on the type of lighting used; this may include the use of directional to avoid unnecessary illumination of adjacent habitats. This can be achieved through the use of LED and incorporation of baffles, cowls or hoods.
- 8.8.82 As detailed in Chapter 13 Road Drainage and the Water Environment, a suitable drainage design would be completed for the proposed scheme in accordance with DMRB *CG 501 Design of highway drainage systems* [61] and DMRB *LA 113 Road drainage and the water environment* [62]. This would provide appropriate

measures to attenuate and treat (including pollution control devices where necessary) surface water runoff from the proposed scheme, thereby avoiding degradation of the water environment and resulting damage or degradation of water habitats and the species they support.

- 8.8.83 The landscape scheme and habitat management regime would be designed to be appropriate given the proximity of the airfield at RNAS Merryfield and the potential that certain types of habitat creation could attract flocks of birds and thereby represent a risk of aircraft bird strike. A bird strike risk assessment will be undertaken and reported as part of the ES, this will help to inform the design and management regime of the landscape scheme.
- 8.8.84 Towards the end of the construction period the EMP would be updated to reflect changes in baseline conditions and include essential environmental information required for future maintenance and monitoring requirements through the proposed scheme's operational life.

### **Enhancement**

- 8.8.85 Enhancement is a measure that is over and above what is required to mitigate the adverse effects of a scheme.
- 8.8.86 The National Policy Statement for National Networks states that opportunities for building in biodiversity features should be maximised and the project should show how it has taken advantage of opportunities to conserve and enhance biodiversity. Through engagement with local stakeholders and landowners, further opportunities for biodiversity enhancements are being sought within the local landscape.
- 8.8.87 Opportunities have been taken to connect previously isolated woodlands with new woodland and hedgerow planting or management to create connectivity of habitats throughout the landscape. The landscaping design for the proposed scheme has been developed to incorporate species of benefit to local wildlife for example through the inclusion of species such as hazel and honeysuckle which are favoured by hazel dormice, and blackthorn which is the food plant of the brown hairstreak butterfly.
- 8.8.88 Opportunities to enhance local conditions, such as removing existing structures or heavily modified sections of channel, are being reviewed and sought as part of the design development process.
- 8.8.89 Enhancements will be detailed within the LEMP which will form part of the EMP submitted with the ES.

## **8.9 Assessment of likely significant effects**

### **Construction effects**

#### Designated sites

- 8.9.1 The construction of the proposed scheme has the potential to have the following effects on designated sites:
- Degradation of the qualifying feature
  - Habitat degradation
  - Habitat loss

*Statutory designations*

- 8.9.1 A Habitats Regulations Assessment (HRA) screening has been undertaken due to the presence of internationally designated sites, in accordance with DMRB LA 115 Habitats Regulations assessment (LA 115) [19]. The HRA screening report can be found in Appendix 8.1: Habitats Regulation Assessment.
- 8.9.2 The Somerset Levels and Moors SPA and Ramsar site is within 2.1 miles (3.5 kilometres) of, and hydrologically linked to, the proposed scheme. The SPA and Ramsar site are sensitive to any reduction in water quality and the potential impact of water pollution poses a potential threat to the bird and invertebrate assemblages for which the SPA and Ramsar site are designated. These internationally important sites may also be considered functionally linked to habitats within the proposed scheme that support bird species that form part of the designating features of the SPA and Ramsar, impacts to these habitats may pose a threat to these bird species through a loss of available functionally linked habitat and disturbance whilst using habitats local to the proposed scheme. The Somerset Levels and Moors SPA and Ramsar site will be taken forward for appropriate assessment as part of the HRA process, as such a preliminary assessment of the impact of the proposed scheme is not provided at this stage.
- 8.9.3 The Severn Estuary Special Area of Conservation (SAC), SPA and Ramsar site is 15.5 miles (25 kilometres) downstream of, and hydrologically linked to, the proposed scheme. These sites are considered functionally linked to the habitats within the proposed scheme in relation to the migratory fish assemblage for which the SAC and Ramsar site are designated. Construction and operation of the proposed scheme has the potential to impact on migratory fish populations that are key species of the Severn Estuary SAC and Ramsar, through direct loss, fragmentation and/or disturbance to functionally linked habitats. The potential also exists for impacts to the migratory fish populations in relation to water quality while using habitats local to the proposed scheme. The preliminary assessment is that, due to the distance from the proposed scheme, there will be no observable impact upon, and therefore no change to, the bird populations that form the qualifying features of the SPA as a result of construction of the proposed scheme. As the SPA is of international importance this is preliminarily assessed as a neutral effect, which is not significant. The Severn Estuary SAC and Ramsar will be taken forward for appropriate assessment as part of the HRA process, as such a preliminary assessment of the impact of the proposed scheme on the SAC and Ramsar is not provided at this stage.
- 8.9.4 Hestercombe House SAC, Beer and Quarry Caves SAC, and Exmoor and Quantock Oakwoods SACs are designated for their notable bat populations and are located within the study area of 18.6 miles (30 kilometres) from the proposed scheme. Habitats within the proposed scheme have the potential to constitute functionally linked habitat for bats originating from the SACs. The construction of the proposed scheme has the potential to impact upon these bat populations through the loss of roosting sites and foraging habitat and the risk of injury or death. Hestercombe House SAC, Beer and Quarry Caves SAC, and Exmoor and Quantock Oakwoods SAC will be taken forward for appropriate assessment as part of the HRA process, as such a preliminary assessment of the impact of the proposed scheme on the SACs is not provided at this stage.
- 8.9.5 Bracket's Coppice SAC is designated for its population of Bechstein's bat. At a distance of 11.4 miles (18.3 kilometres) from the proposed scheme any habitat loss associated with the construction of the proposed scheme is beyond the core

sustenance zone of Bechstein's bat, therefore unlikely to constitute a reduction of functionally linked habitat to the SAC. The preliminary assessment is that there will be no observable impact upon, and therefore no change to, the qualifying feature of SAC as a result of construction of the proposed scheme. As the SAC is of international importance, this is preliminarily assessed as a neutral effect, which is not significant.

- 8.9.6 With the exception of Bracket's Coppice SAC and the Severn Estuary SPA, the internationally designated sites described above will be taken forward for appropriate assessment as part of the HRA process. In order to ensure that consideration of in-combination effects is fully assessed for each of the internationally designated sites, the screening decision for each site (including Bracket's Coppice SAC and the Severn Estuary SPA) will be updated as part of the HRA that will form part of the DCO application.
- 8.9.7 Thurlbear Wood and Quarrylands Site of Special Scientific Interest (SSSI), and Barrington Hill Meadows SSSI & National Nature Reserve (NNR) are designated for their terrestrial habitats. Given their distance from, and limited connectivity to, the proposed scheme, no impact pathways are anticipated between these sites and construction of the proposed scheme. The preliminary assessment is that there will be no observable impact upon, and therefore no change to, the integrity of these sites as a result of construction of the proposed scheme. As these sites are of national importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.8 Herne Hill Local Nature Reserve (LNR) is designated for its semi-natural broadleaved woodland and associated assemblage of woodland species. The site is located on the far side of Ilminster and the River Isle approximately 0.75 miles (1.2 kilometres) from the proposed scheme, given this limited connectivity and the distance from the proposed scheme, no impact pathways are anticipated between the LNR and construction of the proposed scheme. The preliminary assessment is that there will be no observable impact upon, and therefore no change to, the integrity of Herne Hill LNR as a result of construction of the proposed scheme. As this site is of county importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.9 Bickenhall Orchard LNR is designated for its traditional orchard and associated species, including a rich bryophyte community. The site is 0.28 miles (450 metres) west of the proposed scheme, given this proximity, the bryophyte communities may be sensitive to air quality changes associated with construction. Appropriate pollution prevention, such as construction dust suppression, would be detailed within the EMP submitted with the ES. With the implementation of such measures, the preliminary assessment is that there will be no observable impact upon, and therefore no change to, the integrity of Bickenhall Orchard Local Wildlife Site as a result of construction of the proposed scheme. As the site is of county importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.10 South Taunton Stream LNR and Children's Wood/Riverside Park LNR are located downstream of the proposed scheme and, therefore, have the potential to be impacted by water pollution events during construction. With the embedded mitigation measures summarised in Section 8.8 and detailed within Chapter 13 Road Drainage and the Water Environment, this represents a negligible adverse impact on the integrity of the LNRs which are of county importance. This is preliminarily assessed as a slight adverse effect, which is not significant.

*Non-statutory designations*

- 8.9.11 Three non-statutory designated sites fall within the land required for construction of the proposed scheme and would be subject to habitat loss or degradation. These sites are: Road Verges West of Hatch Beauchamp LWS, which would be wholly lost to the widening of the A358 north of Griffin Lane, Jordans Park LWS which would lose approximately 4.9 hectares to the new carriageway and Southfields Link, and River Rag LWS which passes under the existing A358 and approximately 0.05 miles (80 metres) of its length falls within the land required for construction of the proposed scheme.
- 8.9.12 Road Verges West of Hatch Beauchamp LWS would be subject to the permanent and irreversible loss of all habitats that form the designating feature of the LWS. Areas of grassland habitat creation would be planted, to include a diverse mix of species of local provenance to compensate for the habitat lost. It is recognised that such habitat creation would take many years to establish to a level where it provides an equivalent biodiversity value to that lost. Therefore, the loss of habitats at Road Verges West of Hatch Beauchamp LWS will result in permanent / irreversible damage that negatively affects the integrity of the LWS. This represents a major adverse impact on this receptor of county importance and is therefore preliminarily assessed as a moderate adverse effect, which is significant.
- 8.9.13 Jordans Park LWS would be subject to the loss of approximately 16% of its area to construction of the proposed scheme; this would include the loss of parkland habitat (a HPI) and mature, potentially veteran trees, that form the designating feature of the LWS. Areas of species rich grassland, hedgerows, trees and woodland would be provided at Jordans Park LWS, and areas only temporarily required during construction would be reinstated post construction. It is recognised that such habitats would take many years to establish to a level where it provides and equivalent biodiversity value to that lost, and there would be a permanent reduction of the area within the LWS designation. The loss of habitats that form part of the designating features of Jordans Park LWS will result in permanent / irreversible damage that negatively affects the integrity of the LWS. This represents a major adverse impact on this receptor of county importance and is therefore preliminarily assessed as a moderate adverse effect which is significant.
- 8.9.14 River Rag LWS is crossed by the existing A358 to the west of Hatch Green. The existing bridge structure through which the river passes would be extended to accommodate the dualling of the A358. An approximately 0.05 mile (80 metre) length of the River Rag LWS and associated bank vegetation falls within the land required for construction of the proposed scheme and would be subject to direct impacts including loss of bank side vegetation and works within the channel itself. The LWS is designated for its high biological quality and bird population. Wider impacts to the LWS during construction would be controlled through appropriate pollution control measures as described within Section 8.8. Land on the banks only temporarily required either side of the bridge during construction would be replanted with tree and shrub species of wildlife benefit post construction, with approximately 0.02 miles (30 metres) of riverbank lost permanently to the widened A358. Given the size of the extended bridge structure it is not considered to represent a barrier to the river's function as a wildlife corridor. The localised loss of habitats either side of the existing bridge structure under the A358, and the shading effect of the extended structure upon the watercourse, is considered to represent permanent / irreversible damage, however given the relatively small

scale does not affect the integrity of the LWS. This represents a minor adverse impact on this receptor of county importance, which is preliminarily assessed as a slight adverse effect, which is not significant.

- 8.9.15 Ashill Wood LWS, Every's Copse LWS and Huish Copse LWS are located adjacent to the proposed scheme. River Isle LWS is located approximately 0.05 miles (80 metres) from the proposed scheme. No direct loss of habitats are anticipated at these LWS during construction. As such the preliminary assessment is that there will be no observable impact upon, and therefore no change to, the integrity of these LWSs as a result of construction of the proposed scheme. As the sites are of county importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.16 Appropriate pollution prevention, such as construction dust suppression and water quality protection measures, would be detailed within the EMP submitted with the ES. With the implementation of these measures the preliminary assessment is that there will be no observable impact upon, and therefore no change to, the integrity of this LWS as a result of construction of the proposed scheme. As the site is of county importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.17 Potential adverse impacts upon the ancient woodlands that form Saltfield Copse LWS, Bickenhall Woods LWS, Huish Woods LWS, Ashill Wood LWS and Every's Copse LWS are described below in the irreplaceable habitats section (paragraphs 8.9.23-8.9.28).

#### Habitats

- 8.9.18 In the absence of appropriate mitigation, the impacts associated with the construction phase of the proposed scheme on habitats are anticipated to be:
- Habitat loss
  - Habitat severance
  - Habitat degradation
- 8.9.19 The Environmental Master Plan (see Figure 7.8) is being developed which aims to replace any habitats permanently lost as a result of the proposed scheme and enhance retained habitats. This strategy includes the creation of habitat corridors along the length of the proposed scheme, providing links to off-site habitats including previously isolated woodland blocks, and compensatory measures for the loss of species rich grasslands. The strategy ensures that all priority habitats are replaced by at least a 1:1 ratio, and in most cases above this.
- 8.9.20 A LEMP would be developed in several stages as part of the EMP to ensure the establishment and success of habitat created to replace any habitats permanently lost as a result of the proposed scheme and to maintain habitat connectivity along the length of the proposed scheme. This will be submitted with the ES which will accompany the DCO application.
- 8.9.21 Habitats valued at local importance and above are assessed further below.

#### Woodland/trees

- 8.9.22 Approximately 23 hectares of woodland falls within the land required for construction of the proposed scheme; however, it should be noted that this figure includes areas, such as the western verge of the A358, that should be able to be at least partially retained through further refinement of design and implementation

of appropriate protection measures therefore this is a preliminary figure and would be refined and reported in the ES. The woodland within the proposed scheme is further subdivided as follows:

- Semi-natural broadleaved woodland (22.4 hectares)
- Broadleaved woodland plantation (0.7 hectares)
- Mixed semi-natural (0.3 hectares)

*Irreplaceable habitats including ancient woodland and veteran trees*

- 8.9.23 Bickenhall Wood ancient woodland is located directly adjacent to the west of the existing A358 and its associated verge woodland vegetation. The construction of the proposed scheme requires vegetation clearance up to the highway boundary, directly adjacent to the ancient woodland and ground works within 0.01 miles (15 metres) of the ancient woodland therefore there is the potential for direct impacts to the root protection area of some of the trees of the ancient woodland in this location. Further assessment is required of the root protection area of these trees and the potential impact of the proposed construction upon them, this assessment will be undertaken as part of the ES. Ancient woodlands are irreplaceable habitats; the value of which is derived from their longevity which allows stable conditions for a range of species to be established. The direct loss of ancient woodland trees as a result of impacts to their roots from construction of the proposed scheme represents permanent and irreversible damage that negatively affects the integrity of the ancient woodland. The loss of trees within the ancient woodland therefore represents a major adverse impact upon this receptor of national importance and is therefore preliminarily assessed as a large adverse effect, which is significant.
- 8.9.24 Saltfield Copse LWS is designated for its ancient woodland, the boundary of the LWS extends into the existing highway boundary and up to the cutting of the existing A358. The construction of the proposed scheme requires vegetation clearance up to the highway boundary. Further assessment is required to confirm the age of Saltfield Copse and the extent of the ancient woodland component in order to fully assess the impact of construction of the proposed scheme upon the woodland; this assessment will be undertaken as part of the ES. Ancient woodlands are irreplaceable habitats; the value of which is derived from their longevity which allows stable conditions for a range of species to establish. The direct loss of ancient woodland as a result of construction of the proposed scheme represents permanent and irreversible damage that negatively affects the integrity of the ancient woodland. The loss of trees within the ancient woodland therefore represents a major adverse impact upon this receptor of national importance and is preliminarily assessed as a large adverse effect, which is significant.
- 8.9.25 Ashill Wood and Every's Copse ancient woodlands are located to the east of the existing A358 adjacent to Copse Lane and Park Barn Lane. The proposed scheme includes the creation of a new junction at Ashill and the Stewley Link road, which connects into the new junction to the west of Copse Lane. The new junction and Stewley Link have been designed to ensure the construction area required for the proposed scheme is beyond 0.01 miles (15 metres) of Ashill Wood and Every's Copse ancient woodland, allowing a buffer to be established between the construction works and the ancient woodland as recommended in Natural England guidance. Consequently, no direct loss of ancient woodland trees is anticipated at Ashill Wood and Every's Copse as a result of construction of the proposed scheme. The preliminary assessment is that there will be no

observable impact upon, and therefore no change to, the integrity of Ashill Wood and Every's Copse ancient woodland. As these sites are of county importance, this is preliminarily assessed as a neutral effect, which is not significant.

- 8.9.26 The ancient woodland component of Huish Woods LWS, which is known as Huish Copse, is located 0.01 miles (18 metres) from the proposed scheme, however this relates to an area of habitat creation only; the nearest construction for the proposed scheme is approximately 0.05 miles (75 metres) from the ancient woodland. As a 0.01 mile (15 metre) buffer is able to be maintained in line with Natural England guidance, no direct loss of ancient woodland trees at Huish Copse is anticipated as a result of construction of the proposed scheme. The preliminary assessment is that there will be no observable impact upon, and therefore no change to, the integrity of the ancient woodland at Huish Woods LWS as a result of construction of the proposed scheme. As this site is of county importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.27 Given their proximity to the construction works these five ancient woodlands would be at risk of degradation associated with construction related dust deposition and/or changes in water quality or flow. Mitigation measures to further reduce the risk of impacts of habitat degradation on the woodland and ground flora vegetation would be implemented and are to be detailed in the EMP submitted with the ES. With the implementation of this mitigation, dust deposition and changes in water quality as a result of construction would result in temporary/reversible damage that would not affect the integrity or key characteristics of the ancient woodlands and therefore represents a negligible adverse impact upon this receptor of national importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.28 Five veteran trees have been confirmed within the proposed scheme, two of which are pedunculate oaks that fall within proposed areas of habitat creation associated with Jordans Park LWS, these would be retained and protected during construction. A veteran black poplar is present alongside Venner's Water adjacent to an existing drainage basin that requires reconfiguring for the proposed scheme; opportunities will be sought to avoid the root protection area of this tree through further refinement of the design, the result of which will be reported in the ES. Two veteran pedunculate oaks at Jordans Park LWS would fall directly within the footprint of the eastern carriageway of the proposed scheme and would be lost to construction. The loss of veteran trees is a permanent/irreversible impact that negatively affects the integrity of the resource. The loss of veteran trees therefore represents a major adverse impact upon this receptor of national importance and is preliminarily assessed as a large adverse effect, which is significant.

#### *Broadleaved woodland*

- 8.9.29 The majority of woodland to be lost to construction of the proposed scheme is broadleaved semi-natural woodland along the verges and embankments of the existing A358 in particular the sections between Hatch Park and Capland, and between Jordans Park and Horton Cross. Small areas of broadleaved woodland would also be lost at Greenway Bridge, Three Oaks Cross and Thickthorne.
- 8.9.30 With the planting of 42.8 hectares of broadleaved semi-natural woodland and additional planting of approximately 10.3 hectares of a more open woodland and grassland mosaic habitat around junctions, there would be a net increase of up to

30.7 hectares of broadleaved woodland habitats and an increase in connectivity between previously isolated woodland blocks once this woodland has established.

- 8.9.31 Given the timescales required for woodland habitat creation to provide an equivalent biodiversity resource to that lost, the 22.4 hectare loss of broadleaved semi-natural woodland is considered permanent/irreversible, and the extent of loss would negatively affect the integrity of this habitat resource. The habitat loss represents a major adverse impact upon semi-natural broadleaved woodland, a priority habitat and receptor of national importance and is therefore preliminarily assessed as a large adverse effect, which is significant.
- 8.9.32 The 0.7 hectares loss of plantation broadleaved woodland is permanent/irreversible; however, given the small extent of this loss would not negatively affect the integrity of this asset as a habitat resource. The habitat loss represents a minor adverse impact upon this receptor of county importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.33 The 0.3 hectares loss of mixed semi-natural woodland is permanent/irreversible, however given the small extent of this loss would not negatively affect the integrity of this habitat resource. The habitat loss represents a minor adverse impact upon this receptor of county importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.34 The creation of approximately 42.8 hectares of broadleaved semi-natural woodland, and 10.3 hectares of open woodland grassland mosaic habitat, would result in permanent addition to retained broadleaved woodland that would positively affect the integrity of this resource, once established. The habitat creation represents a major beneficial impact upon this biodiversity resource which is of national importance. This impact is therefore preliminarily assessed as a large beneficial effect, which is significant.

#### *Scattered trees*

- 8.9.35 The loss of scattered mature trees to construction of the proposed scheme is permanent/irreversible; however, the extent of this loss within the context of the local landscape would not negatively affect the integrity of this habitat resource. The habitat loss represents a minor adverse impact upon this receptor of local importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant.

#### *Hedgerows*

- 8.9.36 Construction activities would have the following impacts on hedgerows during the construction phase, in the absence of mitigation or suitable working practices:
- Loss and fragmentation of hedgerow habitat
  - Degradation of habitat
- 8.9.37 Approximately 16.9 miles (27.3 kilometres) of hedgerow falls within the land required for construction of the proposed scheme, however it should be noted that this figure includes hedgerows, such as those along the western verge of the A358, that should be retained through further refinement of design and implementation of appropriate protection measures therefore this is a preliminary figure and would be refined and reported in the ES submitted to support the DCO application.

- 8.9.38 The preliminary design includes the planting or enhancement of approximately 28.7 miles (46.2 kilometres) of native species-rich hedgerows and hedgerows with trees. This would result in up to 12.9 miles (20.8 kilometres) of additional species rich hedgerow resource across the proposed scheme, which offers improved connectivity to the existing hedgerow network, and other existing and proposed semi-natural habitats.
- 8.9.39 The loss of important and priority habitat hedgerows, and the associated fragmentation the hedgerow network, would result in the permanent/irreversible damage to this biodiversity resource, the extent of which would negatively affect the integrity of the resource. The habitat loss represents a major adverse impact upon this receptor of national importance and is therefore preliminarily assessed as a large adverse effect, which is significant.
- 8.9.40 The creation or enhancement of 28.7 miles (46.2 kilometres) of native species-rich hedgerows would result in permanent addition to the retained resource of hedgerow that would positively affect the integrity of this resource, once established. The habitat creation represents a major beneficial impact upon this biodiversity resource which is of national importance. This impact is therefore preliminarily assessed as a large beneficial effect, which is significant.

#### *Grassland*

- 8.9.41 The majority of grassland recorded within the study area comprises improved grassland (32.1 hectares) with areas of amenity grassland (0.4 hectares) associated with settlements. Improved grassland and amenity grassland are of less than local importance and so are not included in the assessment.
- 8.9.42 The proposed scheme would result in the following direct losses of grassland types valued as of local importance and above:
- Poor semi-improved grassland (24.4 hectares)
  - Neutral grassland – semi-improved (6.6 hectares)
  - Marshy grassland (1.2 hectares)
- 8.9.43 Most grassland has been categorised as poor semi-improved grassland but noted that there are localised areas of species richness. Areas of neutral semi-improved grassland were identified north of Ashill and Kenny either side of Venner's Water, and areas of marshy grassland identified at Capland and towards the north of the proposed scheme associated with Black Brook. These areas were subject to National Vegetation Classification surveys and found to be grazed by cattle which were contributing to a more improved sward and low abundance and richness of forbs. As such they are not considered to meet the criteria of lowland meadow or floodplain grazing marsh priority habitats.
- 8.9.44 New species rich grassland habitats would be created, and existing retained grassland enhanced, along the proposed scheme. Grassland creation and enhancement has been focussed on those areas where the more diverse grasslands are lost such as at Capland, adjacent to Venner's Water and Black Brook, in locations where there is a requirement for mitigation for fauna such as along Jordans Park, near to the River Ding and west of Meare Green, and also where there are opportunities to incorporate grassland creation alongside specific structures within the proposed scheme such as Ashill Junction and Mattock's Tree Green Junction.
- 8.9.45 The grassland species mix would include a diverse range of grasses and herbs of local provenance and characteristic of the local area and those which provide the

greatest opportunities for local wildlife e.g. by incorporating a high proportion of flowering plants for pollinators and seed producing species for birds. Grassland planting is shown on the Environmental Mitigation Plan (Figure 7.8).

- 8.9.46 With the planting of 43.9 hectares of species rich grassland and creation or enhancement of 10.3 hectares of marshy grassland, there would be a net increase of up to 22 hectares of species rich grassland habitats and an improved connectivity between adjacent semi-natural habitats, and provide foraging 'stepping stones' for pollinators, once the grasslands have established.
- 8.9.47 Given the timescales required for marshy grassland habitat creation to provide an equivalent biodiversity resource to that lost, the loss of 1.2 hectares of marshy grassland would result in permanent/irreversible damage that would negatively affect the integrity of the resource. The habitat loss represents a major adverse impact upon this biodiversity resource of local importance. This impact is therefore preliminarily assessed as a slight adverse effect and not significant.
- 8.9.48 Given the timescales required for neutral semi-improved grassland habitat creation to provide an equivalent biodiversity resource to that lost, the loss of 6.6 hectares of neutral semi-improved grassland would result in permanent/irreversible damage that would negatively affect the integrity of the resource. The habitat loss represents a major adverse impact upon this biodiversity resource of local importance, This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.49 Given the timescales required for grassland habitat creation to provide an equivalent biodiversity resource to that lost, the loss of 24.4 hectares of poor semi-improved grassland would result in permanent/irreversible damage that would negatively affect the integrity of the resource. The habitat loss represents a major adverse impact upon this biodiversity resource of local importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.50 The creation of approximately 54.2 hectares of species rich grassland would result in a permanent addition to the retained resource of semi-improved neutral and marshy grasslands that would positively affect the integrity of this resource, once established. The habitat creation represents a major beneficial impact upon this biodiversity resource of national importance. This impact is therefore preliminarily assessed as a large beneficial effect, which is significant.

#### *Waterbodies*

- 8.9.51 Nineteen ponds fall within or directly adjacent to the land required for construction of the proposed scheme. These are predominantly small ponds within woodlands and hedgerows at the edge of agricultural fields. Two of the waterbodies are larger flood attenuation basin type features directly adjacent to the A358, one to the south of West Hatch Lane and the other near Rapps, as shown on the Phase 1 Habitats Plan within Appendix 8.2.
- 8.9.52 A replacement wildlife pond would be created for each pond lost to construction of the proposed scheme. Where the pond supports a protected species, such as great crested newts, a minimum of two ponds would be created as compensation for the loss. Ponds would be created within the grassland habitat creation areas shown on the Environmental Mitigation Plan (Figure 7-8). The exact location and number of ponds would be reported in the ES following completion of the updated protected species and habitat surveys. Ponds would be designed to benefit a

range of wildlife and planted with native marginal and emergent aquatic plants of local provenance. Where ponds are at the edge of the land required for construction, these would be retained where possible and subject to appropriate protection measure against construction related dust and water pollution. Such protection measures would be detailed within the EMP submitted to support the DCO application.

- 8.9.53 The loss of 19 ponds would result in permanent and irreversible damage that would negatively affect the integrity of the resource. This habitat loss represents a major adverse impact upon this biodiversity resource of local importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.54 The creation of at least 19 ponds specifically designed for wildlife would result in a permanent addition to the retained resource of pond habitat that would positively affect the integrity of the resource, once established. The habitat creation represents a major beneficial impact upon this biodiversity resource of local importance. This impact is therefore preliminarily assessed as a slight beneficial effect, which is not significant, but will provide benefits for local biodiversity.

#### *Watercourses*

- 8.9.55 A large number of watercourses are present within the study area, many of which are crossed by the existing and proposed duelled A358 or would be crossed by the offline section of the proposed scheme. The channels, and associated riparian habitats, of these watercourses provide important foraging, shelter and dispersal opportunities for a range of species, and act as important ecological corridors through the wider landscape. The construction of the proposed scheme has the potential to impact upon these watercourses through direct loss, fragmentation and degradation of their habitats.
- 8.9.56 Where watercourses pass beneath the online section of the proposed scheme through existing culvert and bridge structures, these structures would either be extended or a new adjacent structure created adjacent to the existing structure to accommodate the dualling of the A358. Three watercourses; Black Brook Tributary 1, Black Brook Tributary 2 and the Thornwater Stream, would be crossed by the offline section of the proposed scheme and therefore pass through new culvert and under bridge structures.
- 8.9.57 As detailed within the embedded mitigation section and Chapter 13 Road Drainage and the Water Environment, specific measures would be implemented during construction to prevent the degradation of the water environment. Such measures would be detailed within the EMP and would include management of chemicals/fuels, dewatering protocols, piling risk assessments etc.
- 8.9.58 Watercourses that pass beneath the existing A358 as part of the online section of the proposed scheme would be subject to the loss of adjacent habitat to allow construction of the extended culverts or new adjacent underbridges. These habitat losses would be relatively small within the context of the watercourse and presence of existing structure. Efforts would be made to retain as much of the natural channel as possible. Where sections of the watercourse are only temporarily lost to permit construction, these areas would be re-vegetated post-construction with local species characteristic of the wider riparian corridor. A detailed assessment of the impact of this loss on each watercourse would be provided as part of the ES. On a preliminary basis, the localised loss of watercourse habitats either side of the existing culvert/bridge structures under the

A358 could cause permanent damage to a biodiversity resource. However, its extent does not affect the integrity of the watercourse and is, therefore, considered to represent a minor adverse impact on the biodiversity resource of each watercourse which are of local importance. This impact is therefore preliminarily assessed as a neutral adverse effect, which is not significant.

- 8.9.59 The Thornwater Stream would be crossed by the offline section of the proposed scheme via a new culvert, approximately 0.09 miles (150 metres) upstream of an existing culvert that passes under the existing A358 west of Thornfalcon. To accommodate the new culvert the Thornwater Stream will be subject to an approximate 0.05 mile (80 metre) long realignment. Approximately 0.07 miles (120 metres) of the Thornwater Stream falls within the land required for the construction of the proposed scheme and will result in the loss of riparian habitats along this corridor. The new culvert would be designed to allow it to continue to function as a biological corridor, and habitats would be established along the realigned stretch post construction. The loss and fragmentation of habitats on the Thornwater Stream would cause permanent loss of approximately 0.07 miles (120 metres) of existing river bed and bankside habitats, which would negatively affect the integrity of the watercourse, and represent a major adverse impact on this receptor of local importance which is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.60 As detailed within Chapter 13 Road Drainage and the Water Environment, where watercourses require channel diversions or realignments, these would be designed to match existing conditions (as a minimum) to maintain existing flood risk, water quality and geomorphological conditions. Opportunities would be sought to incorporate habitat and hydromorphological improvements through 're-naturalisation' of the channel form.
- 8.9.61 Black Brook Tributaries 1-3 would be crossed by the offline section of the proposed scheme via three new underbridges, each approximately 0.02 miles (30 metres) in length. An approximately 0.31 miles (500 metre) realignment of Black Brook Tributary 3 is required to connect into Black Brook Tributary 2 and the new underbridge to allow this structure to be perpendicular to the proposed scheme ensuring the length of culverting is kept to a minimum. The realigned section would be designed following the principles detailed above to seek to provide habitats of wildlife benefit along its diverted length. The direct loss of riparian habitats, and fragmentation of the habitat corridors they provide, would cause permanent damage to the Black Brook Tributaries 1-3, which would negatively affect the integrity of the watercourse. This represents a major adverse impact on these receptors of local importance. Given the scale of the realignment the impact is preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.62 Five Head River Main Channel 2 passes beneath the A358 via an underbridge, the construction of the new eastbound carriageway would require an additional underbridge to be constructed directly to the north of the existing. To accommodate this new crossing, an approximately 0.02 mile (40 metre) long realignment of the watercourse is required. The realigned section would be designed following the principles detailed above to seek to provide habitats of wildlife benefit along its diverted length. Once established it is anticipated that the realigned stretch of watercourse would provide an equivalent or greater biodiversity value to that lost. Given the presence of the existing underbridge structure, the new underbridge structure is not considered to represent a significant barrier to the function of the watercourse as a biological corridor. The loss of riparian habitats, and fragmentation of the habitat corridors it provides,

would cause temporary, reversible damage to Five Head River Main Channel 2, that would negatively affect the integrity of the watercourse. This represents a moderate adverse impact on this receptor of local importance which is therefore preliminarily assessed as a slight adverse effect, which is not significant.

- 8.9.63 Venner's Water passes beneath the A358 via an underbridge; the construction of the new eastbound carriageway would require an additional underbridge to be constructed directly to the north of the existing, a new crossing point would also be required approximately 0.05 miles (80 metres) to the north to accommodate the Stewley Link Road. The Stewley Link Road crossing would also require realignment of approximately 0.02 miles (25 metres) of the watercourse either side of the crossing. The realigned section would be designed following the principles detailed above to seek to provide habitats of wildlife benefit along its diverted length. Once established it is anticipated that the realigned stretch of watercourse would provide an equivalent or greater biodiversity value to that lost. However, the new crossing point on the watercourse represents a further fragmentation of the habitat corridor it provides, which would cause permanent damage to Venner's Water, which would negatively affect the integrity of the watercourse. This represents a major adverse impact on these receptors of local importance. However, given the small scale of the realignment the impact is preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.64 The Back Stream connects to the River Ding and River Isle, and currently passes beneath the A358 via an underbridge; Ding Bridge. The construction of the new eastbound carriageway of the proposed scheme to the north of the existing A358 would require an additional underbridge to be constructed for the Back Stream. In order to keep the length of the underbridge to a minimum it has been designed perpendicular to the east bound carriageway of the proposed scheme and would therefore require realignment of the Back Stream channel between the two carriageways to connect into the new underbridge. The new underbridge would also need to accommodate an access track alongside the watercourse. The culverting and realignment of the Back Stream would result in the direct loss of channel habitats, bankside vegetation to the retained channel between the carriageways and within the construction area for the new carriageway. The construction of the proposed scheme would further fragment the Back Stream, creating an isolated stretch of channel approximately 0.09 miles (150 metres) in length between the two underbridge structures. The direct loss of riparian habitats, and fragmentation of the habitat corridor it provides, would cause permanent damage to the Back Stream, negatively affecting the integrity of the watercourse. This represents a major adverse impact on this receptor of local importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant.

#### Protected species

##### *Orchids*

- 8.9.65 The orchid assemblage within the study area is considered to be of local importance.
- 8.9.66 The potential impacts on orchids during the construction phase are:
- habitat loss
  - habitat degradation

- 8.9.67 **Habitat loss:** Construction of the proposed scheme would result in the direct loss of habitats supporting assemblages of orchid, in particular to the dualling of the proposed scheme and loss of the habitats along the east of the A358 at Hatch Park near Griffin Lane. New grassland, woodland edge and hedgerow habitat creation is proposed within close proximity to this loss but outside of the construction footprint to allow early establishment of the habitats. An orchid translocation exercise is proposed to relocate the orchids and their associated soils to these newly created habitat receptor sites. It is recognised that orchid translocation has a high failure rate due to the specific soil requirements and dependence on mycorrhiza, as such the translocation exercise would be carefully planned and the receptor habitats would be managed to encourage the natural colonisation of orchids to compliment the translocated plants and ensure the long-term viability of the local orchid population. Following a successful translocation and establishment of the receptor habitats the loss of the orchid assemblage to construction of the proposed scheme would result in temporary and reversible damage to the local orchid assemblage, that would not affect the integrity of the resource. The habitat loss represents a negligible adverse impact upon this biodiversity resource of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.
- 8.9.68 **Habitat degradation:** Given their proximity to the construction works, orchids within retained habitats adjacent to the proposed scheme would be at risk of degradation associated with construction related dust deposition and or changes in water quality or flow. Mitigation measures to further reduce the risk of impacts of habitat degradation on orchids would be implemented and are to be detailed in the EMP submitted with the ES. With the implementation of this mitigation, dust deposition and changes in water quality as a result of construction would result in temporary/reversible damage that would not affect the integrity of the orchid assemblage and therefore represents a negligible adverse impact upon this receptor of local importance and is therefore preliminarily assessed as a neutral effect, which is not significant.

### *Bats*

- 8.9.69 The overall assemblage of bats within this study area are considered to be of national importance. Within this assemblage common bat species using habitat features within the study area which are considered of low value to the population and are preliminarily assessed as of local importance.
- 8.9.70 The potential impact on bats during the construction phase are:
- loss of roosts
  - loss of foraging habitats
  - disturbance (from noise and vibration)
  - severance of habitat and barrier to dispersal (habitat fragmentation)
- 8.9.71 **Loss of roosts:** Construction of the proposed scheme would result in the loss of likely day tree roosts utilised by low numbers of common bat species which are considered of low value to the population and preliminarily assessed as of local importance. Replacement roosts would be provided under a mitigation licence from Natural England.
- 8.9.72 Replacement roosts would be provided as mitigation. The exact locations and details of the replacement roosts will be detailed within the EMP to be provided with the ES. With this mitigation implemented, the loss of these roosts would

result in temporary/reversible damage to the bat populations that would not affect their integrity. The loss of the roost represents a negligible adverse impact upon the bat assemblage of local value, which is preliminarily assessed as being neutral and not significant.

- 8.9.73 All four Annex II species have been identified during activity surveys and Bechstein's and barbastelle are known to be roosting in woodlands near to the proposed scheme. Further detail will be provided upon completion of the update surveys to be undertaken in the 2021/2022 survey season and a full assessment will be reported in an addendum to the ES. Given the presence of these species, the potential exists for the loss of roosts of national importance, such as a maternity colony of an Annex II species. If present within the land required for construction of the proposed scheme, these roosts would be subject to replacement with the mitigation measures appropriate to the significance of the roosts to be lost. Replacement roosts would be provided under a mitigation licence from Natural England. On implementation of these measures the loss of Annex II roosts to construction of the proposed scheme would result in temporary/reversible damage to the bat populations, that would not negatively affect their integrity. The roost loss would represent a negligible adverse impact upon this nationally important receptor, which is preliminary assessed as a slight adverse effect, which is not significant.
- 8.9.74 **Loss of foraging habitats:** Construction of the proposed scheme would result in the loss of foraging habitat for the bat assemblage including the four Annex II species. The importance of the habitats adjacent to the existing A358, and within the proposed scheme, including woodland and grassland habitats near Huish Woods as well as the woodland complex between Bickenhall Wood and Hatch Beauchamp, have been identified as a result of the advanced surveys for Annex II species (Bechstein's and barbastelle) and the woodland habitats present throughout the length of the proposed scheme including those directly adjacent to the A358 in addition to hedgerows and watercourses/bodies are likely to be of high value for the bat assemblage associated with the site.
- 8.9.75 High value habitats would be retained where possible. The environmental design will include the creation of a linked mosaic of higher quality habitats of suitability for bats, which would increase the foraging habitat to the east and west of the proposed scheme in addition to the bolstering of existing vegetation, early/accelerated planting and/or translocation of habitats. The details of these habitats and their management will be described in detail within the EMP .
- 8.9.76 Following construction mitigation, the effects of habitat fragmentation may still require some bats to seek alternative foraging resources, travel greater distances and thus expend more energy during construction. The fragmentation of bat foraging and commuting habitat would result in temporary/reversible damage to bat populations that would not negatively affect their integrity. This fragmentation represents a moderate adverse impact upon this nationally important receptor, which is preliminarily assessed as a moderate adverse effect, which is significant.
- 8.9.77 **Disturbance:** Construction of the proposed scheme could result in increases in levels of noise, vibration or light which could lead to bats abandoning roosts. Roosts have been identified in trees and buildings within 0.01 miles (20 metres) of the proposed scheme that would be likely to be subject to disturbance effects as a result of the proposed scheme, in addition to further roosts between 0.01 miles (20 metres) and 0.06 miles (100 metres) (including maternity colonies of common pipistrelle between 0.03 miles (50 metres) and 0.06 miles (100 metres)).

- 8.9.78 Construction phase mitigation measures to reduce disturbance impacts would be drawn up in consultation with Natural England and will be detailed within the EMP. With this mitigation implemented, disturbance impacts to these roosts would result in temporary/reversible damage to the bat populations that would not affect their integrity. This disturbance represents a negligible adverse impact upon this nationally important receptor, which is preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.79 **Severance of habitat and barrier to dispersal:** Construction of the proposed scheme would result in the severance and fragmentation of foraging habitat and commuting habitat, notably at the high value crossing points identified during the activity surveys such as Griffin Lane underbridge and Meare Stream Culvert in addition to the woodland adjacent to the road including near Huish Woods and the woodland complex between Bickenhall Wood and Hatch Beauchamp, identified during the advanced surveys.
- 8.9.80 Habitat fragmentation is likely to affect all species in the identified assemblages including the four Annex II species with the possible exception of species more commonly associated with more open habitat types such as noctule, Leisler's and serotine.
- 8.9.81 Construction mitigation could include the retention and bolstering (with vegetation) of existing underpasses, creation of hop-overs in identified high value bat passage areas and habitat translocation (such as tree translocation) and/or early/accelerated planting may be carried out in areas where short-term habitat creation is required to minimise fragmentation effects. The EMP will include a description of the creation of a linked mosaic of higher quality habitats of suitability for bats, which would increase the foraging habitat to the east and west of the proposed scheme, in order to further reduce the fragmentation impacts.
- 8.9.82 The effects of habitat fragmentation may still require some bats to seek alternative foraging resources, travel greater distances and thus expend more energy during construction. The fragmentation of bat foraging and commuting habitat would result in temporary/reversible damage to bat populations that would not negatively affect their integrity. This fragmentation represents a moderate adverse impact upon this nationally important receptor, which is preliminarily assessed as a moderate adverse effect, which is significant.

#### *White-clawed crayfish*

- 8.9.83 The survey information gathered to date has concluded the likely absence of white-clawed crayfish within the study area of the proposed scheme. Surveys are being undertaken in 2021 to validate the findings of the previous surveys, however no change in status is expected given the national retreat in the range of this species. As such the preliminary assessment is that there will be no observable impact upon, and therefore no change to, white-clawed crayfish populations as a result of the construction of the proposed scheme. As this species is of national importance, this represents a neutral effect which is not significant.

#### *Hazel Dormouse*

- 8.9.84 The populations of Hazel dormouse within the study area are considered to be of county importance.
- 8.9.85 The potential impacts on Hazel dormouse during the construction phase are:

- habitat loss
- severance of habitat and barrier to dispersal
- injury/direct mortality and disturbance

- 8.9.86 **Habitat loss:** Construction of the proposed scheme would result in the loss of hedgerow, scrub and woodland habitats that have been found to support populations of hazel dormouse. In many locations dormice are found in habitats impinged between the existing A358 and an intensively managed agricultural landscape. This habitat loss would reduce foraging and nesting opportunities and ultimately the carrying capacity of the study area to support dormice, potentially leading to death or reproductive failure of individuals, threatening the long-term viability of the local dormouse population.
- 8.9.87 Large areas of hedgerow and woodland habitat creation, and habitat management, are proposed as part of the proposed scheme to compensate the habitats lost. This would form part of a mitigation strategy to be agreed with Natural England as part of the mitigation licence for the proposed works. Where possible the carrying capacity of adjacent habitats would be improved through introduction of a sensitive management regime which enhances the foraging resource i.e. rotational hazel coppicing, and hedgerow management. This would be supplemented by habitat creation which would provide foraging and shelter opportunities once established. In these instances, the intention would be to displace dormice from the land required for construction into the adjacent habitats. Where adjacent habitats are not suitable to support a displaced population of hazel dormice, a translocation exercise may be required to an offsite receptor area. The details of this strategy would be agreed with Natural England and submitted with the ES. The details of all habitat creation areas would be provided as part of the EMP with the ES.
- 8.9.88 With the implementation of the mitigation described above it is recognised that new habitats and management regimes would take time to provide an equivalent foraging and shelter resource to those lost. The loss of habitats therefore would result in temporary/reversible damage to the dormouse populations that would affect their integrity. The habitat loss represents a moderate adverse impact upon the local hazel dormouse population which is of county importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant. It is anticipated that within approximately five years, once the NE licenced mitigation strategy has been implemented and habitats have established to a level they provide an equivalent resource to that lost, that the impact of the habitat loss to construction of the proposed scheme would be reduced to a negligible adverse impact and therefore represent a neutral effect.
- 8.9.89 **Severance of habitat and barrier to dispersal:** The study area includes hedgerows and wooded belts that connect into a wider network of hedgerows through the landscape. These habitats offer dispersal opportunities and maintain gene flow between local populations of dormice ensuring their long-term viability. The construction of the proposed scheme would result in the loss of much of the hedgerow, scrub and woodland belt that runs along the verge of the existing A358, and the offline section would sever a network of hedgerows that currently pass through largely open countryside to the south of the A358. These habitats are used by dormice for foraging, shelter and dispersal. The fragmentation of these habitats would lead to the isolation of populations by removing or significantly reducing the movement of individual animals between areas.

- 8.9.90 The areas of hedgerow and woodland creation and management, described above, have been designed to provide connectivity between retained blocks of dormouse habitat and larger areas of habitat creation. Once established these habitats would contribute to the dispersal corridors into the wider landscape and maintain connectivity to the wider dormouse population. The proposed scheme would include the provision of dormouse bridges in key locations to allow movement of dormice across the proposed scheme, these would be designed to connect into retained vegetation and the wider habitat network. Dormouse bridges would be crucial through the offline section to maintain connectivity to the habitats, and dormouse population they support, between the existing A358 and proposed scheme. Dormouse bridges would also be installed at key locations on the online section of the proposed scheme to restore connectivity between habitats on either side of the existing A358, this would help to compensate reductions in connectivity elsewhere on the proposed scheme.
- 8.9.91 With the implementation of the mitigation described above it is recognised that new habitats and management regimes take time to mature and provide an equivalent level of connectivity and dispersal function to that lost. The severance of habitats and barrier to dispersal therefore would result in temporary/reversible damage to the dormouse populations that would affect their integrity. The habitat fragmentation represents a moderate adverse impact upon this receptor of county importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.92 **Disturbance and injury/direct mortality:** Vegetation clearance works or construction activities within proximity to dormouse habitats have the potential to lead to disturbance, killing or injury of dormice. Dormice utilise habitats in different ways throughout the year and this has implications for their vulnerability to disturbance and their risk of injury from works associated with the construction of the proposed scheme. Dormice hibernate at the base of hedgerows, coppice stools, trees and within natural debris, during the autumn and winter (November-March). They are most vulnerable to being killed or injured by vegetation clearance and constructions works during this period. From April to October dormice are active and disperse through hedgerows and woodlands making nests and giving birth to young from June to September. Dormice are particularly vulnerable to disturbance during this period, as it can cause mothers to abandon their young.
- 8.9.93 The full details of the dormouse mitigation strategy would form the basis of the Natural England mitigation licence and would be included within the ES. Vegetation clearance associated with a dormouse displacement or part of a dormouse translocation strategy would take the form of a two-stage clearance exercise. All clearance works would be undertaken under supervision of a suitably experienced ecologist.
- 8.9.94 With the implementation of the mitigation described in Section 8.8, the risk of disturbance, injury/direct mortality would result in temporary/reversible damage to the dormouse populations that does not affect their integrity. The risk of disturbance, injury/direct mortality represents a negligible adverse impact upon this receptor of county importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant.

*Breeding and wintering bird assemblages*

- 8.9.95 The breeding bird assemblage within the study area is considered to be of local importance. The wintering bird assemblage within the study area is also considered to be of local importance.
- 8.9.96 The potential impacts on the breeding and wintering bird assemblages during the construction phase are:
- injury/direct mortality from construction activities
  - loss of breeding and roosting habitat
  - loss and fragmentation of foraging habitat
  - increased lighting and disturbance
- 8.9.97 **Injury/direct mortality:** With the implementation of mitigation measures, including timing of vegetation clearance and pre-construction nest checks (if works cannot be timed outside of the breeding bird season) injury/direct mortality and/or destruction of nests would be avoided. The preliminary assessment is that there would be no observable impact, and therefore no change to, the breeding or wintering bird assemblages resulting from injury or direct mortality during construction works. As these assemblages are of local importance, this is preliminarily assessed as a neutral effect which is not significant.
- 8.9.98 **Loss of breeding habitat:** Construction activities would result in the loss of breeding bird habitat, notably grasslands, hedgerows, scrub and woodland. To mitigate for loss of breeding habitat, grassland, hedgerow and woodland habitat creation has been included within the proposed scheme. Habitat creation would begin before construction and nesting bird boxes would be provided on retained trees and structures for a range of species as detailed in the mitigation section. It is recognised that time is required for the habitats to provide an equivalent nesting resource to that lost therefore the loss of breeding habitat would result in temporary/reversible damage to the breeding bird assemblage that would negatively affect its integrity within the Zol. This habitat loss represents a moderate adverse impact upon the breeding bird assemblage which is of local importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.99 **Loss and fragmentation of foraging habitat:** Loss of grassland, arable and other semi-natural habitats would reduce foraging opportunities during construction. To mitigate for the loss of connectivity and increased fragmentation, the proposed scheme incorporates habitat creation designed to provide additional foraging resources along the length of the proposed scheme, once established, and provided connectivity with retained semi-natural habitat blocks.
- 8.9.100 It is recognised that time is required for the habitats to provide an equivalent foraging resource, therefore the loss and fragmentation of foraging habitat would result in temporary/reversible damage to the breeding and wintering bird assemblages that would negatively affect their integrity. This habitat loss represents a moderate adverse impact upon breeding and wintering bird assemblages which are of local importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.101 **Disturbance, including sound and lighting:** Construction activities on site are likely to displace breeding and wintering birds both within the proposed scheme and potentially in adjacent habitat due to disturbance from increased noise levels and visual disturbance. Noise levels would increase overall, and some are likely

to be irregular in occurrence, meaning that birds are less likely to become habituated to them, although habituation is more likely where there is frequent of continuous noise or activity. Visual disturbance could also reduce the suitability of habitat for foraging. Lighting of construction areas and access routes could disturb owls causing them to avoid affected foraging areas and/or impact roosting.

8.9.102 The EMP to be provided with the ES will detail measures to mitigate the potential sources of disturbance, this will include provision of lighting design, schedule of works, planting and its management. Disturbance from construction activities would result in temporary/reversible disturbance to breeding and wintering bird assemblages that would not affect their integrity. This disturbance represents a negligible adverse impact upon the breeding and wintering bird assemblages which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

#### *Barn owl*

8.9.103 The population of barn owl within the study area is considered to be of county importance.

8.9.104 The potential impacts on barn owl during the construction phase are:

- loss of breeding and roosting habitat
- loss and fragmentation of foraging habitat
- injury/direct mortality
- disturbance

8.9.105 **Loss of breeding and roosting habitat:** Of the 50 Potential Nest Sites (PNS) identified within the study area, four were confirmed as OBS, five as Active Roost Sites (ARS) and one Temporary Roost Site. It should be noted that the remaining PNS could become occupied in the future as barn owl populations undergo significant fluctuations depending on factors such as the availability of prey species and weather conditions. It is, therefore, possible that breeding barn owl could occur in locations where they have previously been recorded as absent, update surveys are being undertaken in 2021 to inform the ES.

8.9.106 The nearest OBS is located approximately 0.34 miles (550 metres) from the proposed scheme to the west of Capland. One ARS and twelve of the PNS are located within 0.31 miles (500 metres) of the proposed scheme and therefore if utilised by barn owl in the future may be subject to disturbance impacts during the construction phase. It is likely that barn owls would temporarily avoid areas undergoing disturbance from construction effects and would find alternative roost sites as there are suitable alternative sites in the vicinity.

8.9.107 Following implementation of the mitigation described in Section 8.8 the loss of breeding and roosting habitat would result in temporary/reversible damage to the barn owl population that would not affect its integrity. This habitat loss represents a negligible adverse impact upon the barn owl population which is of county importance. The impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.

8.9.108 **Loss and fragmentation of foraging habitat:** Construction of the proposed scheme would result in the permanent loss and fragmentation of Type 1 and Type 2 barn owl foraging habitat. This includes the loss and fragmentation of high-quality habitats within the construction footprint of the offline section of the proposed scheme to the west of Henlade, and also along the online section at

Jordans Park LWS, around Ashill and Venner's Water and the farmland surrounding Bickenhall Wood. It is likely that barn owls would temporarily avoid disturbed areas of habitat and would forage in more distant and possibly less productive habitats. This has the potential to increase the risk of mortality through collision with vehicles and/or from reduced prey availability. It also has the potential to decrease breeding success for the same reasons.

- 8.9.109 The proposed scheme includes the provision of areas of species rich grassland, hedgerow and woodland edge habitats which have been designed to connect into the wider landscape and would be managed specifically for biodiversity. Once established these habitats would offer foraging opportunities for barn owl. On implementation of these mitigation measures, and recognising the time taken for habitats to mature and establish to an equivalent biodiversity resource to the lost, the loss and fragmentation of foraging habitat would result in temporary/reversible damage to the barn owl population that would not negatively affect its integrity. This habitat loss represents a negligible adverse impact upon the barn owl population which is of county importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.110 **Injury/direct mortality:** There is potential for injury and/or mortality of barn owls directly caused by construction activities. This could occur through disturbance causing abandonment of a nest (resulting in the death of dependent young birds), destruction of active nests, and/or collisions with construction vehicles. The EMP would include details of how these risks can be reduced including sensitive timing of the works and site speed limits. There would be no observable impact upon, and therefore no change to, the barn owl population resulting from injury or direct mortality during construction works. As the barn owl population is of county importance, this is preliminarily assessed as a neutral effect which is not significant.
- 8.9.111 **Disturbance:** Lighting of construction areas and access routes could cause owls to avoid affected foraging areas and/or have an impact on roosting. An increase in noise and physical disturbance during construction activities has the potential to cause abandonment of roosts and/or nests, particularly if disturbance occurs during the early breeding season when birds are egg-laying or incubating. The distance (from disturbance) at which barn owls would abandon a nest would vary depending on the level of disturbance, length of disturbance and the existing disturbance levels that the birds experience. Studies suggest disturbance from human activity can be caused up to 0.06 miles (100 metres) from the nest site, although the distance at which nesting barn owls become intolerant to the approach of humans and works activities can vary depending on levels of localised day to day activity. Forestry England (previously Forestry Commission) [63] sets a safe working distance from barn owls of between 0.06 miles (100 metres) to 0.16 miles (250 metres). Disturbance from construction activities would result in temporary/reversible damage to the barn owl population that would not affect its integrity. This disturbance represents a negligible adverse impact upon the barn owl population which is of county importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

#### *Great crested newt*

- 8.9.112 The populations of great crested newt within the study area are considered to be of county importance.

- 8.9.113 The presence of great crested newts has been confirmed within four distinct clusters of ponds within the study area considered likely to represent distinct populations.
- 8.9.114 The potential impacts on great crested during the construction phase are:
- habitat loss
  - injury/direct mortality
- 8.9.115 **Habitat loss:** The construction of the proposed scheme would result in the loss of two ponds that are confirmed as supporting populations of great crested newt. The construction of the proposed scheme would also result in the loss of grassland, ditch, hedgerow, scrub and woodland habitats, within 0.16 miles (250 metres) of confirmed great crested newt ponds, that are likely to be used by great crested newts as terrestrial habitats for foraging, dispersal and shelter. The proposed scheme includes the provision of replacement ponds at a ratio for 2:1 for every confirmed great crested newt pond lost, and 1:1 replacement where great crested newts are absent. Following implementation of the mitigation, whilst recognising the time it takes for compensatory habitats to establish, the loss of aquatic and terrestrial habitats would result in a temporary/reversible damage to the great crested newt population that would affect the integrity of the population. This habitat loss represents a moderate adverse impact upon the great crested newt populations which are of county importance. The impact is therefore preliminarily assessed as a slight adverse effect, which is not significant. It is anticipated that within approximately two years, once the NE licenced mitigation strategy has been implemented, and replacement ponds and associated terrestrial habitats have established to a level they provide an equivalent resource to that lost, that the impact of the habitat loss to construction of the proposed scheme would be reduced to a negligible adverse impact and therefore represent a neutral effect.
- 8.9.116 **Injury/direct mortality:** The removal of great crested newt ponds and terrestrial habitats, within 0.31 miles (500 metres) of known great crested newt ponds, could result in individual newts being injured or killed. As described in Section 8.8, a mitigation strategy would need to be developed and agreed with Natural England as part of a mitigation licence application for the proposed works, this is likely to include a capture and exclusion exercise to avoid the risk of accidental injury or death of great crested newt during construction. On completion of the capture and exclusion exercise the risk of construction related injury would be reduced to a minimal level and the preliminary assessment is that there would be no observable impact, and therefore no change to, the great crested newt populations, arising from direct mortality during the construction works. As these populations are of county importance, this is preliminarily assessed as a neutral effect, which is not significant.

#### *Otter*

- 8.9.117 The population of otter within the study area considered to be of county importance.
- 8.9.118 The potential impacts on otter during the construction phase are:
- habitat loss
  - severance and barrier to dispersal
  - disturbance
  - degradation of habitat

- 8.9.119 **Habitat loss:** Otter have been confirmed on 14 watercourses within the study area. Two potential otter holt sites have been identified within 0.03 miles (50 metres) of the proposed scheme, one on the Meare Stream and the other on the Fivehead River Main Channel. Works to construct extended culverts and underbridges along the online section, and new culverts and underbridges on the offline section of the proposed scheme would result in the direct loss of channel and bankside habitats of watercourses used by otter. This would result in reduced shelter and foraging opportunities, however given the long ranges of individual otters the loss of habitat to construction of the proposed scheme would result in a temporary and reversible damage to the foraging resource of the otter that does not affect the integrity of the otter population. This represents a minor adverse impact on the otter population which is of county importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.
- 8.9.120 **Severance and barriers to dispersal:** The extension of existing culvert/underbridge structures under online section of the proposed scheme and creation of new culverts and underbridges on the offline section of the proposed scheme, have the potential to fragment dispersal corridors used by otter. Such structures may force otters out of the water channel where they may be at risk of injury or death. Furthermore, the fragmentation of otter dispersal corridors may cause fragmentation of populations, reducing the interaction and breeding between isolated populations. Following implementation of the measures described in Section 8.8, while recognising that construction of these crossing structures may act as a barrier to dispersal themselves, the severance effect and barrier to dispersal as a result of construction of the proposed scheme would result in a temporary and reversible damage that does not affect the integrity of the otter population. This represents a negligible adverse impact on the otter population which is of county importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.121 **Disturbance:** Otter are confirmed as using watercourses that fall within the draft DCO boundary. Two holt sites and one couch/resting site have been identified on watercourses at locations within 0.03 miles (50 metres) of the proposed scheme. In the absence of mitigation or suitable working practices, working within 0.03 miles (50 metres) of a watercourse could cause disturbance to otters. Disturbance within close proximity to resting sites or holts may cause otter to abandon these sites. Otter are highly mobile species, and their use of resting features along a watercourse will vary through the year. Pre-construction surveys would determine presence of otters and mitigation requirements, such as working distances, timing of works, lighting in the proximity of watercourses and requirements for artificial holts (if required) would be detailed within the EMP and a form the basis of a licence application to Natural England (if required). Disturbance from construction activities would result in temporary/reversible damage to the otter population that would not affect its integrity. This disturbance represents a negligible adverse impact upon the otter population which is of county importance. The impact is therefore preliminarily assessed as a neutral effect, which is not significant.
- 8.9.122 **Habitat degradation:** Pollution events in the absence of mitigation could cause short and long-term impacts upon aquatic habitat that otter depend upon for survival; however, pollution control measures would be included within the EMP. The preliminary assessment is that there would be no observable impact upon, and no change to, the otter population due to habitat degradation resulting from construction works. As this population is of county importance, this is preliminarily assessed as a neutral effect which is not significant.

*Water vole*

- 8.9.123 The population of water vole within the study area is considered to be of county importance.
- 8.9.124 The potential impacts on water vole during the construction phase are;
- habitat loss
  - severance and barriers to dispersal
  - degradation of habitat
  - disturbance
- 8.9.125 **Habitat loss:** Water vole have been confirmed on three watercourses and based on partial survey information are considered likely to be present on an additional five watercourses. This includes the Black Brook, Black Brook Tributaries, Thornwater Stream, Meare Stream, Venner's Water and the River Ding Back Stream. Works to construct extended culverts and underbridges and associated minor realignments along the online section, and new culverts and underbridges on the offline section of the proposed scheme would result in the direct loss of channel and bankside habitats of watercourses used by water vole. This has the potential to result in the direct loss of existing water vole burrows as well as foraging resources, and cover for dispersal. The realignment works proposed on the Thornwater Stream, Black Brook Tributaries and River Ding Back Stream would result in more extensive losses of habitat, potentially comprising the entire home range of a water vole (0.03-0.09 miles (50-150 metres)).
- 8.9.126 Works impacting upon populations of water vole must be carried out under a conservation licence. This requires the applicant to demonstrate a conservation benefit for water voles. This can be achieved through a net gain in the amount of suitable habitat available to water vole. As described in Chapter 13 Road Drainage and the Water Environment, realigned watercourses would be designed to match existing conditions (as a minimum) to maintain existing flood risk, water quality and geomorphological conditions and opportunities would be sought to incorporate habitat and hydromorphological improvements through 're-naturalisation' of the bank profile and channel form. Appropriate planting would be introduced along realigned watercourses to provide cover and foraging resources for water vole. Opportunities would be sought to enhance retained sections of watercourse adjacent to the proposed scheme, through measures such as the implementation of sensitive management to encourage a diverse botanical composition, fencing to restrict poaching from livestock, and management of scrub encroachment.
- 8.9.127 Following implementation of the measures described above, the loss of habitat to construction of the proposed scheme would result in temporary and reversible damage to the habitat resource for water vole, however the extent of realignment works would negatively affect the integrity of the water vole population while the riparian habitats of the realigned watercourses establish. This represents a moderate adverse impact on this receptor of county importance and is therefore preliminarily assessed as a slight adverse effect, which is not significant. It is anticipated that within approximately two years, once the licenced mitigation strategy has been implemented and riparian habitats have established to a level they provide an equivalent resource to that lost, that the impact of the habitat loss to construction of the proposed scheme would be reduced to a negligible adverse impact and therefore represent a neutral effect

- 8.9.128 **Injury/direct mortality:** In the absence of mitigation or appropriate working practices, the construction of the proposed scheme has the potential to result in the direct injury or mortality of water vole, particularly through collapse of burrows with water vole resident. Buffer zones would be established to protect water voles. The exact extent of the buffer zones would be determined on the completion of detailed water vole surveys pre-construction to confirm the location and extent of any burrows present. However, burrows are likely to be at least 5 metres from the toe of the bank.
- 8.9.129 Where works cannot be restricted to outside of the buffers, it would be necessary to temporarily exclude and remove water vole from the construction areas as using displacement or translocation as described in Section 8.8. Displacement must be undertaken under supervision of a Natural England Class Licence holder. Translocation would require the development of a site-specific licence to permit the works. For both the displacement technique and translocation, the receptor area intended to receive relocated animals, must be created well in advance of the construction works to ensure it is sufficiently established to provide the foraging and shelter requirements of the relocated water vole. Following the implementation of these, the risk of injury and direct mortality as a result of construction of the proposed scheme would be reduced to a level at which there would be no observable impact upon, and therefore no change to, the water vole population, from the construction works. As the water vole population is of county importance, this is preliminarily assessed as a neutral effect which is not significant.
- 8.9.130 **Severance and barriers to dispersal:** The extension of existing culvert/underbridge structures under online sections of the proposed scheme and creation of new culverts and underbridges on the offline section of the proposed scheme, have the potential to create barriers to water vole dispersal. These barriers may fragment the territories of individual water voles, cause fragmentation of populations, reducing the interaction and breeding opportunities between isolated populations. As described in Section 8.8, the proposed scheme includes the provision of mammal ledges on new culvert or underbridge structures, or where vertical alignment does not allow, the provision of dry tunnels under the proposed scheme, adjacent to the watercourse. As described above water vole would be displaced from working areas prior to the commencement of construction, planting would be introduced at as early a stage post construction as possible to provide cover and foraging resources to encourage water vole to recolonise the areas and pass through new structures and channels.
- 8.9.131 Following implementation of these measures, while recognising that construction of the crossing structures and realigned channels would act as barrier to dispersal, the severance effect and barrier to dispersal as a result of construction of the proposed scheme would result in temporary and reversible damage that does not affect the integrity of the water vole population. This represents a negligible adverse impact on the water vole population which is of county importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.132 **Degradation of habitat:** Pollution events in the absence of mitigation could cause short and long-term impacts upon aquatic habitat that water vole depend upon for survival; however, pollution control measures would be included within the design and included in the EMP. The preliminary assessment is that there would be no observable impact upon, and therefore no change to, the water vole

population as a result of habitat degradation associated with construction works. As the water vole population is of county importance, this is preliminarily assessed as a neutral effect which is not significant.

8.9.133 **Disturbance:** Water vole are at greatest risk of being adversely affected by disturbance while they are in their burrows. The watercourses supporting water vole within the study area are already subject to a high level of noise, vibration and visual disturbance from the existing road network and agricultural activities. With the implementation of the measures discussed above, including buffer zones and displacement/translocation if required, the preliminary assessment is that there would be no observable impact upon, and therefore no change to, the water vole population as a result of habitat disturbance associated with construction works. As the water vole population is of county importance, this is preliminarily assessed as a neutral effect which is not significant.

*Brown hairstreak*

8.9.134 The population of brown hairstreak butterfly within the study area is considered to be of local importance.

8.9.135 The potential impacts on brown hairstreak during the construction phase are:

- habitat loss

8.9.136 **Habitat loss:** The construction of the proposed scheme would result in the loss of hedgerows, scrub and woodland edge habitats that have been confirmed as supporting a population of brown hairstreak. Blackthorn is particularly important for brown hairstreak, as females lay their eggs on young blackthorn stems. A reduction in the prevalence of blackthorn, particularly in hedgerows, as a result of clearance required for construction of the proposed scheme has the potential to interrupt the life cycle of the brown hairstreak and lead to decline of its local population.

8.9.137 As described within the embedded mitigation section, the proposed scheme includes the provision of areas of hedgerow and woodland habitat creation. These would be designed to include a high proportion of blackthorn within the planting mix. Hedgerows would be managed on a low intensity management regime to allow brown hairstreak to go through their full life cycle. Opportunities would be explored to translocate hedgerows into habitat creation areas to ensure continuity of mature habitats, while new habitats establish. Following implementation of these measures, but recognising the time taken for habitats to establish to a level at which they offer an equivalent resource to that lost, habitat loss associated with construction of the proposed scheme would result in temporary/reversible damage to the brown hairstreak population that would affect its integrity. This habitat loss represents a moderate adverse impact upon the brown hairstreak population which is of local importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.

8.9.138 Once established, there would be a net increase in hedgerow habitats with a high proportion of blackthorn, sensitively managed to ensure they support the full life cycle of the brown hairstreak. This habitat creation would result in the permanent improvement of the habitat resource that would positively affect the integrity of the brown hairstreak population. This habitat creation represents a major beneficial impact upon the brown hairstreak population, which is of local importance. This is therefore preliminarily assessed as a slight beneficial effect, which is not

significant, however will provide long term benefits for the brown hairstreak population.

### *Badger*

8.9.139 The population of badgers within the study area are considered to be of local importance.

8.9.140 The potential impacts on badgers during the construction phase are:

- habitat loss
- degradation of habitat
- severance of habitat and barrier to dispersal
- disturbance
- mortality, injury or trapping

8.9.141 **Habitat loss:** Based on survey results, the proposed scheme would result in the loss of badger foraging habitat and badger setts including outlier setts, subsidiary setts, annex setts and at least two main setts. All setts would require closure under a Natural England licence and closure of main setts would require the provision of artificial setts, which need to be in use by badgers, prior to closure of the existing main sett. The location of the proposed artificial sett would be determined on the basis of update survey information being gathered in 2021 & 2022. The location would be shown on the final Environmental Master Plan to be submitted with the ES. The loss of habitat including setts would result in temporary/reversible damage to the badger population that would negatively affect its integrity. This habitat loss represents a moderate adverse impact upon the badger population which is of local importance. The impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.

8.9.142 **Habitat Degradation:** The construction of the proposed scheme has the potential to cause habitat degradation and a potential loss of foraging resource for badgers as a result of pollution events and run off from construction areas including compounds and spoil heaps. The EMP would include a description of proposed protection measures as stated above in the embedded construction mitigation section (para 8.9.64) of this chapter to reduce the likelihood of these risks. The preliminary assessment is that there would be no observable impact upon, and therefore no change to, the badger population as a result of habitat degradation associated with construction works. As this population is of local importance, this is preliminarily assessed as a neutral effect, which is not significant.

8.9.143 **Severance of habitats and barriers to dispersal:** The clearance of sites in preparation for construction of the proposed scheme could lead to isolation of badger populations both within and between clans. Severance could cause an increase in conflict and competition due to a temporary reduction in territory size and foraging resource. Such impacts would be reduced by careful construction programming so that certain crossing areas remain open and early provision of habitat creation areas to ensure enough foraging areas remain available to badgers prior to final crossing points in the form of wildlife culverts being completed. Temporary fencing would be required to funnel badgers to these areas throughout the construction phase.

8.9.144 The proposed scheme would incorporate mammal ledges within culverts, and dry pipe tunnels, as described in Section 8.8, at key crossing points for badger across the proposed scheme. Following implementation of these measures, and the

habitat creation described as part of the embedded mitigation, severance of habitats and territories would result in temporary/reversible damage to the badger population that would not negatively affect its integrity. Severance of habitat represents a negligible adverse impact on this receptor of local importance and is therefore preliminarily assessed as a neutral effect, which is not significant.

- 8.9.145 **Disturbance:** Construction of the proposed scheme would cause noise and vibration greater than the background level created by the existing A358 and M5. Noise and vibration could result in temporary disturbance which can lead to abandonment of setts and young or in the case of vibration could lead to collapse of sett tunnels leading to mortality. Suitable working methods would be incorporated into the EMP, including the requirement that no works involving heavy machinery or piling are to be undertaken within at least 0.02 miles (30 metres) of an active badger sett, to avoid likelihood of disturbance. Any construction works within this 0.02 miles (30 metres) buffer may require the temporary closure of the sett(s) under a licence from Natural England. Following implementation of these measures the preliminary assessment is that there would be no observable impact upon, and therefore no change to, the badger population from noise and vibration during construction. As this population is of local importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.146 **Mortality, injury and trapping:** To reduce the chance of mortality and injury during construction all haul routes, compound areas and works on the live highway would be temporarily fenced off using suitable badger fencing prior to any construction activities and would be detailed in the EMP. Permanent badger fencing would be shown where it is required on the final Environmental Master Plan and would be installed prior to the completed road network opening. This would be presented in the ES which supports the DCO application. Best practice methods to avoid mortality to badgers during construction as a result of construction vehicle collisions or entrapment in excavations would also be included in the EMP as stated in Section 8.8 Design, mitigation and enhancement. Sett closures would be conducted in accordance with best practice guidance and under a Natural England licence. Following implementation of these measures the preliminary assessment is that there would be no observable impact upon, and therefore no change to, the badger population from mortality, injury or trapping during construction. As this population is of local importance, this is preliminarily assessed as a neutral effect, which is not significant.

### *Reptiles*

- 8.9.147 The populations of reptiles, including slow worm and grass snake, within the study area are considered to be of local importance.
- 8.9.148 The potential impacts on reptiles during the construction phase are:
- habitat loss and fragmentation
  - mortality, injury or trapping
- 8.9.149 **Habitat loss and fragmentation:** Construction of the proposed scheme would result in the loss of grassland, pond, scrub and hedgerow habitats used by reptiles. As described in section 8.8, habitat creation measures are included within the proposed scheme for reptiles. The details of these habitat creation measures would be included within the EMP with the ES. Following implementation of the mitigation, whilst recognising the time it takes for

compensatory habitats to establish, the loss of habitat would result in temporary/reversible damage to the reptile populations that would negatively affect their integrity. This habitat loss represents a moderate adverse impact upon reptile populations which are of local importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant. It is anticipated that within two to five years once mitigation strategies have been implemented and grassland, scrub and hedgerow habitats have established to a level they provide an equivalent resource to that lost, that the impact of the habitat loss to construction of the proposed scheme would be reduced to a negligible adverse impact and therefore represent a neutral effect.

8.9.150 **Injury/direct mortality:** Reptiles are present along the length of the proposed scheme within grassland and scrub habitats, this includes the verges of the existing A358 where the suitable grassland habitats are located between the road and adjacent intensively managed agricultural land. In the absence of mitigation, construction activities could result in individual reptiles being injured or killed. Given that the suitable habitats along the A358 falls largely within the land required for construction of the proposed scheme, in many instances it would not be possible to displace reptiles from construction working areas into retained adjacent habitats. Therefore, where displacement cannot be deployed, a capture and exclusion exercise would be required, with individual reptiles captured in the construction zone prior to construction occurring and translocated to one of the areas of habitat creation described above. Following implementation of these measures, injury or direct mortality of reptiles during construction would be minimal and it is preliminarily assessed that there would be no observable impact upon, and therefore no change to, the reptile populations arising from direct mortality of reptiles during construction works. As these populations are of local importance, this is preliminarily assessed as a neutral effect, which is not significant.

#### *Terrestrial invertebrates*

8.9.151 The assemblages of terrestrial invertebrates within the study area are considered to be of local importance.

8.9.152 The potential impacts on terrestrial invertebrates during the construction phase are:

- habitat loss

8.9.153 **Habitat loss:** Construction of the proposed scheme would result in the loss of a range of habitats utilised by terrestrial invertebrates including grassland, scrub, hedgerows and woodland. The proposed scheme includes the creation of areas of grassland, hedgerow and woodland habitats to mitigate those lost. Species utilised within these habitat creation areas would include species of benefit to invertebrates, including a high proportion of flowering species for pollinators. Additional features including the retention of dead wood from clearance works and creation of log piles within the new habitats would provide habitat opportunities for terrestrial invertebrates. Following implementation of these measures, habitat loss would result in temporary/reversible damage to terrestrial invertebrate assemblages that would not affect their integrity. This habitat loss represents a negligible adverse impact on terrestrial invertebrate assemblages which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

### *Fish*

- 8.9.154 Surveys of the River Ding confirmed the presence of European bullhead, brown trout, stone loach, minnow and 3-spined stickleback. Further surveys are proposed on other watercourses within the proposed scheme in 2021. The fish populations within the study area are considered to be of local importance.
- 8.9.155 The potential impacts on fish during the construction phase are:
- habitat loss
  - degradation of habitat
  - direct mortality
- 8.9.156 **Habitat loss:** Surveys of the River Ding confirmed the presence of European bullhead, brown trout, stone loach, minnow and 3-spined stickleback. Further surveys are being undertaken on other watercourse to be subject to realignment as part of the construction of the proposed scheme, these surveys would further inform the assessment of impacts upon the fish population and would be reported in the ES supporting the DCO application.
- 8.9.157 In addition to the loss of habitats to construction of the watercourse realignments, the construction of the proposed scheme would result in the localised loss of aquatic and marginal habitats for the construction of new culvert/underbridge structures or the extension of existing structures carrying watercourses under the A358. Construction works required within watercourses, such as the proposed realignments, would be undertaken in accordance with relevant guidance and EA permits. Construction activities where fish populations are noted (through the surveys described above) would be sensitively timed as stated in the construction mitigation section. Realigned sections of watercourse would be designed to provide a range of niches for the different life cycles of the species present on the watercourses, this may include incorporating features, such as root bowls of felled trees and willow faggots, into the channel to provide shelter points for fish fry as the vegetation and natural structure of the watercourse develops.
- 8.9.158 With the implementation of mitigation, habitat loss would result in temporary/reversible damage to fish populations that would not affect their integrity. Habitat loss represents a negligible adverse impact upon fish populations, which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.
- 8.9.159 **Degradation of habitat:** The realignment of watercourses including Black Brook Tributaries, Thornwater Stream, Venner's Water, Five Head River Main Channel 2, and the River Ding Back Stream increase the potential for pollution events from fuel and chemical spills, and from construction related sediment run-off, which could cause degradation of the water quality.
- 8.9.160 As described in Chapter 13 Road Drainage and the Water Environment, appropriate measures would be implemented to attenuate and treat surface water runoff from construction, including the use of pollution control devices where necessary, thereby avoiding degradation of the water environment. Realigned channels of watercourses would be designed to match existing conditions (as a minimum) to maintain existing flood risk, water quality and geomorphological conditions. Opportunities would be sought to incorporate habitat and hydromorphological improvements through 're-naturalisation' of the bank profile and channel form. With the implementation of these mitigation measures, the

preliminary assessment is that there would be no observable impact upon, and therefore no change to, fish populations as a result of habitat degradation associated with construction works. As these populations are of local importance, this is preliminarily assessed as a neutral effect which is not significant.

- 8.9.161 **Direct mortality:** Mortality of species is highly likely in the absence of mitigation or suitable working practices. Construction activities could result in adult fish of conservation importance being directly killed or injured, eggs laid in spawning habitats destroyed or damaged, juveniles killed or injured, and hypoxia through dewatering resulting in death.
- 8.9.162 Pre-construction surveys would be conducted to confirm species presence/absence and to inform any additional mitigation measures necessary to avoid fish mortality such as fish translocation prior to dewatering and sensitive timing of in-channel works. With this mitigation implemented, direct mortality of fish or fish eggs is considered very unlikely. Any direct mortality would result in temporary/reversible damage to fish populations that would not affect their integrity. Direct mortality represents a negligible adverse impact upon fish populations, which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

#### *Aquatic macroinvertebrates*

- 8.9.163 The assemblages of aquatic invertebrates within the study area are considered to be of local importance.
- 8.9.164 The potential impacts on Aquatic invertebrates during the construction phase are:
- habitat loss
  - degradation of habitat
  - injury and/or mortality
- 8.9.165 **Habitat loss:** The construction of the proposed scheme would result in the localised loss of aquatic and marginal habitats for the construction of new culvert/underbridge structures or the extension of existing structures carrying watercourses under the A358. The construction of the proposed scheme also requires realignments of sections of at least five watercourses; the Black Brook Tributary 3, Thornwater Stream, Fivehead River Main Channel 2, Venner's Water and the River Ding Back Stream. Terrestrial and aquatic habitat for macroinvertebrates would be lost.
- 8.9.166 The realigned section of watercourses would be designed with sinuosity to replicate a more natural shape and profile, offering a greater range of micro-habitats for aquatic invertebrate species. The realigned channels would incorporate features such as riffles and pools and depth variation to provide further habitat heterogeneity/diversity where possible. As described in Chapter 13 Road Drainage and the Water Environment, opportunities would be sought to incorporate habitat and hydromorphological improvements through 're-naturalisation' of the bank profile and channel form. Following implementation of the mitigation measures, but recognising the time required for habitats to establish, the habitat loss related to construction would result in temporary/reversible damage to aquatic populations that would not affect their integrity. Habitat loss represents a negligible adverse impact upon aquatic macroinvertebrate assemblages, which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

- 8.9.167 **Degradation of habitat:** Habitats hydrologically connected to the proposed scheme, are sensitive to effects from construction such as pollution events from fuel and chemical spills, from change in vehicle emissions, and from sediment run-off. This could result in the temporary reduction of macroinvertebrate abundance and diversity. Construction mitigation to avoid and reduce any such impacts on waterbodies and associated sensitive habitats would follow pollution prevention best practice and would be incorporated in the EMP. With the implementation of these measures, there would be no observable impact upon, and therefore no change to, aquatic macroinvertebrates assemblages as a result of habitat degradation associated with construction works. As the assemblage is of local importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.168 **Injury and/or mortality:** Where construction of the proposed scheme requires direct works within the watercourse, such as the construction of new culvert/underbridge structures, the extension of existing structures and the realignments on the Black Brook Tributary and River Ding Back Stream, mortality of macroinvertebrates is highly likely in the absence of appropriate mitigation and working methods.
- 8.9.169 Construction works within the watercourses would be undertaken under the relevant EA permits. As described above the realigned sections of watercourses would be designed to benefit macroinvertebrate populations, and wider biodiversity once established. It is anticipated that colonisation of realigned stretches of channel would occur naturally as a result of natural drift from upstream and via airborne colonisation. These measures would be further detailed within the EMP as part of the ES.
- 8.9.170 On implementation of the mitigation measures, direct mortality would result in temporary/reversible damage to aquatic invertebrate populations that would not affect their integrity. Direct mortality represents a negligible adverse impact upon aquatic invertebrate populations, which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

*Other section 41 Species of Principal Importance (SPI)*

- 8.9.171 Survey and desk-based data search confirmed the presence of hedgehog, common toad, polecat, brown hare and harvest mouse within the study area. Habitats suitable for these species are found throughout the land required for construction of the proposed scheme.
- 8.9.172 During construction potential impacts could occur through permanent and temporary habitat loss, severance and disturbance, as well as individual mortality. However, embedded mitigation and best practice techniques, such as habitat clearance designed and timed to be sensitive to these species, alongside habitat manipulation clearance techniques to deter species away from areas, would remove or reduce these risks. Where any animals found during construction are moved by the Ecological Clerk of Works (ECoW) these would be relocated to the most appropriate nearby mitigation areas, for example, common toad would be moved adjacent to wet areas. This approach would be detailed within the EMP as part of the ES.
- 8.9.173 With the inclusion of these mitigation measures, and the habitat creation measures incorporated into the proposed scheme, it is considered that construction works would result in temporary/reversible damage to populations

of other SPI that would not affect their integrity. Construction works would have a negligible adverse impact upon SPI populations of local importance, which is preliminarily assessed as a neutral effect, which is not significant.

## **Operational effects**

### Designated sites

#### *Statutory designations*

- 8.9.174 Seven international designated sites are present within the study area of the proposed scheme.
- 8.9.175 Somerset Levels and Moors SPA and Ramsar is within 2.1 miles (3.5 kilometres) of, and hydrologically linked to, the proposed scheme. The SPA and Ramsar are sensitive to any reduction in water quality and the potential impact of water pollution during operation of the proposed scheme poses a threat to the species and habitats for which the SPA and Ramsar are designated. The SPA and Ramsar could be considered functionally linked to the proposed scheme through the bird assemblage utilising the land within the study area of the proposed scheme. All internationally designated sites fall beyond 0.12 miles (200 metres) of the ARN with the exception of Somerset Levels and Moors SPA and Ramsar. Given the distance of the proposed scheme and ARN from these internationally designated sites, no significant air quality impacts are anticipated as a result of air quality changes associated with operation of the proposed scheme. The impact is, therefore, preliminarily assessed as there being no change. As the sites are of international importance, this results in a neutral effect, which is not significant. Somerset Levels and Moors SPA and Ramsar is within 0.12 miles (200 metres) of the ARN. However, it does not meet the annual average daily traffic (AADT) exceedance criteria for requiring further assessment and, therefore, no observable air quality impacts are anticipated. The impact is therefore preliminarily assessed as there being no change. As the site is of international importance, this results in a neutral effect, which is not significant.
- 8.9.176 Severn Estuary SAC, SPA and Ramsar is 15.5 miles (25 kilometres) downstream of, and hydrologically linked to, the proposed scheme. The SAC and Ramsar are sensitive to any reduction in water quality and the potential impact of water pollution during operation of the proposed scheme poses a threat to the species and habitats for which the SAC and Ramsar are designated. The preliminary assessment is that, due to the distance from the proposed scheme, there will be no observable impact upon, and therefore no change to, the bird populations that form the qualifying features of the SPA, as a result of the operation of the proposed scheme. As the SPA is of international importance this is preliminarily assessed as a neutral effect, which is not significant. The Severn Estuary SAC and Ramsar will be taken forward for appropriate assessment as part of the HRA process, as such a preliminary assessment of the impact of the proposed scheme on the SAC and Ramsar is not provided at this stage.
- 8.9.177 Hestercombe House SAC, Beer and Quarry Caves SAC, Bracket's Coppice SAC and Exmoor and Quantock Oakwoods SACs are designated for their notable bat populations and are located within 18.6 miles (30 kilometres) of the proposed scheme. Operation of the proposed scheme could impact the populations of notable bat for which the sites are designated through increased mortality arising from vehicle collisions. These internationally important sites will be taken forward

for appropriate assessment as part of the HRA process, as such a preliminary assessment of the impact of the proposed scheme is not provided at this stage.

- 8.9.178 Bracket's Coppice SAC is designated for its populations of Bechstein's bat. At a distance of 11.4 miles (18.3 kilometres) the proposed scheme is beyond the core sustenance zone of Bechstein's bat, therefore there is unlikely to be any impact of increased mortality arising from vehicle collisions upon this qualifying feature of the SAC. The preliminary assessment is that there will be no observable impact upon, and therefore no change to, the qualifying feature of the SAC, as a result of the operation of the proposed scheme. As the SAC is of international importance, this is preliminarily assessed as a neutral effect, which is not significant.
- 8.9.179 An HRA screening has been undertaken due to the presence of these internationally designated sites, in accordance with DMRB LA 115 [19]. The HRA screening report can be found in Appendix 8.1: *Habitats Regulation Assessment*. With the exception of Bracket's Coppice SAC and Severn Estuary SPA these internationally designated sites will be taken forward for appropriate assessment. The results of the appropriate assessment will be reported as part of the HRA that will form part of the DCO application.
- 8.9.180 The potential impacts of the operation of the proposed scheme on other statutory designated sites would be:
- habitat degradation as a result of change in air quality
- 8.9.181 **Nitrogen deposition:** The proposed scheme could result in an increase in traffic adjacent to statutory designated sites and ancient woodlands, as described in Chapter 5 Air Quality, this would result in an increase in N deposition that exceeds 1% of the lower critical load at each of the following sites:
- Maiden Down SSSI
  - Huntspill River NNR
- 8.9.182 Given that none of these sites will be subject to an increase in N deposition exceeding 0.4kg N/ha/year, in line with the guidance set out in DMRB LA 105 [23] it is considered unlikely that the N deposition would result in observable degradation of the habitats in these locations, i.e. resulting in the loss of one or more species. No observable adverse effects are anticipated at these sites as a result of N deposition associated with operation of the proposed scheme. The impact is therefore preliminarily assessed as there being no change. As the sites are of international importance, this results in a neutral effect, which is not significant. Further assessment of changes in N deposition at these sites and other relevant statutory and non-statutory sites within 0.12 miles (200 metres) of the ARN will be undertaken and reported in the ES following further refinement of the design and the traffic modelling for the proposed scheme.
- 8.9.183 The proposed scheme would result in an increase in traffic adjacent to Children's Wood/Riverside Park Local Nature Reserve (LNR). As described in Chapter 5 Air Quality, this would result in an increase in nutrient N deposition of 0.4kg N/ha/year within the LNR. The site comprises areas of grassland and woodland along the River Tone providing an important movement corridor for a range of species. In the absence of mitigation, the increase in nutrient N deposition has the potential to lead to the degradation of the species present within the terrestrial habitats. Consultation would be undertaken with Taunton Deane Borough Council (now Somerset West and Taunton Council), who own the LNR, to better

understand the environmental pressures upon the habitats at the LNR and how N deposition may contribute to these and measures that could be taken to mitigate the effects. In the absence of such mitigation but noting that the nutrient N deposition effect is restricted to a small area within the wider LNR, the operation of the proposed scheme would result in permanent/irreversible damage to the terrestrial habitats of the LNR at a magnitude and extent that does not affect the integrity of the LNR. N deposition as a result of the operation of the proposed scheme would have a minor adverse impact upon Children's Wood/Riverside Park LNR, which is of local importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.

8.9.184 There are 110 non statutory designated sites, including Local Wildlife Sites (Somerset) and County Wildlife Sites (Devon) within 0.12 miles (200 metres) of the ARN. Potential N deposition impacts upon these sites will be assessed and reported in the ES.

#### Ancient Woodland

8.9.185 **Nitrogen deposition:** The proposed scheme would bring the carriageway of the A358 closer to Bickenhall Wood ancient woodland and would also result in an increase in traffic within 0.12 miles (200 metres) of the ancient woodland. As described in Chapter 5 Air Quality, this would result in a maximum increase in nutrient N deposition as a result of the proposed scheme in 2023 that is predicted to be 0.5kg N/ha/year at Bickenhall Wood ancient woodland. At this location there is a 5.0% increase in N deposition as a percentage of the lower critical load for the relevant habitat (10 kg N/ha/yr). In the absence of mitigation this increase in N deposition has the potential to directly impact the botanical species and change the vegetative composition and structure of the woodland, leading to degradation of the biodiversity of the ancient woodland.

8.9.186 Woodland planting is proposed adjacent to Bickenhall wood to help to buffer the woodland and compensate for degradation of the habitat. Opportunities would be sought to implement sensitive management within the woodland to benefit biodiversity and mitigate the loss of botanical diversity as a result of N deposition. Further studies would be undertaken to inform the assessment of the effect of N deposition on Bickenhall Wood and mitigation proposed as required, this would be reported in the ES. In the absence of such measures the operation of the proposed scheme would result in permanent/irreversible damage to the ancient woodland habitats of Bickenhall Wood that has the potential to affect its integrity. Operation of the proposed scheme would have a major adverse impact upon Bickenhall Wood ancient woodland, which is of national importance. This impact is therefore preliminarily assessed as a large adverse effect, which is significant.

8.9.187 The proposed scheme would result in an increase in traffic adjacent to the following additional ancient woodlands, as described in Chapter 5 Air Quality, this would result in an increase in N deposition at each of the following sites that exceeds 1% of the lower critical load:

- Unnamed ancient woodland 1/2/3/4 (north of the A30 at Coombe, West Crewkerne)
- Unnamed ancient woodland 5 (north of the A30 at Lower Coombe, West Crewkerne)
- Unnamed ancient woodland 6 (north of A303 at Boxstone Hill, Whitelackington)

- Knights Wood ancient woodland
- Warren Hill ancient woodland

8.9.188 Given that none of these sites will be subject to an increase in N deposition exceeding 0.4kg N/ha/year, in line with the guidance set out in DMRB LA 105 [23] it is considered unlikely that the N deposition would result in observable degradation of the habitats in these locations, i.e. resulting in the loss of one or more species. The preliminary assessment is that there will be no observable impacts, and therefore no change, at these sites as a result of N deposition associated with operation of the proposed scheme. As these sites are of national importance, this is preliminarily assessed as a neutral effect, which is not significant.

8.9.189 Further assessment of changes in N deposition at ancient woodland sites within 0.12 miles (200 metres) of the ARN will be undertaken and reported in the ES following further refinement of the design and the traffic modelling for the proposed scheme.

#### Habitats

8.9.190 There is potential for degradation of woodland, hedgerow and grassland habitat as a result of pollution from road traffic or surface water run-off during operation of the proposed scheme. With the embedded mitigation in the form of planting and attenuation basins to manage surface water run-off and pollution events from the road, the preliminary assessment is that there would be no observable impact upon, and therefore no change to, habitats within the Zol from pollution events during the operational phase of the proposed scheme. As habitats are of up to national importance, this is preliminarily assessed as a neutral effect which is not significant.

#### Protected species

##### *Bats*

8.9.191 The potential impacts of the operation of the proposed scheme on the bat assemblage are:

- increased risk of road mortality or injury
- habitat fragmentation

8.9.192 **Direct mortality:** Collision resulting in mortality of bats occurs in areas where bats would attempt to cross the highway when following existing or new linear features (hedgerows, tree lines, and other features). This is particularly relevant to the low flying woodland species present along the proposed scheme such as horseshoe bats and Bechstein's bats which are more reluctant to fly in the open and tend to commute along linear features in the landscape and woodland edges.

8.9.193 Key crossing points have been identified to date at Griffin Lane and Meare Stream Culvert; at these locations bats are safely crossing beneath the existing A358. New culvert and underbridge structures on the proposed scheme would be designed to tie into existing and proposed vegetation belts to encourage their use as safe crossing points for bats beneath the proposed scheme. At other key points where bats cross over the existing A358, the loss of the mature tree belts and hedgerows along the proposed scheme may increase the risk of bats coming into direct contact with vehicles. In such instances tall planting and 'hop-overs'

would be used to encourage bats to pass over the proposed scheme at a safe height, these would be tied into structural planting along the proposed scheme to funnel bats to safe crossing points. Habitat creation including woodland belts and hedgerows have been included in the environmental design to connect existing and proposed blocks of habitats, once established these will create new commuting routes for bats and help to channel them away from the road to safe crossing locations.

- 8.9.194 Through the further survey work being undertaken along the proposed scheme during 2021, including crossing point surveys and radiotracking, a better understanding will be gained of the key points along the proposed scheme where bat species are crossing. This will further inform the proposed scheme design and allow mitigation measures, including further habitat creation where required, to be developed appropriately. It is recognised that the habitat creation measures proposed take time to mature and provide the function required, even when they are provided early in the construction of the proposed scheme. However temporary screening will be deployed to serve the same function early in construction to provide mitigation while habitats establish. With these measures in place the risk of vehicular related mortality of bats as a result of the operation of the proposed scheme would result in temporary/reversible damage to the bat assemblage that would not affect its integrity. Direct mortality therefore represents a negligible adverse impact upon the local bat assemblage which is of national importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.195 **Severance of habitat and barrier to dispersal:** The operation of the proposed scheme would result in increased vehicular traffic and associated light spill onto adjacent habitats. This light spill has the potential to alter the behaviour of bats utilising these habitats, and could deter bats from using habitats beyond the proposed scheme. This has the potential to fragment the foraging and commuting routes of the local bat assemblage causing them to expend greater energy and resources by having to utilise more distant foraging grounds. Bats utilising habitats along the offline section of the proposed scheme are particularly vulnerable to displacement by light spill given that these habitats are currently some distance from the existing vehicular passage on the A358. The proposed scheme design incorporates a belt of hedgerow, trees and woodland alongside the proposed road, once established these habitats will help to mitigate the impacts associated with increased light spill from vehicles on adjacent habitats. Increased light levels from traffic would result in permanent/irreversible damage to commuting and foraging bats that would not affect the integrity of the bat assemblage. This represents a minor adverse impact on the bat assemblage of national value, which is preliminarily assessed as a slight adverse effect, which is not significant.
- 8.9.196 **Disturbance:** The operation of the proposed scheme would result in increased vehicular traffic and associated noise and vibration. Bat roosts have been identified in trees and buildings within 0.01 miles (20 metres) of the proposed scheme, in addition to further roosts between 0.01 miles (20 metres) and 0.06 miles (100 metres). Chapter 11 Noise and Vibration has assessed the increases in noise levels as significant for human receptors, however it is difficult to assess the impact on ecological receptors. There is little evidence to show what constitutes a significant adverse effect for bats. In their paper on the effects of anthropogenic noise on foraging bats, Schaub, et al [64] identify that whilst traffic noise and other sources of intense broadband noise are shown to degrade

the suitability of foraging areas, there are many examples of bats roosting in extremely noisy situations (bell towers of churches or under motorway bridges). Further assessment of the impact of operational noise will be undertaken on completion of the roost identification surveys and reported in the ES. However, given the existing background noise level associated with the traffic on the A358 and the proximity of the M5 traffic to the offline section, vehicular related noise and vibration disturbance as a result of operation of the proposed scheme is not anticipated to result in an observable impact upon, and, therefore, no change to, roosting or foraging bats. As the bat assemblage is of national importance, this is preliminarily assessed as a neutral effect, which is not significant.

#### *White-clawed crayfish*

8.9.197 The survey information gathered to date has concluded the likely absence of white-clawed crayfish within the study area of the proposed scheme. Surveys are being undertaken in 2021 to validate the findings of the previous surveys, however no change in status is expected given the national retreat in the range of white-clawed crayfish. As such the preliminary assessment is that there will be no observable impact upon, and therefore no change to, white-clawed crayfish populations as a result of the operation of the proposed scheme. As this species is of national importance, this represents a neutral effect which is not significant.

#### *Hazel Dormouse*

8.9.198 Given the high level of existing traffic related background noise, light and vibration disturbance upon dormouse habitats along the A358, additional disturbance impacts are not anticipated on this receptor of county importance as a result of operation of the proposed scheme. The preliminary assessment is that there will be no observable impact upon, and therefore no change to, the integrity of the dormouse population, as a result of operation of the proposed scheme. As this population is of county importance, this represents a neutral effect which is not significant.

#### *Breeding & wintering bird assemblages*

8.9.199 The potential impacts on the breeding and wintering bird assemblages during the operational phase are:

- road mortality
- disturbance

8.9.200 **Road mortality:** The existing A358 poses a risk to birds from collision with vehicles, however the proposed scheme would increase this risk through the widening of the road for dualling, and the operation of the offline section of the proposed scheme through insertion of the road into previously open countryside. Areas of habitat creation have been proposed along the proposed scheme, this would include the planting of tree belts and tall hedgerow planting to encourage birds up and over the carriageway, however it is recognised that this would take time to establish, therefore opportunities will be taken to begin habitat creation early within the construction programme, in advance of substantial vegetation clearance. Following the establishment of such planting, while recognising that the risk of road mortality cannot be fully mitigated, road mortality would represent permanent/irreversible damage to birds however this would not affect the integrity of the assemblage. Direct mortality represents a minor adverse impact

upon bird assemblages which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

- 8.9.201 **Disturbance:** The operation of the offline section of the proposed scheme would result in increased vehicular traffic and associated noise and lighting disturbance on adjacent habitats utilised by the bird assemblage. While it is recognised that birds utilising habitats along the existing A358 are likely to be habituated to disturbance associated with a busy road, the increased disturbance along the offline section is likely to displace birds both away from the immediate proposed scheme area, but also adjacent habitats where sound level changes are significant, and disturbance can cause functional habitat loss.
- 8.9.202 The proposed scheme includes the provision of areas of hedgerow, tree belt and woodland planting that would help to screen lighting impacts beyond the road. In addition, the proposed scheme includes the provision of hedgerows, grassland and woodland creation set back from the A358 where operational levels of noise and light pollution would be similar, or less than, background levels (pre-proposed scheme) in order to mitigate with functional habitat. Following the implementation of this mitigation, disturbance would result in permanent/irreversible damage to bird assemblages that would not affect their integrity. Disturbance represents a minor adverse impact upon bird assemblages which are of local importance. This impact is therefore preliminarily assessed as a neutral effect, which is not significant.

#### *Barn owl*

- 8.9.203 The potential impacts on the breeding and wintering bird assemblages during the operational phase are:
- increased risk of road mortality
- 8.9.204 **Road mortality:** alignment and widening of the road, improvements to traffic congestion and increased traffic speed would cause an increased risk of road mortality of barn owls. This is particularly relevant to young birds dispersing in the autumn months. While the closest OBS is located approximately 0.46 miles (750 metres) from the proposed scheme, there is one ARS and seven PNS within 0.31 miles (500 metres) of the proposed scheme. Studies estimate that between 3,000 and 5,000 barn owls are killed on roads annually, with over 90% of these fatalities occurring on major roads (motorways and dual carriageways) [65]. The rough grass verges alongside major roads provide long stretches of habitat for barn owl prey species and birds would frequently fly across the road at low height, resulting in the potential for direct conflict with traffic. The presence of major roads can cause the absence of breeding barn owls within 0.31 miles (500 metres) on either side of the road, with negative impacts detected up to 15.5 miles (25 kilometres) away from a major road [66]. Where the road realignment crosses existing areas of Type 1 and 2 habitats, mortality through collision with vehicles is likely to be highest. Type 1 and 2 habitats are present on either side of the A358 and within the land required for construction of the offline section of the proposed scheme.
- 8.9.205 Mitigation would include strategic planting of woody species of a height of at least 3 metres in areas considered to be of high collision risk to encourage barn owls to fly high over the road network and planting and management of grassland verges, keeping grassland short in specified areas or planting scrub to reduce the habitat suitability for small mammals and therefore decrease the foraging potential alongside the road verges for barn owls. The landscape design for the proposed

scheme has aimed to provide suitable foraging habitat set back from the road, as well as enhancement to hedgerows into the wider landscape to act as commuting routes for barn owls and connect existing habitat each side of the road corridor. Following the implementation and establishment of these measures, while recognising that the risk of road mortality cannot be fully mitigated, increased mortality of barn owl would result in permanent/ irreversible damage to barn owl however this would not affect the integrity of the barn owl population. Increased mortality risk represents a minor adverse impact on the barn owl population, which is of county importance. This impact is therefore preliminarily assessed as a slight adverse effect, which is not significant.

#### *Great crested newt*

8.9.206 No observable direct or indirect impacts upon the integrity of the great crested newts population, of county importance, are anticipated as a result of the operational phase of the proposed scheme. This is therefore preliminarily assessed as a neutral effect, which is not significant.

#### *Otter*

8.9.207 The potential impacts of the operation of the proposed scheme on otter are:

- injury or mortality

8.9.208 Otter are present on watercourses crossed by the proposed scheme. This includes watercourses that pass beneath the existing A358 and the Black Brook which would be crossed by the offline section of the proposed scheme. The operation of the proposed scheme has the potential to increase vehicular related injury and mortality of otter crossing the proposed scheme. Field sign evidence would suggest that otter use the existing culvert and underbridge structures to pass along watercourses under the A358, this in combination with the absence of otter mortality records in the data search, suggests that otter do not routinely cross over the existing A358 and risk being injured by vehicles. The operation of the proposed offline section of the proposed scheme is considered to represent a greater risk to otter as this would introduce a dual carriageway into otherwise open countryside and require culverting of watercourses, including the Black Brook. Fencing will be installed along the carriageway in key locations assessed as being at higher risk of otter crossing and as described above, mammal ledges would be installed on new culvert and underbridge structures, where size and vertical alignment can accommodate these, to allow passage of otter during flood events. This would be combined with hedgerow, scrub and tree planting and fencing to direct otter, and other species, through the safe crossing points under the proposed scheme.

8.9.209 While it is recognised the risk of the road vehicle related injury or mortality of otter cannot be completely removed, with the implementation of the measures described above the preliminary assessment is that the risk of mortality associated with the operation of the proposed scheme would be reduced to a level at which it has no observable impact, and therefore no change to, the otter population. As the otter population is of county importance, this is preliminarily assessed as a neutral effect, which is not significant.

*Water vole*

8.9.210 No observable direct or indirect impacts upon the integrity of the water vole population, of county importance, are anticipated as a result of the operational phase of the proposed scheme. This is therefore preliminarily assessed as a neutral effect, which is not significant.

*Brown hairstreak*

8.9.211 No observable direct or indirect impacts upon the integrity of the brown hairstreak population, of local importance, are anticipated as a result of the operational phase of the proposed scheme. This is therefore preliminarily assessed as a neutral effect, which is not significant.

*Badger*

8.9.212 The potential impacts on badgers during the operation phase are:

- injury or mortality

8.9.213 **Injury or mortality:** The dualling of the A358, and the operation of the offline section of the proposed scheme would result in an increased risk of vehicle collision related injury/mortality of badgers. The inclusion of fencing and crossing points in the form of mammal ledges in culverts and underbridges, and provision of badger tunnels in key locations where the proposed scheme severs identified badger territories would restore safe crossing points for badgers within their territories and across the wider landscape. Badger fencing and hedgerow, woodland and scrub planting would be included at crossing points to encourage and channel movement of badgers away from the highway and through safe culverts, underpasses and tunnels.

8.9.214 While it is recognised the risk of the road vehicle related injury or mortality of badger cannot be completely remove, with the implementation of the measures described above the preliminary assessment is that the risk of injury or mortality associated with the operation of the proposed scheme would be reduced to a level at which it has no observable impact upon, and therefore no change to, the badger population. As the badger population is of local importance, this is preliminarily assessed as a neutral effect, which is not significant.

*Reptiles*

8.9.215 No observable direct or indirect impacts upon the integrity of the reptile population, of local importance, are anticipated as a result of the operational phase of the proposed scheme. This is therefore preliminarily assessed as a neutral effect, which is not significant.

*Terrestrial invertebrates*

8.9.216 No observable direct or indirect impacts upon the integrity of the terrestrial invertebrate assemblage, of local importance, are anticipated as a result of the operational phase of the proposed scheme. This is therefore preliminarily assessed as a neutral effect, which is not significant.

*Fish*

8.9.217 Potential indirect impacts of the operation of the proposed scheme on fish communities include increased sedimentation, hydrological changes and

increased pollution events through surface run off or groundwater feeds. This may result in changes to water quality and associated degradation of habitats utilised by fish species. All operational impacts that are likely to affect aquatic receptors are identified within Chapter 13 Road Drainage and the Water Environment.

- 8.9.218 Embedded mitigation in design to avoid or reduce these impacts have been included and described within Chapter 13 Road Drainage and the Water Environment, including road drainage and attenuation ponds to mitigate impacts. As such, the preliminary assessment is that there would be no observable impact upon, and therefore no change to, fish populations, as a result of the operation of the proposed scheme. As the fish populations are of local importance, this is preliminarily assessed as a neutral effect, which is not significant.

#### *Aquatic macroinvertebrates*

- 8.9.219 Potential indirect impacts of the operation of the proposed scheme on macroinvertebrate communities include increased sedimentation, hydrological changes and increased pollution events through surface run off or groundwater feeds. Some species of aquatic macroinvertebrates are sediment sensitive and thus changes to suspended sediment or the bed substrate could result in loss of potential species. All operational impacts that are likely to affect aquatic receptors are identified within Chapter 13 Road Drainage and the Water Environment.
- 8.9.220 Embedded mitigation in design to avoid or reduce these impacts have been included and described within Chapter 13 Road Drainage and the Water Environment, including road drainage and attenuation ponds to mitigate impacts. As such, the preliminary assessment is that there would be no observable impact upon, and therefore no change to, the aquatic macroinvertebrate assemblage as a result of the operation of the proposed scheme. As the aquatic macroinvertebrate assemblage is of local importance, this is preliminarily assessed as a neutral effect, which is not significant.

#### *Other Section 41 Species of Principal Importance*

- 8.9.221 There is an inherent risk of mortality through traffic collision associated with SPIs crossing the carriageway. Crossing points have been included in the design in the form of culverts, underbridges and mammal tunnels, to improve connectivity and reduce mortality risk, providing fencing within key locations to funnel animals to safe crossing points. With the incorporation of this embedded mitigation the risk of mortality would be reduced to a level at which it would result in permanent/irreversible damage to the SPIs, that does not affect the integrity of the SPI populations which are of local importance. Traffic related mortality as a result of the operation of the proposed scheme represents a minor adverse impact, on SPIs, which are of local importance, preliminarily assessed as a slight adverse effect, which is not significant.

## **8.10 Monitoring**

- 8.10.1 Where significant adverse environmental effects are reported for a scheme, projects shall undertake monitoring in accordance with DMRB *LA 104 Environmental assessment and monitoring* [17].
- 8.10.2 Details of monitoring would be discussed with Natural England and the Environment Agency as required and agreed with Highways England. This would

be summarised in the Environmental Statement and detailed within the LEMP developed as an Annex of the EMP to be submitted with the ES.

## **8.11 Summary**

- 8.11.1 The preliminary assessment of impacts of the proposed scheme on biodiversity has identified a range of effects during construction and operation. The likely residual significant effects during construction and operation are summarised in Table 8-11 and Table 8-12 below.

**Table 8-11 Summary of preliminary assessment of likely significant construction effects**

<b>Ecological receptor</b>	<b>Description of potential impact</b>	<b>Embedded design, mitigation, and enhancement measures</b>	<b>Importance of receptor</b>	<b>Duration and reversibility</b>	<b>Magnitude of impact</b>	<b>Significance of potential effect</b>
Road Verges West of Hatch Beauchamp LWS	Total loss of all habitats within the Road Verges West of Hatch Beauchamp LWS	Compensatory grassland planting to include a diverse mix of species of local provenance.	County	Permanent/irreversible	Major adverse	Moderate adverse (significant)
Jordans Park LWS	Loss of 16% of the area of Jordans Park LWS, including loss of parkland habitats and mature (potentially veteran) trees.	Areas of species rich grassland, hedgerows, trees and woodland will be provided at Jordans park. Areas temporarily required will be reinstated post-construction.	County	Permanent/irreversible	Major adverse	Moderate adverse (significant)
Bickenhall Wood ancient woodland	Direct impacts to the root protection zone of trees within the ancient woodland due to vegetation clearance.	It is not possible to mitigate against the loss of ancient woodland.	National	Permanent/irreversible	Major adverse	Large adverse (significant)
Saltfield Copse LWS	Loss of 0.25 ha of ancient woodland habitat.	It is not possible to mitigate against the loss of ancient woodland.	National	Permanent/irreversible	Major adverse	Large adverse (significant)
Veteran trees	Loss of two veteran pedunculate oak trees within Jordans Park	It is not possible to mitigate against the loss of veteran trees.	National	Permanent/irreversible	Major adverse	Large adverse (significant)
Broadleaved semi-natural woodland	Loss of 28ha of broadleaved semi-natural woodland	Retention and protection of woodland and trees	National	Permanent/irreversible	Major adverse	Large adverse (significant)

	along the verges and embankments of the existing A358.	wherever loss can reasonably be avoided.				
Broadleaved semi-natural woodland	Planting of approximately 42.8 ha of broadleaved semi-natural woodland and 10.3ha of open woodland and grassland mosaic.	n/a	National	Permanent	Major beneficial	Large beneficial (significant)
Hedgerows	Loss of important and priority habitat hedgerows and fragmentation of the hedgerow network.	Protection of retained hedgerows.	National	Permanent / irreversible	Major adverse	Large adverse (significant)
Hedgerows	Planting of approximately 28.7 miles (46.2 kilometres) of native species-rich hedgerows.	n/a	National	Permanent	Major beneficial	Large beneficial (significant)
Species-rich grassland	Creation of 43.9ha of species rich grassland.	n/a	National	Permanent	Major beneficial	Large beneficial (significant)
Bats	Loss of foraging and commuting habitats for the bat assemblage, including the four Annex II species, leading to habitat fragmentation.	Retention and protection of high value habitats wherever loss can be reasonably avoided. Creation of a linked mosaic of higher quality habitats of suitability for bats.	National	Temporary/ reversible	Moderate adverse	Moderate adverse (significant)

**Table 8-12 Summary of preliminary assessment of likely significant operation effects**

<b>Ecological receptor</b>	<b>Description of potential impact</b>	<b>Embedded design, mitigation, and enhancement measures</b>	<b>Importance of receptor</b>	<b>Duration and reversibility</b>	<b>Magnitude of impact</b>	<b>Significance of potential effect</b>
Bickenhall Wood	Degradation of ancient woodland habitat due to increased nutrient nitrogen deposition of 0.5kg N/ha/year.	Planting of woodland adjacent to Bickenhall Wood ancient woodland to buffer from air pollution and compensate for habitat degradation. Opportunities will be sought to implement sensitive management within the woodland itself.	National	Permanent/irreversible	Major adverse	Large adverse (significant)

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 9  
Geology and Soils

HE551508-ARP-EGT-ZZ-RP-LE-000003

27/09/21

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## 9 Geology and soils

### 9.1 Introduction

- 9.1.1 This chapter assesses the potential effects on geology and soils from the construction and operation of the proposed A358 Taunton to Southfields Dualling Scheme, following the methodology set out in *Design Manual for Roads and Bridges* (DMRB) LA 109 *Geology and soils* [1]. The scope of the assessment and the abbreviations and terms of reference used in this chapter, are as described in DMRB LA 109 *Geology and soils*.
- 9.1.2 This chapter provides an overview of the regulatory and policy framework related to geology and soils, both nationally and locally, details the methodology followed for the preliminary assessment and current assumptions and limitations. The existing environment and development history of the area through which the proposed scheme passes and surrounding locality, is described with respect to geology and soils. This provides the basis on which the proposed design, mitigation and opportunities for enhancement are identified and discussed, allowing for the subsequent assessment of likely residual significant effects of the proposed scheme.
- 9.1.3 The impacts on the existing environment in the area surrounding the proposed scheme is considered with regard to:
- bedrock geology and superficial deposits, including geological designations and sensitive / valuable non-designated features
  - quantity and quality of agricultural land that would be affected, both temporarily and permanently
  - soil resources
  - land contamination on human health, surface water and groundwater receptors
- 9.1.4 In accordance with current contaminated land guidance [2] this chapter presents the baseline conditions with respect to potential soil and groundwater contamination and identifies potential contaminant linkages (PCLs) which could be formed due to the construction and/or operational phases of the proposed scheme. This forms the basis for the assessment of potential effects from land contamination.
- 9.1.5 Although designated sites exist within the region, there are no geological features of scientific interest and importance (e.g. Geological site of special scientific interest (SSSI) or Local Geological/Geomorphological Sites (LGS)) within the Geology and soils study area, therefore this aspect has been scoped out of further assessment.
- 9.1.6 Effects from land contamination are considered for soil, surface water and groundwater. Chapter 13 Road Drainage and the Water Environment details potential effects of the proposed scheme on surface and groundwaters from drainage and discharge, in terms of the potential effects on hydrogeology.
- 9.1.7 The potential effects of dewatering during construction works on paleoenvironmental and archaeological deposits are addressed in Chapter 6 Cultural Heritage.

- 9.1.8 The effects on mineral deposits as a resource and the suitability for reuse of soils are described in Chapter 10 Material Assets and Waste.
- 9.1.9 Chapter 7 Landscape considers the potential effects on geomorphology in relation to landforms.

## 9.2 Legislative and policy framework

### Legislation

- 9.2.1 Geological sites of national importance are principally afforded protection under the *Wildlife and Countryside Act 1981* [3] (as amended) or the *National Parks and Access to the Countryside Act 1949* [4] by designation as SSSI or National Nature Reserve (NNR). In addition, the Joint Nature Conservation Committee (JNCC) has carried out a Geological Conservation Review (GCR) and Earth Science Conservation Review (ESCR) to identify the best and most representative earth science sites in Great Britain, with a view to their long-term conservation. Although GCR/ESCR identification does not itself give any statutory protection, many GCR/ESCR sites have been notified as SSSIs.
- 9.2.2 Environmental legislation and regulation provide drivers to manage contamination. The main drivers for managing risks to human health and the environment from land contamination are:
- *Part IIA of the Environmental Protection Act (1990) (c. 43)* [5]
  - *The Contaminated Land Regulations (2006) (SI 2006/1380)* [6]
  - *Contaminated Land (England) Amendment Regulations (2012) (SI 2012/263)* [7]
  - *Environment Act (1995) (c.25)* [8] and
  - *The Environmental Permitting (England and Wales) Regulations 2016 (SI 2016/1154)* [9]
- 9.2.3 Under Part IIA of the Environmental Protection Act, sites are identified as 'contaminated land' if they are causing, or if there is a significant possibility of them causing significant harm to human health or significant pollution of controlled waters, as defined by Section 104 of the *Water Resources Act 1991* (c.57) [10]. In general terms, the legislation advocates the use of a risk based assessment approach for the assessment of contamination and remedial requirements.
- 9.2.4 The *Town and Country Planning (Development Management Procedure) (England) Order 2015 (SI 2015/595)* [11] sets out the statutory consultation procedures whereby Natural England must consider development proposals which are not in accordance with a development plan and individually or cumulatively involve the loss of more than 20 hectares (ha) of best and most versatile agricultural land.
- 9.2.5 Additional key legislation/regulations considered within the assessment relating to contamination include:
- *The Water Act 2003 (Commencement No. 11) Order 2012 (SI 2012/264)* [12]
  - *Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 (SI 2009.3104)* [13]
  - *The Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015)* [14]

- *The Environmental Damage (Prevention and Remediation) Regulations 2015 (SI 2015/810)* [15]
- *The Town and Country Planning (Development Management Procedure) (England) Order 2015 (SI 2015/595)* [11]

### National and regional planning policy

9.2.6 As discussed in Chapter 1 Introduction, the primary basis for deciding whether or not to grant a Development Consent Order (DCO) for the proposed project is the *National Policy Statement for National Networks (NPSNN)* [16], which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered. Table 9-1 identifies the NPSNN policies relevant to geology and soils, and then specifies where in the preliminary environmental information (PEI) report chapter information is provided to address the policy.

**Table 9-1 Relevant NPSNN policies for geology and soils assessment**

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where addressed in this chapter
5.22	<i>Where the project is subject to EIA ‘the applicant should consider likely significant effects on internationally, nationally and locally designated sites of ...geological conservation importance</i>	Section 9.7 Baseline conditions
5.23	<i>The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests</i>	Section 9.7 Baseline conditions – no sites of geological conservation importance have been identified within the study area.
5.25	<i>as a general principle, and subject to the specific policies below, development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives’</i>	Section 9.7 Baseline conditions have identified no sites of geological conservation importance within the study area and therefore no mitigation required.
5.168	<i>for developments on previously developed land ‘applicants should ensure that they have considered the risk posed by land contamination and how it is proposed to address this</i>	Section 9.7 Baseline conditions, identifies potential land contamination sites Section 9.8 Potential impacts - describes how potential contaminant sources could impact identified receptors. Embedded and additional mitigation to address these impacts are described in Section 9.9.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where addressed in this chapter
5.168	<i>where significant development of agricultural land is necessary applicants should seek to use areas of poorer quality land in preference to that of a higher quality. Applicants should consider the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification). Applicants should also identify any effects, and seek to minimise impacts, on soil quality, taking into account any mitigation measures proposed</i>	Section 9.7 Baseline conditions, identifies Agricultural Land Classification (ALC) grades of the area directly intersected by the proposed scheme and proposed scheme redline boundary. Section 9.8 Potential impacts – identifies how land is impacted both temporarily and permanently and the area of each ALC grade impacted. Section 9.9 Design, mitigation and enhancement measures describes best practice mitigation measures for the protection of soil.
5.179	<i>states ‘applicants can minimise the direct effects of the project on existing uses of the proposed site or proposed uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction’</i>	Section 9.9 Design, mitigation and enhancement measures describes best practice mitigation measures for the protection of soil.

- 9.2.7 In addition to the NPSNN, this PEI Report also considers the *National Planning Policy Framework* (NPPF) [17] and relevant *Planning Practice Guidance* (PPG) including that for land contamination [18], which emphasises the need for sustainable development in terms of the resources used, the maintenance of the environment, the economic use of land and societal considerations within the general area. The importance of the restoration of derelict and contaminated land is stated.
- 9.2.8 In relation to conserving and enhancing the natural environment, the NPPF states that impacts on geodiversity should be reduced by preventing harm to geological conservation interests. In the UK, geological sites are afforded consideration at a local level by designation, including:
- Geological Conservation Review (GCR) sites (England, Scotland, Wales)
  - Geoparks
  - Regionally Important Geological and Geomorphological Sites (RIGS)
  - Local Geological/Geomorphological Sites (LGS)
  - Sites of Importance for Nature Conservation (SINC)
- 9.2.9 Regarding development on land affected by contamination, the NPPF emphasises the requirement to understand the ground risks, and the development of appropriate remediation to make ground hazards material considerations during the planning process.
- 9.2.10 It also states that planning policies and decisions should ensure that a site is suitable for its proposed use taking account of ground conditions. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation).

- 9.2.11 With regards to agricultural land, the NPPF states that: “where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality”. The protection and enhancement of soils is also considered an important element of the conservation of the natural environment.
- 9.2.12 The NPPF states that planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of land instability.
- 9.2.13 It should be noted that the direct environmental impacts of land instability are excluded from this chapter in accordance with DMRB LA 109 *Geology and soils* [1], which states; “*Risks associated with geotechnical hazards and land stability are assessed in accordance with CD622, Managing geotechnical risk.*” [19]
- 9.2.14 Indirect impacts associated with land stability mitigation, such as damage to the landscape or ecological receptors have been considered within their respective chapters.

### Local planning policy

#### Taunton Deane Borough Council Adopted Core Strategy (TDBC) 2011-2028 [20]

- 9.2.15 This strategy sets out the vision for future development of the Taunton Deane borough with objectives and policies developed to control and direct development.
- 9.2.16 The strategy includes environmental objectives and policies:
- Strategic objective 8 – ‘*maintain and enhance biodiversity, the natural and man-made environment, minimising the need to travel, waste, pollution and the use of non-renewable resources and to promote good design and materials which respect and enhance local distinctiveness.*’
- 9.2.17 This strategic objective is to be delivered via core policies specifically core policy CP8, Environment, which aims to enhance and protect the natural and historic environment including geological sites.
- 9.2.18 The TDBC strategy is to be replaced by the *Somerset West and Taunton Local Plan 2040* once adopted [21].

#### West Somerset Local Plan to 2032 (adopted 2016) [22]

- 9.2.19 The Local Plan for West Somerset aims to help make West Somerset a better place to live, work and study in. The Local Plan sets out a vision for the sustainable development of the communities in West Somerset over the next 20 years and provides the means of achieving it through the application of strategic planning policies.
- 9.2.20 Policy NH9; Pollution, Land Contamination and Land Instability requires that;
- ‘All development proposals on or in proximity to land known to be, or which may be, contaminated will include measures designed to prevent an unacceptable risk to public health and the environment.’*
- 9.2.21 The purpose of the policy is to prevent new development being adversely affected by land contamination and protect users of the new development.

### South Somerset Local Plan 2006-2028 [23]

- 9.2.22 Contaminated land is covered in policy EQ7 Pollution control, and in line with the NPPF, this policy aims to ensure new developments do not harm existing residents, future residents, or the natural environment. The policy states that *‘Development that, on its own or cumulatively, would result in air, light, noise, water quality or other environmental pollution or harm to amenity, health or safety will only be permitted if the potential adverse effects would be mitigated to an acceptable level by other environmental controls, or by measures included in the proposals. This may be achieved by the imposition of planning conditions or through a planning obligation.’*
- 9.2.23 Sites of geological importance are considered in policy EQ4 Biodiversity, stating that all proposals for development, including those which would affect sites of regional and local biodiversity, nationally and internationally protected sites and sites of geological interest, should be designed to protect, enhance and conserve these protected areas. *‘Development will not be allowed to proceed unless it can be demonstrated that it will not result in any adverse impact on the integrity of national and international wildlife and landscape designations, including features outside the site boundaries that ecologically support the conservation of the designated site’.*

### **Standards and guidance**

- 9.2.24 This PEI Report refers to the following guidance:
- *Geotechnics, General Information, Managing Geotechnical Risk, CD 622, (formerly DMRB Volume 4, Section 1, Part 2 HD 22/08) [19]*
  - *DMRB LA 104 Environmental assessment and monitoring [24]*
  - *DMRB LA 109 Geology and Soils [1]*
  - *DMRB LA 113 Road drainage and the water environment [25]*
  - *Contaminated Land Statutory Guidance, Department for Environment, Food and Rural Affairs (Defra), 2012 [26]*
  - *Environment Agency (2020) Land Contamination: Risk Management, [27]*
  - *BS 5930:2015 + A1 2020: Code of Practice for Site Investigations [28]*
  - *BS 10175:2011 + A2 2017: Code of Practice for Investigation of Potentially Contaminated Sites [29]*
  - *Environment Agency (2010) Guiding Principles for Land Contamination [30]*
  - *Environment Agency (2018) The Environment Agency’s approach to groundwater protection [31]*
  - *CIRIA C552: Contaminated Land Risk Assessment, A guide to good practice [32]*
  - *CIRIA C681: Unexploded ordnance (UXO) A guide for the construction industry [33]*
  - *Defra: Soil Strategy for England – Safeguarding Our Soils, 2009 [34]*
  - *Defra: The Natural Choice: securing the value of nature, 2011 [35]*
  - *Defra: Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, 2009 [36].*

## **9.3 Assessment methodology**

- 9.3.1 This section outlines the methodology employed for assessing the likely significant effects on geology and soils from the construction and operation of the proposed scheme. The assessment methodology is based on LA104.

9.3.2 An overview of the methodology is provided below and comprises the following steps:

- Establish outline study area and baseline conditions.
- Undertake a desk-based review of study area to include; physical conditions, historical information and current regulatory data on potentially contaminative activities.
- Establish the potential for significant effects based on the scoping in DMRB LA 109 *Geology and soils*.
- Where likely significant effects are identified, complete a detailed baseline assessment which is representative of current conditions without implementation of the project.
- Finalise study area based on proposed scheme design and baseline scenarios.
- Establish design and mitigation measures.
- Undertake assessment of likely significant effects.
- Recommend monitoring where significant effects are reported.

#### **Identification of baseline conditions**

9.3.3 The scope of the baseline studies for specific topic areas is listed in 9.4.5. The identification of baseline conditions for geology and soils is primarily based on desk study information included within the Preliminary Sources Study Reports (PSSR) [37] and the Contamination Preliminary Risk Assessment (PRA) report [38].

9.3.4 The PSSRs were completed prior to adoption of preferred route option, 'pink modified route'. The options assessment process is set out in Chapter 3 of this PEI Report: Assessment of Alternatives. The PRA [38] was completed after preferred route announcement in June 2019.

9.3.5 Baseline data have been abstracted from the following sources:

- The options selection stage PSSR (HE551508-MMSJV-HGT-000RP-CE-0001) [37] was based on the following main primary sources:
  - previous reports available from the Highways Agency Geotechnical Data Management Systems (HAGDMS) website
  - a review of previous site investigations (SI)
  - Landmark Envirocheck Reports obtained between 2016 and 2018
  - Benham, A J et al. 2005. Mineral Resource Information in Support of National, Regional and Local Planning: Somerset (comprising Somerset, North Somerset, Bath and North East Somerset, the City of Bristol, and part of Exmoor National Park). British Geological Survey Commissioned Report, CR/04/214N
  - Multi Agency Geographic Information for the Countryside (MAGIC) website
  - findings of site walkovers completed between April and May 2017.
- The options selection stage Environmental Scoping Report (ESR) (HE551508-MMSJV-EGN-000-RP-LP-0006) [39].
- The options selection stage Environmental Assessment Report (EAR) (HE551508-MMSJV-EGN-000-RP-LP-0001) [40].
- The options selection stage Preliminary Sources Study Addendum (PSSR); (HE551508-MMSJV-HGT-0000-RP-CE-0006) [41].

- The options selection stage Environmental Assessment Report Addendum (EAR) (HE551508-MMSJV-EGN-000-RP-LP-0030) [42].
- Agricultural Development Advisory Service (ADAS) (1995), Taunton Deane Local Plan (MAFF ref. ALCB00895 [43]).
- Cranfield University (2001), The National Soil Map of England and Wales 1:250,000 scale, Cranfield University: National Soil Resources Institute [44].
- Soil Survey of England and Wales (1984), Soils and Their Use in South West England, Harpenden [45].
- MAGIC interactive mapping [46].
- Natural England's Regional ALC Maps [47].
- The Environmental Constraints Plan.
- Stage 3 Contamination Preliminary Risk Assessment (PRA), 2021 [38], which was based on the following additional sources:
  - Groundsure Geographic Information System (GIS) dataset (2021)
  - Groundsure Insight reports (2021)
  - British Geological Survey (BGS) Geoindex
  - Aerial photographs
  - Local Authority contaminated land searches

9.3.6 For land contamination, the collation and assessment of the baseline data has been undertaken in line with current guidance, Land Contamination: Risk Management [2].

9.3.7 A Tier 1 preliminary risk assessment of potentially contaminated land sites has been completed in accordance with LCRM [2]. This is reported in the PRA [38] as individual conceptual site models (CSMs) for each site. Appendix 9.2 summarises the CSMs from the PRA. The risk assessments have been completed in accordance with current guidance and detail of the methodology is presented in Appendix 9.3 Detailed Assessment Methodology for Contaminated Land.

### **Assessment Methodology**

9.3.8 The environmental impact assessment methodology outlined below applies to both construction and operational phases of the propose scheme.

9.3.9 The assessment was undertaken in accordance with the following:

- DMRB LA 104 *Environmental assessment and monitoring* [24]
- DMRB LA 109 *Geology and soils* [1]

9.3.10 The key steps to the assessment are outlined below:

- Step 1: assess the value (sensitivity) of receptors, shown in Table 9-2, in accordance with Table 3.11, DMRB LA 109 *Geology and soils*.
- Step 2: assess the magnitude of impact on receptors, shown in Table 9-3, Table 3.12 in DMRB LA 109 *Geology and soils*.
- Step 3: derive impact significance from receptor value and magnitude of impacts, shown in Table 9-4 and in accordance with Table 3.8.1 in DMRB LA 104 *Environmental assessment and monitoring*. The significance of effect is determined by comparison of the identified value (sensitivity) of the receptors with the magnitude of the effect. For the purpose of this assessment, values of moderate adverse and above have been defined as significant effects.

**Table 9-2 Environmental value (sensitivity) of receptors in the study area**

<b>Value/ sensitivity</b>	<b>Aspect</b>	<b>Description</b>	<b>Examples within the study area</b>
Very High	Geology	International designated sites of geological value (e.g. United Nations Educational Scientific and Cultural Organization (UNESCO) World Heritage Sites).	None identified within the study area.
	Agricultural land and soil	ALC Grades 1 and 2 <sup>1</sup> . Soils directly supporting an EC designated site (e.g. Special Area of Conservation (SAC) or Special Protection Area (SPA)) <sup>2</sup> .	Detailed post 1988 data shows areas of land in ALC Grade 2 to the north of the study area. An area of land in Grade 2 is also predicted to be found south-west of Thornfalcon.
	Human health	Very sensitive land use such as residential, allotments, schools.	Residential properties scattered along the route and settlements including; Henlade, Rushton, Thornfalcon, Haydon, West Hatch, Hatch Beauchamp and Ashill with other residential properties. Also Somerset Progressive School adjacent the route at West Hatch, Ashill Primary School.
	Groundwater	Principal aquifer <sup>3</sup> , providing a regionally important resource and/or supporting a site protected under EC and UK legislation. Groundwater that locally supports a groundwater dependent terrestrial ecosystem (GWDTE). Inner source protection zone (SPZ1).	No source protection zones within the vicinity of the route and study area. No Principal aquifer within the study area.
	Surface water	Watercourse having a Water Framework Directive (WFD) classification shown in a River Basin Management Plan (RBMP) and a Q95≥1.0m <sup>3</sup> /s. <sup>3</sup> Species or site protected/ designated under EC or UK legislation e.g. site of special scientific interest (SSSI), SPA.	No watercourses of this sensitivity were identified in the study area.
High	Geology	Regionally Important Geological Sites with limited potential for replacement (e.g. RIGS). Geology meeting regional designation citation criteria which is not designated as such.	None identified in the study area.
	Agricultural land and Soil	ALC Subgrade 3a Soils supporting a UK designated site (e.g. SSSI).	Detailed post-1988 data show areas of land in ALC Subgrade 3a at the western end of the proposed scheme at the M5 Junction 25. A large part of the study area north of West Hatch, and a small area south of

Value/ sensitivity	Aspect	Description	Examples within the study area
			Capland is also predicted to be in Subgrade 3a.
	Human health	High sensitivity land use such as public open space, recreational grounds, public rights of way (PRoW).	Users of parks/recreation grounds, PRoW, such as recreational ground at Ashill.
	Groundwater	Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports GWDTE, SPZ2.	Secondary aquifers (undifferentiated)/Secondary A aquifers
	Surface water	Watercourse having a Water Framework Directive (WFD) classification shown in RBMP and a $Q_{95} < 1.0 \text{m}^3/\text{s}$ . Species protected under EC or UK legislation.	Broughton Brook, River Isle
Medium	Geology	Regionally Important Geological Sites (RIGS) with limited potential for replacement. Geology meeting regional designation criteria which is not designated as such.	None identified in the study area.
	Agricultural land and Soil	ALC Subgrade 3b Soils supporting non-statutory designated sites (e.g. LNR).	Detailed post-1988 data shows large area of land in ALC Subgrade 3b at the western end of the proposed scheme at the M5 Junction 25. The majority of the agricultural land in the study area south of West Hatch is predicted to be ALC Subgrade 3b.
	Human health	Medium sensitivity land use such as commercial or industrial.	Users of commercial properties and industrial areas located throughout the study area, for example: depot, petrol filling station (PFS), farm workers.
	Groundwater	Secondary B aquifer / aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3	Secondary B aquifers in Mercia Mudstone Group and Branscombe Formation
	Surface water	Watercourse not having a WFD classification shown in RBMP and a $Q_{95} > 0.001 \text{m}^3/\text{s}$ .	Black Brook Tributaries (1 to 6), Venner's Water, Cad Brook.
Low	Geology	Geology of local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarries / mining sites).	Local Geological / Geomorphological Site, identified 950m east (beyond study area). Historical mineral extraction sites.

Value/ sensitivity	Aspect	Description	Examples within the study area
	Agricultural land and Soil	ALC Grades 4 and 5. Soils supporting non-designated notable or priority habitats.	Some local areas of ALC Grade 4 and 5 land could be present in the land currently predicted to be Subgrade 3b.
	Human health	Low sensitivity land use such as highways and rail.	Local road network.
	Groundwater	Unproductive strata.	Charmouth Mudstone Formation including the Belemnite Member at the eastern end of the route
	Surface water	Watercourse not having a WFD classification shown in RBMP and a $Q_{95} \leq 0.001 \text{m}^3/\text{s}$ .	Fivehead River Tributaries 1, 3, 4 & 5
Negligible	Geology	No geological exposures, little / no local interest.	None within the study area.
	Agricultural land and Soil	Previously developed land formerly in 'hard uses' with little potential return to agriculture.	A number of areas within the study area have been previously developed.
	Human health	Undeveloped surplus land / no sensitive land use proposed.	Undeveloped field.
	Groundwater	Not included in Table 3.70 of LA 113	Not applicable.
	Surface water	Not included in Table 3.70 of LA 113	Not applicable.
Notes:			
1 Refer to Section 9.6.15 for definition of ALC			
2 Refer to Chapter 18 Glossary for definition of environmental designations			
3 Refer to Chapter 13 Road drainage and the water environment for description of controlled water designations.			

**Table 9-3 Magnitude of impact and typical description**

Magnitude of impact (change)	Receptor type	Typical description
Major	Geology	Loss of geological feature/designation and/or quality and integrity, severe damage to key characteristics, features or elements.
	Soils	Physical removal or permanent sealing of soil resource or agricultural land (>20ha).
	Contamination	1) human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. category 4 screening levels, refer to Appendix 9.3) with potential for significant harm to human health. Contamination heavily restricts future use of land. 2) surface water: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria e.g. environmental quality standards (EQS)/UK drinking water standards (DWS). Contamination causes significant chemical/biological degradation of water, reduction in WFD Classification/loss of regionally important public water supply. 3) groundwater: significant contamination identified.

Magnitude of impact (change)	Receptor type	Typical description
		Contamination levels significantly exceed background levels and relevant screening criteria e.g. EQS/ DWS Contamination causes reduction in water body WFD classification, loss of regionally important public water supply, loss of or extensive change to GWDTE.
Moderate	Geology	Partial loss of geological feature/designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Soils	Permanent loss/reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource.), Including: 1) physical removal or permanent sealing of 1ha-20ha of agricultural land; or 2) permanent loss/reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource).
	Contamination	1) human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. category 4 screening levels). Significant contamination can be present. Control/remediation measures are required to reduce risks to human health/make land suitable for intended use. 2) surface water: contamination exceed background levels and are in-line with screening criteria e.g. EQS/DWS. Control/remediation measures are required to improve water quality, degradation of regionally important public water supply, contribution to reduction in water body classification. 3) groundwater: contamination exceed background levels and are in-line with screening criteria e.g. EQS/DWS. Control/remediation measures are required to improve water quality, contribution to reduction in water body classification, degradation of regionally important public water supply, partial loss of the integrity of GWDTE.
Minor	Geology	Minor measurable change in geological feature/designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Soils	Temporary loss/reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource.)
	Contamination	1) human health: contaminant concentrations are below relevant screening criteria (e.g. category 4 screening levels). Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health. 2) surface water: contaminant concentrations are below relevant screening criteria (e.g. EQS/DWS). Minor effects on water supplies. 3) groundwater: contaminant concentrations are below relevant screening criteria (e.g. EQS/DWS). Minor effects on an aquifer, GWDTEs, abstractions.
Negligible	Geology	Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature/designation. Overall integrity of resource not affected.

Magnitude of impact (change)	Receptor type	Typical description
	Soils	No discernible loss/reduction of soil function(s) that restrict current or approved future use.
	Contamination	<ol style="list-style-type: none"> <li>1) human health: contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g. category 4 screening levels). No requirement for control measures to reduce risks to human health/make land suitable for intended use.</li> <li>2) surface water: contaminant concentrations substantially below screening criteria (e.g. EQS/DWS).</li> <li>3) groundwater: contaminant concentrations substantially below screening criteria (e.g. EQS/DWS). No measurable impact on aquifer.</li> </ol>

Table 9-4 Significance matrix

		Magnitude of impact (degree of change)				
		No change	Negligible	Minor	Moderate	Major
Environmental value (sensitivity)	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

### Consultation/Engagement

9.3.11 Engagement has taken place with key stakeholders since 2018 including:

- A technical working group (TWG) was established for the options selection stage of the proposed scheme and a workshop held on the 8 May 2018. A number of statutory environmental bodies attended with representatives from the National Trust, Natural England, South Somerset District Council (SSDC), Blackdown Hills Area of Outstanding Natural Beauty, Taunton Deane Borough Council and West Somerset Council.
- Consultation with the Environment Agency, regarding records of historical landfills within the study area.
- Consultation with Somerset West and Taunton Council (SWTC) and SSDC to obtain information on historical landfills, potentially contaminated land and private water abstractions.

9.3.12 Recent enquiries have been made with Somerset County Council (SCC) with regard to information on historical landfills and to consult on the study area. The relevant Petroleum Licensing Officers (PLO) have been contacted for copies of their records for the fuel sites within the study area.

9.3.13 Engagement is currently on-going and specific further consultation with the Environment Agency will be necessary to discuss the effect of the proposed scheme on the landfill sites identified and vice versa.

9.3.14 Public consultation has been undertaken for previous stages and a community engagement has been completed at the end of March on the preferred route alignment with further dates planned.

## 9.4 Assessment assumptions and limitations

9.4.1 The assessment undertaken for geology and soils has been based on the collation and evaluation of available documentation listed in Section 9.3.5.

9.4.2 The proposed assessment methodology is, therefore, largely dependent on information obtained from third party sources the quality of which has not been independently verified. Some additional information may be available for future drafts, from the proposed SI and monitoring programmes.

9.4.3 The approach which was adopted for the assessment of contamination at the site is based on current best practice guidance.

9.4.4 In areas of land that would be temporarily acquired for construction, soils would be managed in accordance with Defra (2009) *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites* [36] and restored to the reasonable satisfaction of the owners of the land.

9.4.5 It is assumed that prior to completion of construction, the areas adjacent to the proposed scheme used for access, egress and other associated construction works would be restored to the reasonable satisfaction of the owners of the land.

9.4.6 It is assumed that potential effects on human health (e.g. for construction and maintenance workers) would be mitigated through adherence to relevant legislation and best practice with respect to health and safety management, including the *Construction (Design and Management) Regulations (CDM) 2015* (SI 2015 No. 51) [48].

9.4.7 The following limitations have been encountered:

- Currently only provisional ALC data is available for the majority of the study area and as such the potential impact on soil and agricultural land cannot be fully assessed at this stage. A detailed soil survey will be undertaken to inform further stages of assessment.
- A SI is being scoped at the time of writing. In the absence of investigation data, potential impacts to current land users, groundwater and surface water from land contamination cannot be fully assessed at this stage.
- The SI is programmed to be completed and data made available in time to inform the assessment. However, if some of the SI data are unavailable at the time of drafting the Environmental Statement, a qualitative land contamination risk assessment will be completed.

9.4.8 It is proposed to undertake additional technical consultation with various statutory and non-statutory bodies and external sources to obtain the latest information on baseline conditions. However, the information held by these sources may in some cases be limited and may be delayed. Where there is a lack of third-party data, professional judgement will be used in interpreting available desk study information.

## 9.5 Study area

- 9.5.1 DMRB LA 109 *Geology and Soils* [1] does not set a defined study area but states that it should be 'identified on a project by project basis' taking account of the following:
- Construction footprint including compounds and temporary land take.
  - Potential and actual land contamination inside and outside the construction footprint which could affect receptors.
  - Location of off-site sensitive receptors (such as controlled waters, land users and neighbours) that can be affected by the project.
- 9.5.2 The study area for this PEI report has therefore taken into account the above, the physical conditions of the site and surrounding area. The following define the study area, with buffers measured from the centre line:
- The limits of the land to be used either temporarily or permanently for the construction and operation of the proposed scheme for soils and agricultural land and designated geological sites.
  - 250m for potential land contamination sites and past pollution incidents.
  - 500m for landfills/waste management sites (historical and current).
- 9.5.3 The extent of these zones has been developed using professional judgement on the basis that contamination migration beyond this distance is likely to be minimal or could be mitigated. As the design of the proposed scheme progresses additional areas may be incorporated into the assessment which will be reported in the Environmental Statement. The study area is shown on Figure 9.1 Study Area.
- 9.5.4 The following sections describe the baseline geology and soil conditions and identify receptors and potential impacts within the study area as defined above.

## 9.6 Baseline conditions

- 9.6.1 Baseline conditions are described in detail in the PSSRs previously prepared [37] [41] and the PRA [38], a summary of conditions is provided in the following sections.

### Topography

- 9.6.2 The route joins the M5 at junction 25 where the motorway gyratory is above the main carriageway with a maximum elevation of approximately 20m above ordnance datum (AOD). The Broughton Brook watercourse is located beneath the existing slip road to the M5, which is at an elevation of approximately 10m AOD. Heading south-east towards the proposed Henlade Interchange, the topography passes through a valley and elevation remains relatively flat before gradually rising to a maximum of 16m AOD at the location of the proposed Henlade Interchange.
- 9.6.3 The alignment then descends into a wide valley containing Greenway bridge (approximately 21m AOD) before rising again to Mattock's Tree Hill at an existing height of approximately 60m AOD. There is then very little relief in terrain until Cad Road junction, ranging between 45-55m AOD as the route passes the hilltop village of Ashill. There is then a gentle decrease in existing ground levels until the alignment reaches the A303 at Southfields roundabout at an approximate

elevation of 35m AOD. The topography of the area is presented on Figure 9.2 Topography.

## **Geological setting**

### Artificial ground

9.6.4 Artificial ground is a term used by the British Geological Survey (BGS) for those areas where the ground surface has been significantly modified by human activity and includes areas of made ground, worked ground, landscaped and infilled ground. No areas of artificial ground are recorded on published sources beneath the route or within the proposed scheme boundary, however these are anticipated within the study area associated with historical land uses, such as; a dismantled railway which intersects the existing A358 and the proposed route at West Hatch Lane junction, and an inert landfill at Ashill junction adjacent to the existing A358.

### Superficial deposits

9.6.5 The superficial geology where present beneath the route, comprises Quaternary age deposits of Head (gravel, sand and clay), Colluvium (Diamicton) and Valley Head or Alluvium (clay, silt and sand overlying gravel). An interdigitated succession of alluvium and colluvium is prevalent in the floodplain of the River Isle (at the eastern end of the proposed scheme). The location of superficial deposits is shown on Figure 9.3 Published Geology – Superficial Deposits.

### Bedrock geology

9.6.6 A summary of the bedrock geology underlying the study area is described below and is shown on Figure 9.4 Published Geology - Bedrock:

- Mercia Mudstone, comprising Mudstone and Halite-stone at the M5 junction to Haydon.
- Branscombe Formation, consisting of reddish brown, weakly calcareous mudstones approximately 180m thick, of the Mercia Mudstone Group to south of Henlade.
- Blue Lias Formation underlies the route from just north of Griffin Lane to Folly Drove, comprising interbedded grey mudstones and limestones, with a thickness of 45m.
- From Folly Drove to Southfields the route is underlain by Charmouth Mudstone comprising dark grey laminated shales and dark, pale and bluish grey mudstone, approximately 95m thick, which dips to the south-east.
- At Ashill the Belemnite Marl Member is recorded either side of the current A358 beneath the proposed link roads, comprising dark grey interbedded calcareous mudstones with abundant belemnites, 25m thick and dipping to the south-east.

9.6.7 The route is crossed by two normal faults; north of Griffin Lane trending north-west to south-east and north of Horton Cross Farm, trending north east to south-west.

9.6.8 Further detail of the geology and existing borehole records can be found within the PSSRs. Additional SI will be completed to confirm the geochemical, geological and hydrogeological conditions within the study area not covered by previous investigations.

- 9.6.9 No landslips are recorded on the route, although two are recorded within 300m of it; Stoke Wood Landslip to the south and Island Copse landslip to the north. The potential for slope instability associated with Colluvium and Valley Head deposits and the underlying mudstone is noted, see the PSSR for further details.

#### Mining, quarrying and mineral resources

- 9.6.10 BGS Mineral Resource Information has been referenced in the options selection stage Scoping Report and EAR, no recorded mineral sites have been identified in close proximity to the route, although the Blue Lias Formation (limestone) is recorded as a resource which intersects the route.
- 9.6.11 Superficial deposits are not identified as a mineral resource in the BGS onshore mineral resources database, however, there is evidence for historical quarrying in the area, see following paragraphs. Further detail and assessment are presented in Chapter 10 Material assets and Waste.

#### Historical mineral extraction sites (potentially infilled)

- 9.6.12 Two areas of historical quarrying have been identified within the study area based on historical mapping:
- A quarry is indicated on-route near Home Farm.
  - A gravel pit just north of the proposed Jordan's Bridleway.
- 9.6.13 The presence or composition of any backfilled material is unknown.

#### **Geological designated sites**

- 9.6.14 A local geological/geomorphological site (LGS) is recorded, south east of Hatch Beauchamp approximately 950m east of the route, identified as the Hatch Beauchamp Cutting designation noted as 'Exposure of Rhaetic clays and limestone in former railway cutting near Hatch Fault'. According to the options selection stage reports, no other designated geological sites of local, regional, national or international importance have been identified along the route or within the study area.

#### **Soils and agricultural land**

- 9.6.15 The quality of agricultural land in England and Wales is graded from 1 to 5 under the post-1988 ALC system, dependent on the extent to which physical or chemical characteristics of the soil impose long-term limitations on the agricultural use of the land. Grade 1 land is excellent quality agricultural land with either no or very minor limitations to its agricultural use. Grade 5 is very poor quality land, with severe limitations due to adverse soil, relief, climate or a combination of these factors. Grade 3 land is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land).
- 9.6.16 Best Most Versatile (BMV) agricultural land is defined as Grades 1, 2 and Subgrade 3a of the ALC system. BMV land is the most flexible land in terms of the range of crops that can be grown, gives the highest yield, produces the most consistent yield, and requires fewer inputs.

#### Desk studies

- 9.6.17 As it has not been possible to carry out a detailed soil survey prior to the publication of this PEI Report, baseline soils and agricultural land conditions have

been determined using existing published information. Detailed surveys will be carried out in the summer of 2021 to inform the Environmental Statement.

- 9.6.18 The publicly available information considered includes Natural England's 1:250 000 scale *Regional ALC Map* [47], which is intended by Natural England for strategic use only and is not intended for use in assessment of individual sites. It should also be noted that the map shows the provisional Grades 1-5, but Grade 3 is not subdivided. Where detailed ALC mapping is available, the grade of agricultural land within the study area has been described.
- 9.6.19 Provisional ALC data for the study area show the area to be dominated by undifferentiated Grade 3 land. When soil and climate data is also taken into consideration, it is anticipated that this land would be a broadly even mix of BMV land in Subgrade 3a and lower quality land in Subgrade 3b. There are two small areas provisionally mapped as Grade 4 at the eastern portion of the A358 associated with alluvial soils adjacent to Venner's Water and a tributary leading to Cad Brook.
- 9.6.20 Available soil mapping shows the route to traverse nine soil associations which can be roughly grouped into four soil types:
- Imperfectly drained fine loamy or silty over clay, or clayey, of the Worcester, Whimble 3, Wickham 2 and Oxpasture associations.
  - Poorly drained stoneless clay soils developed in river alluvium, of the Compton and Fladbury 1 associations.
  - Imperfectly drained calcareous clays of the Evesham 1 and Evesham 3 associations.
  - Well drained coarse loamy soils over gravel, of the Newnham association.
- 9.6.21 Climate, which can place a limitation on agricultural land quality, is warmest and driest in the north of the study area, becoming cooler and wetter in the south. The number of Field Capacity Days (FCD), when the soil moisture deficit is zero, is larger than is typical for lowland England which generally constrains agricultural cultivation and soil handling for relatively long periods over winter.
- 9.6.22 The first three grouped soil types identified in Paragraph 9.7.19 above are likely to be subject to similar wetness and workability limitations whilst the Newnham soils are more likely to be limited by droughtiness. It should be noted that the Newnham and Oxpasture associations are mapped to a very limited extent at the northern and southern edges of the study area respectively.

#### *Published ALC data*

- 9.6.23 Published detailed post-1988 ALC data is available at the northern end of the study area between the M5 Junction 25 and east of Henlade. The extent of the published data is shown on Figure 9.5 Published Detailed ALC Data.
- 9.6.24 The survey, carried out by ADAS in 1994, included 161 soil profiles of which 49 are within the study area. A majority of the surveyed land within the study area is classified as Subgrade 3b, with smaller areas of Grade 2 and Subgrade 3a.
- 9.6.25 The majority of the land classified by ADAS as Grade 2 is located on gently sloping land away from the watercourses and is mainly affected by a minor wetness and workability limitation (few profiles outside the study area are affected by droughtiness). Most of the profiles are described as having medium clay loam topsoils over heavy clay loam and clay subsoils. The profiles are slowly

permeable at depth and are assessed as Wetness Class (WC) II. Occasional profiles of WC I with heavy clay loam topsoil were identified and are also limited to Grade 2.

- 9.6.26 Land of Subgrade 3a quality has a moderate wetness limitation. The topsoil is medium clay loam or heavy clay loam and the subsoil is red clay. The profiles are gleyed below 40cm and slowly permeable at depth, assessed as WC II or III. To the south of Rose Farm is a minor soil variant in which the red clay subsoil is porous and the profile is WC I, however the topsoil is clay, resulting in a workability limitation to Subgrade 3a.
- 9.6.27 The most common soil type identified includes heavy clay loam or clay topsoil over red clay subsoil. All profiles are slowly permeable in the subsoil and are of WC II, III or IV depending upon the depth of the slowly permeable layer. With heavy topsoils, there is a wetness and workability limitation to Subgrade 3b.

#### *Predicted ALC grades*

- 9.6.28 Provisional ALC information, soil mapping, climate data and aerial photography have all been used to predict the likely agricultural land quality where detailed ALC survey information is unavailable. The various predicted ALC grades are shown on Figure 9.6 Probable Predominant Agricultural Land Quality.
- 9.6.29 Consideration of the mapped soil associations indicates that the areas of Grade 2 identified in the north and south of the study area are likely to be the most significant areas. Land south of Thornfalcon in the mapped Whimble 3 association may include land of Grade 2 quality, if found to be of WC II with medium loamy topsoil.
- 9.6.30 It is not considered likely that substantial areas of additional Grade 2 will be identified through detailed survey as most of the mapped soil associations are typically of WC III with clay loam topsoil. As seen in the detailed data available, where the topsoil is medium clay loam, or the profiles are slightly better draining, there is a wetness limitation to Subgrade 3a. Soils of the Worcester association, mapped broadly between Henlade and West Hatch, are likely to fall into this category and are predicted to be mainly of Subgrade 3a. A small additional area between Capland and Stewley is also predicted to be of Subgrade 3a, based on satellite images of the area.
- 9.6.31 The Wickham 2 association is generally of WC III or IV, resulting in a higher prevalence of Subgrade 3b south of Ashill.
- 9.6.32 The Evesham 1 and Evesham 2 associations mapped between West Hatch and Bickenhall Lane, and from north of Green Drove to north of Folly Drove, are also typically of WC III. With clay topsoils these profiles will all be limited to Subgrade 3b.
- 9.6.33 The alluvial soils mapped in the centre of the site, west of Hatch Green where two unnamed watercourses converge, and in the south of the study area along a tributary of Cad Brook, are clayey and affected by groundwater and/or flooding which ordinarily puts them in WC IV, resulting in a wetness limitation to Subgrade 3b. The areas of published and predicted ALC grades within the study area are shown in Table 9-5 below, with the distribution of these grades shown on Figures 9.5 Published Detailed ALC Data and 9.6 Probable Predominant Agricultural Land Quality.

**Table 9-5 Baseline agricultural land within the study area**

Agricultural land quality	Area (ha) (detailed survey)	Area (ha) (predicted)	Total area (ha)
Grade 1	0.0	0.0	0.0
Grade 2	6.5	14.7	21.2
Subgrade 3a	16.4	66.8	83.2
BMV subtotal	22.9	81.5	104.4
Subgrade 3b	41.8	205.0	246.8
Grade 4	0.0	0.0	0.0
Grade 5	0.0	0.0	0.0
Non-agricultural	19.2	89.9	109.1
Total agricultural land	64.7	286.5	351.2

### Walkover surveys

- 9.6.34 A walkover survey of selected potential land contamination sites was completed on 22 June 2021 (Appendix 9.1 Site Walkover Notes).

### Environmental setting

#### Site history

- 9.6.35 Historical Ordnance Survey (OS) maps dating from 1888 to current and Google Earth imagery have been reviewed to provide an understanding of the development history across the proposed scheme. This review has also assisted in identifying potentially contaminated sites within 250m of the proposed scheme, see Section 9.7.32.
- 9.6.36 The proposed scheme predominately passes through land which has a long history of agricultural usage, largely dairy farming with small settlements. The surrounding settlements of Henlade, West Hatch, Hatch Beauchamp, Hatch Green, Stewley, Ashill, and Cad Green have steadily developed to their current extents.
- 9.6.37 The proposed scheme to West Hatch comprised predominantly fields, crossed by several watercourses and numerous tracks, which have largely remained unchanged. The Great Western Railway (GWR) railway line was also present from earliest available maps from 1888 until noted as disused on the 1968 OS map. The line of the former GWR intersects the proposed scheme boundary at Thornfalcon and West Hatch, crossing the existing and proposed A358 alignment. The M5 was noted from OS map dated 1977 linking to the existing A358.
- 9.6.38 The route follows the line of the existing A358 at West Hatch to the A303 at Southfields roundabout. The original line of the A358 is shown on the maps from the 1880s. It diverted from the current alignment north of West Hatch, swinging to the east to Hatch Beauchamp, then passing south through Hatch Green to Capland and through Ashill before turning to the east to Rapps then heading south to Horton Cross. The current A358 was first indicated on OS plans dated 1989 and was generally developed along previously undeveloped farmland, following the original course of the road between Capland and Ashill.

- 9.6.39 Former and existing on-site and off-site land uses within 500m of the centre line include farmyards, filling stations, bulk fuel storage, a builders' yard, garden building factory, gravel pits, a sewage works and the former GWR railway line. Historical landfills have also been identified within 500m; these are further discussed in Section 9.7.32.

#### Unexploded ordnance

- 9.6.40 An unexploded ordnance (UXO) pre-desk study assessment completed in 2017 by Zetica identified the site to be at low UXO hazard level [37]. The options selection stage report [37] indicated that no further UXO investigation is required. A further UXO report produced by Fellows [49] was obtained for the section of route from the M5 junction to Henlade, which was not covered by the options selection stage PSSR due to modifications to the proposed route. This report concluded a low to medium risk for this section of the route. The medium risk is from 'fall to earth' anti-aircraft munitions due to the placement of British anti-air defensive munitions (a heavy anti-aircraft (HAA) battery approximately 360m south east and five light anti-aircraft (LAA) batteries) in the study area (5km from the route). The report includes mitigation recommendations.

#### Hydrogeology and hydrology

- 9.6.41 The hydrological and hydrogeological baseline conditions are described in full in Chapter 13 Road drainage and the water environment. A summary is provided in this chapter and in the PRA [38] and PSSRs [37], [41].
- 9.6.42 The area covered by the proposed route is underlain by formations of the Mercia Mudstone Group and Lias Group which are designated by the Environment Agency as Secondary B (Branscombe Mudstone), Secondary A (Blue Lias Formation) and Secondary undifferentiated (Charmouth Mudstone) aquifers.
- 9.6.43 In areas where superficial deposits are present the Colluvium and Head Deposits are classed as Secondary A aquifers, Alluvium is designated as a Secondary (undifferentiated) aquifer.
- 9.6.44 The proposed scheme boundary does not intersect any groundwater source protection zones (SPZ).
- 9.6.45 A groundwater abstraction has been identified within 250m of the proposed scheme, this is a private domestic water supply used for general farming and domestic purposes, located to Ashe Farm at Mattock's Tree Green. At this stage, it is not known if this water supply is officially designated as potable, or if it is used for drinking water supply. Additional data on this will be provided in the ES.
- 9.6.46 The groundwater vulnerability across the proposed alignment varies between high to medium indicating some to no protection to the underlying aquifers from pollution.
- 9.6.47 Five WFD water bodies fall within the study area and or cross the proposed scheme including; Broughton Brook, West Sedgemoor Main Drain, Fivehead River, River Ding and River Isle. The Proposed scheme is also crossed by numerous smaller watercourses and tributaries to these water bodies. All watercourses flow to the east/ northeast.
- 9.6.48 Construction works, if not carefully managed, may lead to downward migration or the creation of preferential overland or sub-surface pollution pathways for

contamination which could impact on groundwater and surface water. Information on surface water and groundwater receptors is covered in Chapter 13, road drainage and the water environment.

- 9.6.49 Surface water and groundwater will be monitored, as part of the proposed SI works, to enable assessment of the potential impact of the proposed scheme on groundwater and surface water.
- 9.6.50 Any potential effects from dewatering during construction works on paleoenvironmental and archaeological deposits are included in Chapter 6 Cultural Heritage.

#### Environmental designations

- 9.6.51 Most environmental designations are in excess of 1.5km from the proposed scheme. These include; Sites of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Special Protection Area (SPA) and Ramsar Site.
- 9.6.52 There are no geological features of scientific interest and importance (e.g. Geological Site of Special Scientific Interest (SSSI) or Local Geological/Geomorphological Sites (LGS)) within the study area.
- 9.6.53 The only environmental designations which fall within the study area are areas of ancient woodland:
- Henlade, approximately 435m south west (Stoke Wood)
  - Mattock's Tree Hill, approximately 94m south west (Huish Coppice)
  - West Hatch, approximately 475m east (Line Wood)
  - Bickenhall Lane junction, adjacent to Red line 0m west (Bickenhall Wood)
  - Ashill, adjacent to red line 0m east (Ashill Wood/Everyse Copse)

#### Regulatory data

- 9.6.54 Regulatory data pertaining to environmental permitting, abstraction and discharge consents, pollution incidents and waste management have been obtained for the study area [38]. The following records are of note:
- Three discharge consents to groundwater are recorded within the study area which relate to discharge of sewage effluent to a soakaway/infiltration system.
  - Six discharge consents to surface water are noted, most relate to discharge of treated effluent (non-sewage works), however one is recorded to Ashill Sewage Treatment works for treated effluent to be discharged to Venner's Water and one formerly operated by Butler's Fuel for discharge of contaminated surface water.
  - Two Part B environmental permits were identified, for unloading of petrol into storage tanks and are held by the Texaco and Horton Cross PFS, Texaco also hold a Part B permit for burning of waste oil.
  - Four waste exemptions have been identified, two for use of waste in construction, one for burning waste in the open and one for storage of sludges.
  - Eleven pollution incidents have been recorded between 2001 and 2004, all caused no impact or minor impact and involved pollutants such as oils and fuels, sewage materials, slurry and inert materials/commercial waste.
  - No active landfill sites are recorded within the study area, however there are a number of historical landfills, further details of which are provided below.

9.6.55 The pollution incidents and discharge consents could have had a detrimental impact on soils and groundwater and surface water quality.

#### Landfills

9.6.56 Five records of historical landfills have been identified within the study area; Near Dairy House Farm Landfill, Thornfalcon refuse tip, Ashill Bypass Site A, Land East of Bow Bridge and Sawmills. Two are noted to intersect the proposed scheme. These are:

- Thornfalcon Refuse Tip at Mattock's Tree Green Junction off-slip embankment of the east bound carriageway. This site historically accepted commercial, industrial and biodegradable domestic waste, with last input in 1973, located in the former Great Western Rail (GWR) railway cutting.
- Ashill Bypass Site A Landfill at the crest of cutting, intersected by the proposed carriageway, Stewley link road and east-bound off-slip. The facility accepted inert waste and was operated under a waste management licence.

9.6.57 Further detail of these landfills and others within the study area are presented in PSSR [37].

9.6.58 Several of the landfill sites are former historical features including old gravel pits and railway cuttings, e.g. at West Hatch Lane, a quarry near Home Farm and a gravel pit just north of the proposed Jordan's Bridleway. Some former landfills are not in evidence on the historical Ordnance Survey (OS) maps reviewed. Further detail on these features is available in the PSSR [37].

#### Potential sources of contamination (based on historical and current land use)

9.6.59 The study area is located in a predominately rural setting however a number of potentially contaminative land uses have been identified including; historical landfills, an infilled railway cutting, a sewage works, commercial activities and fuel storage sites and there is evidence of made ground of unknown quality. The following potential land contamination sites have been identified:

##### *On-site (direct interaction with proposed scheme alignment):*

- Former Thornfalcon Refuse Tip/Thornfalcon Tip, the proposed slip embankment to Ashe Farm Road passes through the landfill and a proposed farm access track
- GWR infilled cutting at Home Farm and West Hatch intersected by both the existing and proposed scheme route
- Former inert Ashill Bypass Site A Landfill, located directly on the proposed scheme alignment and new link road

##### *Off-site (within 250m of proposed scheme centreline)*

- Near Dairy Farm landfill
- Texaco PFS and motorhome dealer at Mattock's Tree Hill
- Foresters Garden Buildings, north west of West Hatch Lane, manufacturers of timber products
- Hatch Green Garage and PFS at Hatch Green
- Former Ashill PFS (Stewley Cross)
- Former Butlers Fuel Depot, Kenny Lane, Ashill
- Ashill Sewage Treatment Works

- Land east of Bow Bridge and Sawmills
- Shell PFS, Horton Cross

9.6.60 Other areas of potential land contamination have also been identified, within the study area (*within 250m from centre of the proposed scheme*):

- Depot at Greenway Lane
- Farmyards (potential contamination sources include fuel tanks and slurry pits)
- Builders' yard at Hatch Beauchamp
- Former Horlick's site former dairy and cattle breeding centre
- Presence of made ground associated with existing road construction and the immediate environment of the route corridor, infilled disused quarries and former gravel pits

9.6.61 Priority sites of potential land contamination are shown on Figure 9.7 Potential Land Contamination Sites, these have been subject to a Tier 1 preliminary (qualitative) risk assessment (PRA) and are to be further investigated as part of the proposed SI for the proposed scheme.

### **Conceptual site model (CSM)**

9.6.62 Conceptual site models (CSMs) have been produced for each of the potential contaminated land sites as these are most likely to interact with the proposed scheme and/or associated construction works. The potential sources of contamination, pathways and receptors are described in detail in Appendix F of the PRA [38], each potential contaminant linkage (PCL) identified has been assigned a level of risk. The CSMs from the PRA have been summarised and are presented in Appendix 9.2. The PCLs with a moderate or high risk assigned to them have been taken forward for the environmental assessment of potential significant effects and are addressed in Section 9.10.

### **Site investigation**

9.6.63 A programme of intrusive investigation is to be undertaken across the current proposed scheme to provide information on the ground conditions and to inform the design. The PRA [38] identified priority sites which are included in the scope for the geo-environmental element of the investigation. The scope includes requirements for soil and groundwater sampling and a period of environmental monitoring to further investigate the priority sites and also provide scheme wide baseline monitoring data. These will be used in the next stages of assessment for geology and soils, refer to Appendix 9.3 for further detail on the methodology. Proposed exploratory hole locations are indicated on Figure 9.8 Proposed Ground Investigation – Indicative Location Plan.

### **Future baseline - 2028**

#### Geology

9.6.64 No significant changes are anticipated.

#### Soils and agricultural land

9.6.65 The current soil baseline conditions for soils and agricultural land are expected to remain unchanged for the foreseeable future. However, in the longer term it is expected that climate change will affect the quality of the land within the study

area, although potential effects on the ALC will be complex and will vary between soil types. Therefore, the current conditions are considered to provide the most reasonable basis for assessment.

### Contamination

- 9.6.66 Any future land use changes, for example a new bulk fuel storage premises (petrol station) developed in the study area, would potentially impact baseline soil conditions, groundwater and surface water quality in the area. Existing ground conditions would generally improve (particularly groundwater and surface water quality) in areas where existing / historical land contamination sources identified along the route are remediated for example, the former Ashill PFS at Stewley Cross .
- 9.6.67 It should be noted that a new business park, “Nexus 25” is currently being developed at the M5 junction 25 which could introduce new potential sources of contamination. The Nexus site will be considered during the ES.
- 9.6.68 The owners of the former Butler’s fuel depot, at Ashill, have applied for permission to redevelop the land for a residential use which would potentially require remediation of soil and /or groundwater contamination and also introduce new sensitive receptors. The application has been granted permission in principle.
- 9.6.69 An application to redevelop the former post office adjacent the former Ashill petrol fuel station for 10 residential units, is currently under consideration, this would also introduce new sensitive receptors and potentially require remediation of soil/groundwater contamination.
- 9.6.70 The former Ashill PFS itself is currently being developed for residential land use, outline planning permission 13/00101/OUT includes conditions pursuant to potential contamination, (numbers 14 to 17). Information on the SSDC planning portal indicates that the site has been subject to a Desk Study and SI with planned remediation works to remove the underground fuel tanks and provide a verification report. The planning conditions pursuant to desk study, SI and remediation have been discharged with an outstanding condition awaiting confirmation of validation works to verify that the site has been remediated to current standards.
- 9.6.71 Planning for a mixed use residential and commercial development at B3168 Station Road Ilminster south of the Southfields roundabout, on the former Horlicks factory is underway and these developments, if planning is granted, could introduce new sensitive receptors and potential sources of contamination dependent on the activities located on the commercial development. The works should also address potential contamination linkages related to the historical use of the site.
- 9.6.72 Additional residential developments within the study area which will introduce new highly sensitive human receptors include:
- proposed development of 25 dwellings, Windmill Hill Lane, Ashill
  - minor development of two dwellings south of Stewley Cross, at Wood Road, Ashill

## 9.7 Potential Impacts

9.7.1 Mitigation measures incorporated in the design and construction of the proposed scheme are reported as embedded mitigation in Chapter 2.

### Construction

#### Soils and agricultural land

9.7.2 Soils and agricultural land would potentially be affected during construction by way of:

- Damage to soils during stripping, handling and storage, through mechanisms such as compaction and smearing, and the temporary loss of agricultural land.
- Permanent removal of soils or permanent sealing of agricultural land.

#### Contamination

##### *Human health*

9.7.3 Made ground, infill materials, and natural soils underlying the proposed scheme may have been contaminated by historical and current land use activities including historical landfill sites, infilled mineral extraction pits, fuel storage, PFS, industrial areas and farmyards. Disturbance of potentially contaminated soils may cause an increase in leaching and mobilising of contaminants, along new or existing surface or sub-surface pollution pathways. These could create new pathways to receptors.

9.7.4 Ground gases/vapours may be associated with the existing historical landfills at Thornfalcon refuse tip and Ashill Bypass Site A, which could migrate to a small number of commercial/residential properties in close proximity to the proposed scheme. In the current scheme design there would be limited interaction with the landfills, however this may have to be reassessed once project control framework (PCF) stage 3 is adopted. Vapours could also be associated with former fuel sites where there is residual contamination which could also migrate to adjacent properties.

9.7.5 SI soil chemical data was not available at the time of writing, therefore, screening of the soil chemical analysis data against soil guideline values for human health risk assessment has not been undertaken. However, the impact on human health from exposure to contaminants exposed during the construction phase is considered likely to be minor based on information available from the PSSR. There is a short-term human health risk of exposure to potentially harmful contaminants at the landfill sites, infilled railway cutting, and other commercial sites such as bulk fuel storage sites, PFS and timber product site.

##### *Groundwater and surface water*

9.7.6 Several potentially contaminated land sites have been identified along the proposed scheme:

- Historical landfills
- Former or existing fuel sites
- Timber products manufactory
- Diffuse pollutants from agricultural land

- 9.7.7 Disturbance of potentially contaminated soils from these sites could be caused due to earthworks and/ or use of piled foundations for structures. This may cause an increase in leaching of contaminants in soils and mobilising of contaminants along new or existing surface or sub-surface pollution pathways. This in turn may lead to the quality of surface waters and groundwater aquifers being impacted through runoff, infiltration and vertical and horizontal movement of contaminated groundwater and leachate. In the absence of site-specific SI data and baseline groundwater monitoring data, the predicted significance of effects on Controlled Waters is likely to be moderate, prior to mitigation.

## **Operation**

### Soils and agricultural land

- 9.7.8 No additional impacts are predicted on soils or agricultural land during the operational phase. The permanent loss of agricultural land occurring during construction would continue into operation but is not considered as an additional effect. Temporary effects arising during construction on soil quality in relation to degradation during handling may extend into operation but should not be persistent assuming that the best practice mitigation measures are applied and a soil restoration plan is followed. Operational effects on soils and agricultural land are therefore scoped out of further assessment.

### Contamination

#### *Human health*

- 9.7.9 The proposed scheme will predominately comprise hardstanding which will remove potential contaminant linkages to human health receptors. Contamination identified as having the potential to cause significant effect to human health would likely be removed or treated, during construction. This would reduce the potential for contact with contaminated soil/waste/leachate during the operational phase. The impact to future site users would be reduced to negligible for human health.
- 9.7.10 Appropriate site-specific risk assessments and method statements would be produced to control any likely future exposure to maintenance workers. However, human health for maintenance workers and occupants of residential properties are assessed where the alignment interacts with, or properties are near, landfill sites or fuel storage sites due to the possibility of them being affected by ground gas/vapours during the operational phase.

#### *Groundwater and surface water*

- 9.7.11 Potential land contamination linkages will be addressed during construction, i.e. contamination source removal or treatment, or breaking of potential contaminant linkages. If required, monitoring of groundwater, leachate and surface water will continue from the construction phase into the operational phase to confirm there are no additional impacts predicted, in relation to water receptors. Operational impacts on surface water and groundwater from land contamination are therefore scoped out of the operational assessment.
- 9.7.12 During operation there is the potential for leakage of various chemicals and fuels from vehicle using the road which could impact controlled waters due to surface run-off from the road. The potential impacts on water receptors are addressed in Chapter 13.

## 9.8 Design, mitigation and enhancement measures

9.8.1 The proposed scheme has been designed, to avoid and prevent adverse environmental effects on Geology and soils, through the process of design development and consideration of good design principles.

### Construction

9.8.2 The following mitigation measures would be put in place for the receptors that have been identified as being potentially impacted by the proposed scheme or sites which would potentially impact the proposed scheme. Mitigation measures would include both embedded mitigation and additional mitigation measures.

### Soils and agricultural land

9.8.3 Impacts on agricultural land would be reduced by minimising the use of agricultural land required permanently by the proposed scheme. In addition, agricultural land used temporarily would be restored to a condition suitable for a return to its existing land use.

9.8.4 The primary measures to mitigate the effects on soil resources would be set out in a Soil Resource and Management Plan (SRMP) which will identify the existing soil resources that will be affected by the proposed scheme, based on detailed soil surveys information.

9.8.5 The SRMP, which would be developed during the pre-construction phase and implemented by the Principal Contractor, would be prepared to reflect the intention of the proposed scheme to appropriately re-use soils within its design. Furthermore, it would confirm the different soil types and the proposed methods for handling, storing and replacing soils on-site.

9.8.6 The quality of soils retained on-site and exported off-site (if required) would be maintained by following good practice guidance on soil handling and storage, in accordance with Defra's Code of Construction Practice for the Sustainable Use of Soils on Construction Sites (2009) [36]. In particular, it would be necessary to avoid compaction and biodegradation of soils that are to be retained on-site in storage. In this respect, topsoil must be stockpiled separately to subsoil.

9.8.7 With the adoption of appropriate mitigation for soil handling and restoration, soils that are re-used on or off-site would be able to continue their various ecosystem functions, principally as a medium for producing food and biomass; for storing and cycling water and carbon; and for supporting habitats; biodiversity and landscape planting.

### Contamination

9.8.8 Risks during construction would typically be mitigated by applying best practice, to be set out in an Environmental Management Plan (EMP) or Health and Safety Plan.

9.8.9 Embedded mitigation would include design measures which may include the use of:

- Promotion of sustainable reuse of excavated made ground and natural soils either within the proposed scheme or at a receiver or hub site; a Materials Management Plan (MMP) will be prepared by the Contractor in advance of

construction works in accordance with *CL:AIRE Definition of Waste Code of Practice (2011) (v.2)* [50], see Chapter 10 Material assets and waste.

- Adoption of waste hierarchy principles to be used at every stage of the project, as appropriate, to identify opportunities for reuse of soils within the proposed scheme.
- Completion of SI - to better define contaminated land and groundwater).
- Provision of risk assessments and method statements to be completed as part of the construction process and for future maintenance activities.
- Production of a draft EMP to be prepared prior to construction commencing
- The EMP to be further developed by the appointed contractor prior to the start of construction works.

9.8.10 Additional mitigation measures may also be developed to address specific identified impacts. At this stage, the requirement for specific mitigation measures in respect of soils and geology could include, for example:

- Remedial works where risk from land contamination to human health or controlled waters is assessed as high or moderate e.g.: associated with landfill sites (such as mobilisation of contamination to groundwater due to creation of new pathways and /or off-site migration of landfill gas) or sites identified following the SI which may identify areas of existing contamination.
- Control measures to mitigate potential impacts from gas migration, dust and vapour generation.

9.8.11 The requirement for remedial works is usually informed by SIs and detailed risk assessment. Remedial options and associated costs would be likely to be more complex and costly if the route is aligned through the existing landfill boundaries. The design should avoid these areas if possible, to reduce costs/impacts to construction programme.

### **Enhancement**

9.8.12 Remediation of the legacy land contamination sites would be of environmental benefit.

### **Operation**

9.8.13 No operational effects are identified.

## **9.9 Assessment of likely significant effects**

9.9.1 This section presents the preliminary assessment of likely significant effects on geology, soils and land contamination resulting from the construction and operation of the proposed scheme.

9.9.2 The potential effects (set out in Section 9.8) that are considered to be non-significant have been reported in Appendix 9.4. Non-significant effects would be addressed by appropriate environmental management measures to be recorded and implemented within the draft EMP for submission.

### **Soils and agricultural land**

9.9.3 During the construction phase, the areas of agricultural land within the study area which would be temporarily and permanently required is shown in Table 9-6 below.

**Table 9-6 Agricultural land required temporarily and permanently**

Agricultural land quality	Area required temporarily (ha)	Area to be restored (ha)	Area required permanently (ha)
Grade 1	0.0	0.0	0.0
Grade 2	21.2	8.6	12.6
Subgrade 3a	83.2	30.4	52.8
BMV subtotal	104.4	39.0	65.4
Subgrade 3b	246.8	77.6	169.2
Grade 4	0.0	0.0	0.0
Grade 5	0.0	0.0	0.0
Total agricultural land	351.2	116.6	234.6

- 9.9.4 The proposed scheme would result in the temporary loss of approximately 351ha agricultural land, of which approximately 104ha are classified as BMV land in Grade 2 and Subgrade 3a. According to Table 9-2, agricultural land in Grade 2 is a resource of *very high sensitivity*, with land in Subgrade 3a being a resource of *high sensitivity*.
- 9.9.5 Using the criteria in Table 9-3, the construction of the proposed scheme would require the physical removal of more than 20ha of agricultural land and would therefore be an impact of major magnitude. Therefore, the proposed scheme would result in a direct, temporary *very large adverse* effect on BMV agricultural land. This is considered a significant effect.
- 9.9.6 Within the land required temporarily for construction, approximately 116ha of agricultural land including 39ha of BMV land would be reinstated to agricultural use. This would leave a permanent loss of approximately 235ha of agricultural land, including 65ha of BMV land.
- 9.9.7 As the area of agricultural land which will be sealed or otherwise permanently required will be greater than 20ha (*major magnitude*), the proposed scheme would result in a direct, permanent *very large adverse* effect on BMV agricultural land, which is significant.
- 9.9.8 Furthermore, the temporary and permanent loss of more than 20ha of land in Subgrade 3b (*medium sensitivity* receptor) would result in a *large adverse* effect, which is significant.
- 9.9.9 The sensitivity of soils, other than as reflected in their ALC grade, is also determined by their support for habitats and biodiversity. As the majority of soils within the study area are used for agricultural production, they are considered *low sensitivity* in these terms.
- 9.9.10 The construction of the proposed scheme would result in the temporary loss of soil functions including food production and flood alleviation on land within the study area, such that the magnitude of change on the soil resource will be *moderate adverse*. This would give rise to a direct, temporary *slight adverse effect* on agricultural soils, which would not be significant.
- 9.9.11 Assuming mitigation measures outlined above in Section 9.8 are fully implemented, the majority of the soils would be restored or appropriately re-used off-site continuing to fulfil their various ecosystem functions. As such the

proposed scheme would have a permanent *neutral effect* on agricultural soils, which would not be significant.

### Contamination

- 9.9.12 The potential for impacts from contamination on human health, surface water and groundwater are reported in the PRA [38] and summarised in Appendix 9.2 Contamination Preliminary Risk Assessment for Priority Sites of this PEI Report.
- 9.9.13 Potential contaminant linkages (PCLs) deemed to pose a 'moderate' risk or greater, in accordance with best practice guidelines in CIRIA C552, have been identified for further investigation and included in the scope of the proposed SI. Once the soil and groundwater data are available, further risk assessment in the form of a Tier 2 Generic Quantitative Risk Assessment (GQRA) will be completed. In this assessment, soil and groundwater contamination data will be screened against published guideline values based on the relevant receptors considered in the CSMs. Detail of the assessment methodology for all stages is present in Appendix 9.3 Detailed Assessment Methodology for Priority Sites.
- 9.9.14 The following PCLs were considered:
- Construction workers encountering potentially contaminated soils/materials/groundwater, primarily through the inhalation of soil dusts and direct dermal contact.
  - Proposed scheme neighbours (e.g. residents, adjacent site workers, members of the public) being exposed to potentially contaminated materials via inhalation and dermal contact with soils or dust during construction works.
  - Leaching of contaminants into the groundwater during the construction phases through rainwater infiltration.
  - Runoff of contaminants to surface water receptors, during the construction phase.
  - Driving of contaminated soils/groundwater/leachate downward during construction e.g. during piling works.
  - Future maintenance workers coming to contact with potentially contaminated soils/materials/groundwater.
- 9.9.15 A current lack of site-specific SI and ground gas/ groundwater monitoring means that it is not feasible to identify likely significant or residual effects with respect to contamination, at this stage. However, the incorporation of the mitigation measures outlined in Section 9.9 has been considered, allowing a preliminary assessment to be made, as described in the following paragraphs.
- 9.9.16 During the construction phase, disturbance of landfills may create ground gas and vapour pathways, which could affect nearby residential and commercial properties. The magnitude of impact has been assessed as minor and therefore this has been assessed as a moderate adverse temporary effect, which could continue post construction, see Table 9-7. SI and risk assessment will identify the requirement for remedial/mitigation measures, which will be applied where the risk is significant.

### Table 9-7 Summary of significant effects

Potential impact	Receptor	Receptor sensitivity	Magnitude of impact	Significance of effect
Exposure to contaminated soil / groundwater / leachate / ground gas/ vapours	Off-site users - residential	Very high	Minor	Moderate

- 9.9.17 If required, the design of the proposed scheme would include measures to protect off site residential receptors by mitigating against the ingress and accumulation of ground gas and vapours into confined spaces/service ducts/drains which may act as a secondary pathway to off-site receptors. This could include remediation activities at the landfills such as, placement of an engineered cover system within which service ducts/drains are placed, and /or installation of a gas pathway/venting layer across the top of the landfill waste, linked to vent trenches to passively vent gases/vapours to the atmosphere. Any old services / utilities identified should be identified and treated to prevent preferential pathways being created.
- 9.9.18 All construction activities would be undertaken in line with current best practice and guidance and to be detailed in the EMP which would also mitigate contamination risks with respect to controlled waters during construction (i.e. management of construction related waters and environmental monitoring). This also includes consideration of appropriate dust suppression measures which would reduce the impacts to construction workers and adjacent scheme neighbours.
- 9.9.19 The adoption of mitigation measures such as health and safety training and the provision and use of appropriate personal protective equipment (PPE) is considered to be sufficient in mitigating the identified risks posed to construction personnel. The health and safety management systems would incorporate appropriate mitigation measures and therefore the works would have a minor adverse impact, with a temporary slight adverse effect, which is not significant.
- 9.9.20 Assuming appropriate good working practices are undertaken during construction and monitoring of groundwater/surface water is continued post construction (if required), the predicted significance of effects is generally likely to be low.
- 9.9.21 Based on the desk study review and PRA, including information on the historical and current land uses, some remedial works may be required and some localised areas of unexpected contamination may be present within the proposed scheme area. These may pose a risk to construction workers (low sensitivity of receptor) and controlled waters (low to high sensitivity of receptors). This would be mitigated by the EMP and an action plan and procedures on how to manage and assess unexpected contamination that will be presented in the Environmental Statement. On account of these mitigation measures the potential impact would be negligible resulting in a temporary slight adverse and therefore not significant effect.
- 9.9.22 To promote sustainable reuse of excavated made ground and natural soils either within the proposed scheme or at a receiver or hub site, an assessment of the suitability for reuse of these materials would be required to confirm no significant risk to human health or controlled waters.
- 9.9.23 A Materials Management Plan (MMP) will be prepared in advance of construction works in accordance with *CL:AIRE Definition of Waste Code of Practice (2011) (v.2)* [50], see Chapter 10 Material assets and waste for further details. This will

include measures to establish acceptable reuse criteria (both chemical and geotechnical) and procedures, to ensure the suitability of material for reuse, can be demonstrated and verified.

- 9.9.24 A Site Waste Management Plan (SWMP) should also be prepared in advance of construction for the removal, transportation and disposal of all waste materials resulting from excavations. Recycling potential of materials arising from construction of the proposed scheme should be maximised.
- 9.9.25 The reuse of made ground, site won materials and material imported from off-site sources would also meet guidance in the Specification for Highway Works, Series 600 Earthworks and as a result, only material that is demonstrated to be suitable for reuse would be used along the proposed scheme.
- 9.9.26 Adherence to guidance described above would ensure that post completion of the works, there is unlikely to be a negligible impact above the current baseline scenario with respect to contamination with a *permanent slight adverse and not significant effect*.

## 9.10 Monitoring

- 9.10.1 A significant effect has been identified associated with land contamination. Further SIs and specific risk assessments would be required to confirm the risks and inform the design of appropriate remediation measures and monitoring required.
- 9.10.2 Restored soils would require monitoring for a period of five years following their reinstatement to confirm they are suitable for their intended use and function, as restored agricultural land or a basis for habitat creation or landscape planting.

## 9.11 Summary

### Preliminary construction assessment

#### Soils and agricultural land

- 9.11.1 The construction of the proposed scheme would result in a direct, temporary and permanent, very large adverse effect on BMV agricultural land, and a large adverse effect of Subgrade 3b agricultural land, both of which are significant. All agricultural land temporarily required would be restored to ensure it could continue to fulfil its primary agricultural use.
- 9.11.2 The proposed scheme would result in a direct temporary slight adverse effect on agricultural soils, which is not considered to be significant. Appropriate mitigation would ensure that the permanent effect on agricultural soils would be *neutral*.

#### Contamination

- 9.11.3 With appropriate mitigation measures in place, a potential significant effect related to contamination from historical landfills and off-site residential site users has been identified which is considered likely during the construction of the proposed scheme and would produce a moderate adverse temporary effect. SI and risk assessment would identify the requirement for remedial / mitigation measures, further assessment to be undertaken on completion of the planned SI.

- 9.11.4 For all other PCLs no significant effects have been identified, once mitigation measures are in place.

### **Preliminary operational assessment**

- 9.11.5 No operational effects are identified as mitigation measures in the construction phase, as previously described, would ensure that contamination is minimised during the operational phase. Where historical landfills are remediated, there may be a requirement for longer term gas, ground and surface water monitoring to continue, into the operational phase.

### **Further work**

- 9.11.6 Information gained from the planned intrusive SI and period of environmental monitoring would be used in the assessment for geology and soils and reported on in the Environmental Statement. Data will be gathered on the chemical quality of soil and groundwater which will be used to inform further stages of assessment.
- 9.11.7 A land contamination risk assessment will be undertaken in accordance with the online guidance Land Contamination Risk Management (LC:RM) [2]. A Tier 1 risk assessment has been completed and CSMs have been developed as part of the initial desk-based assessment of the proposed scheme. The model will be refined or revised as more information becomes available (for example SI data).
- 9.11.8 Data gathered from the proposed SI and environmental monitoring will be assessed and the CSM and preliminary risk assessment will be updated on completion of the Tier 2 GQRA. Potential risks to human health will be assessed by screening soil contaminant concentrations against relevant soil screening criteria (e.g. category 4 screening levels) recommended in DMRB LA 109 *Geology and soils* [1] for assessment of risk to human health from land contamination. Similarly, potential risks to controlled waters will be assessed by screening monitoring data against relevant guideline screening values. Where exceedances of screening levels are established, further risk assessment and/or additional mitigation works will be recommended and incorporated into the design.
- 9.11.9 Additional technical consultation with various statutory and non-statutory bodies and external sources will be undertaken to obtain the latest information on baseline conditions, particularly landfills and the petrol filling sites.
- 9.11.10 Monitoring of watercourses likely to be impacted by the proposed scheme (see Chapter 13 for details of watercourses) is being undertaken prior to the start of construction works. This will be detailed in the Environmental Statement (ES) and EMP. The purpose of the monitoring would be to provide data under differing flow conditions which would be used to assess the impact, if any, of the proposed scheme development on surface water quality during and post construction works.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

## References

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 10  
Material Assets and Waste

HE551508-ARP-EGN-ZZ-RP-LE-000013

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## 10 Material assets and waste

### 10.1 Introduction

- 10.1.1 This chapter assesses the potential impacts on the use of material assets and the generation, disposal and recovery of waste arising from the construction and operation of the A358 Taunton to Southfields Dualling Scheme (the ‘proposed scheme’) following the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 110 *Material assets and waste* [1].
- 10.1.2 This chapter details the methodology followed for the preliminary assessment, summarises the regulatory and policy framework related to material assets and waste, and describes the existing environment in the area surrounding the proposed scheme. Following this, the design, mitigation and residual effects of the proposed scheme are discussed, along with the limitations of the assessment.
- 10.1.3 Material assets and waste are defined in DMRB LA 110 *Material assets and waste* [1] as comprising:
- the consumption of materials and products (from primary, recycled or secondary, and renewable sources), the use of materials offering sustainability benefits, and the use of excavated and other arisings that fall within the scope of waste exemption criteria
  - the production and disposal of waste
- 10.1.4 The preliminary assessment presented in this chapter reports on the construction phase and first year of operational activities.
- 10.1.5 The effects of the proposed scheme in terms of geology and soils, and the potential for land contamination, have been addressed in Chapter 9 Geology and Soils of this Preliminary Environmental Information (PEI) Report, and the effects on climate have been addressed in Chapter 14 Climate.
- 10.1.6 The effects associated with the transportation of materials are scoped in, however these are assessed separately in Chapter 5 Air quality, Chapter 11 Noise and vibration and Chapter 14 Climate.

### 10.2 Legislative and policy framework

- 10.2.1 As discussed in Chapter 1 Introduction, the primary basis for deciding whether to grant a Development Consent Order (DCO) is the *National Policy Statement for National Networks* [2] (NPSNN), which sets out policies to guide how DCO applications are decided and how the effects of national networks infrastructure should be considered. Table 10-1 identifies the NPSNN policies relevant to the material assets and waste assessment and then specifies where in the chapter information is provided to address the policy.

**Table 10-1 Relevant NPSNN policies for the material assets and waste assessment**

Relevant NPSNN paragraph	Requirement of the NPSNN	Where in the chapter is information provided to address this policy?
Paragraph 5.42	The applicant should set out the arrangements that are proposed for managing any waste produced. The arrangements described should include information on the proposed waste recovery and disposal system	The anticipated waste arrangements proposed for construction and operation are detailed in Section 10.8. Estimates of waste generated is outlined in Table 10-9. Section 10.8 outlines how the proposed

Relevant NPSNN paragraph	Requirement of the NPSNN	Where in the chapter is information provided to address this policy?
	for all waste generated by the development. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome.'	scheme would re-use as much material as possible on-site should it be assessed as being suitable for re-use. Section 10.8 also details the design, mitigation and enhancement measures that would be implemented during the design and construction phases.
Paragraph 5.43	<p>The Secretary of State should consider the extent to which the applicant has proposed an effective process that will be followed to ensure effective management of hazardous and non-hazardous waste arising from the construction and operation of the proposed development. The Secretary of State should be satisfied that the process sets out:</p> <ul style="list-style-type: none"> <li>• any such waste will be properly managed, both on-site and off-site.</li> <li>• the waste from the proposed facility can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area;</li> <li>• adequate steps have been taken to minimise the volume of waste arisings, and of the volume of waste arisings sent to disposal, except where an alternative is the most sustainable outcome overall.'</li> </ul>	<p>On-site and off-site waste management arrangements, targets and contractor performance are detailed in the Section 10.8.</p> <p>The estimated volumes of hazardous and non-hazardous waste arising from construction have been forecast in Table 10-9 and compared with the local, regional and national waste infrastructure capacity. Available local recovery and disposal sites were evaluated against a suite of sustainability criteria in Section 10.9. This has demonstrated that sufficient capacity exists within the existing regional waste infrastructure.</p>
Paragraph 5.169	'Applicants should safeguard any mineral resources on the proposed site as far as possible.'	A Mineral Safeguarding Assessment has been undertaken to understand the potential for extractable minerals to be present within the proposed scheme area.
Paragraph 5.182	'Where a proposed development has an impact on a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that the applicant has put forward appropriate mitigation measures to safeguard mineral resources.'	The Somerset County Council (SCC) Minerals Plan [3] does not show any Mineral Safeguarding Areas within the proposed scheme area. In addition, there are no peat resources located within the proposed scheme area.

## Legislation

### The Waste and Environmental Permitting etc (Legislative Functions and Amendment etc) (EU Exit) Regulations 2020

- 10.2.2 *The Waste and Environmental Permitting etc (Legislative Functions and Amendment etc) (EU Exit) Regulations 2020* [4] ensure that waste and environmental permitting regimes continued to operate effectively at the end of the EU transition period.

### Waste (England and Wales) Regulations 2011

- 10.2.3 The *Waste (England and Wales) Regulations 2011 (S.I. 2011 No. 988)* [5] includes measures taken before a substance, material or product has become a waste that reduce:
- the quantity of waste, including through re-use of products or the extension of the life span of products
  - the adverse impacts of generated waste on the environment and human health
  - the content of harmful substances in materials and products
- 10.2.4 The Waste (England and Wales) Regulations 2011 implement much of the EU Waste Framework Directive 2008/98/EC (“the Directive”) that provided the overarching legislative framework for the collection, transport, recovery and disposal of waste within the EU. In addition, the Waste and Environmental Permitting etc. (Legislative Functions and Amendments etc.) (EU Exit) Regulations 2020 [4] set out how articles 5 and 6 of the Directive should be read now that the transition period has ended. In addition, the definition of waste remains as ‘*any substance or object which the holder discards or intends or is required to discard*’, with the term ‘discard’ including the disposal, recovery or recycling of a substance.
- 10.2.5 Waste for disposal is classed as hazardous, non-hazardous or inert, depending on the level of harm to human health and/or the environment. Once a material has become waste, it remains waste until it has been fully recovered and no longer poses a potential threat to the environment or human health, at which point it is no longer subject to the controls and measures required by the Directive. The Directive also sets out measures to protect the environment and human health by preventing or reducing the adverse effects of the generation and management of waste, by improving the efficiency of resource use, and reducing the overall impacts.
- 10.2.6 The Waste (England and Wales) Regulations 2011 also mandate the waste hierarchy, which requires that where waste is unavoidable, products and materials should, subject to regulatory controls, be used again, for the same or a different purpose (re-use). Otherwise, assets should be recovered from waste through recycling. Value can also be recovered by generating energy from waste, but only if none of the above offer an appropriate alternative solution. The waste hierarchy is summarised in Table 10-2 below.

**Table 10-2 The waste hierarchy**

<b>Stages</b>	<b>Includes</b>
Prevention	Using less material in design and manufacture. Keeping products for longer; re-use. Using less hazardous material.
Preparing for re-use and re-use	Checking, cleaning, repairing, refurbishing, whole items or spare parts.
Recycling	Turning waste into a new substance or product. Includes composting if it meets quality protocols.
Other recovery	Includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste; some backfilling operations.
Disposal	Landfill and incineration without energy recovery.

### Environmental Permitting (England and Wales Regulations) 2016

- 10.2.7 The objective of the *Environmental Permitting (England and Wales) Regulations 2016* [6] is to supplement the requirements of the *Waste (England and Wales) Regulations 2011* and prevent or reduce as far as possible the negative effects of landfilling on the environment and any resultant risks to human health. It sets out requirements for the locations, management, engineering, closure and monitoring of landfills.
- 10.2.8 Furthermore, the requirements of the EU Landfill Directive 1999/31/EC [7] were transposed into UK national legislation through *The Landfill (England and Wales) Regulations 2002* and subsequently re-transposed as part of *The Environmental Permitting (England and Wales) Regulations 2016* [4]. This aims to prevent or reduce negative effects on the environment from the landfilling of waste, as far as possible, and introduces technical requirements for waste and landfills as a disposal option through:
- setting minimum standards for the location, design, construction and operation of landfills
  - setting targets for the diversion of Biodegradable Municipal Waste from landfill
  - controlling the nature of waste accepted for landfill
  - defining the different categories of waste (hazardous waste, non-hazardous waste and inert waste)
- 10.2.9 *The Environmental Permitting (England and Wales) Regulations 2016* [4] applies to all landfills, which are defined as waste disposal sites for the deposit of waste onto or into land.

### Waste Minimisation Act 1998

- 10.2.10 The purpose of this Act [8] is to give power to certain local authorities to take steps to minimise the generation of waste in their area and for related purposes.

### Further legislation

- 10.2.11 There are a number of primary legislative instruments in the UK on waste that enact a wide range of secondary legislation that governs the storage, collection, treatment and disposal of waste. These include:
- *The Environmental Protection Act 1990* [9]
  - *The Environment Act 1995* [10]
  - *The Finance Act 1996* [11]
  - *The Waste and Emissions Trading Act 2003* [12]
  - *The Clean Neighbourhoods and Environment Act 2005* [13]
  - *The Waste (Circular Economy) (Amendment) Regulations* [14]

### Aggregates Levy

- 10.2.12 *The Aggregates Levy* [15] is intended to encourage a shift in demand from primary aggregates towards alternative materials such as recycled aggregate. This is a tax on sand, gravel and rock that has either been excavated from the ground, dredged from the sea in UK waters or imported. HM Revenue and Customs (HMRC) are notified every quarter on how much aggregate has been produced or sold and there is a levy of £2 per tonne of sand, gravel or rock [16].

### The Waste (Circular Economy) (Amendment) Regulations

- 10.2.13 The UK began to implement the Circular Economy Package (CEP) on 1 October 2020. Amendments contained in the *Waste (Circular Economy) (Amendment) Regulations* [14] will see the CEP implemented in England and Wales, and partially in Scotland and Northern Ireland.
- 10.2.14 The CEP is mainly focused on increasing resource efficiency, aiming to make sure that fewer resources are sent to landfill when they could be reused or recycled instead. Moving towards a circular economy will result in an optimisation of resources and also increase a product's life. Some companies across the UK have already begun to implement their own circular economy policies, which focus on bringing resources back into the company once a product has reached its end-of-life so that parts can be reused or repurposed for new products.
- 10.2.15 Now the CEP is being fully introduced in law via a series of minor and technical amendments. Although the legislative framework for the CEP lies in European Law, the UK is still fully committed to ensure that it is properly implemented in its own domestic laws. The amendments aim to:
- Specify when a separate collection of waste is not necessary.
  - Ensure any waste collected separately that can be prepared for reuse or recycling is not incinerated or landfilled.
  - Introduce an environmental permit condition on waste incinerators and landfills which restrict waste (paper, metal, plastic and glass), which is collected separately for re-use or recycling, from being accepted for incineration or landfill.
  - Make sure unlawfully mixed hazardous waste is separated wherever technically feasible.
  - Prohibit the mixing of waste oils where the mixing would prevent the regeneration or recycling of the oil delivering an equivalent or better environmental outcome.
  - Require relevant waste operators, operating under a registered waste exemption, to record, retain and submit information on hazardous waste and the products and materials resulting from the treatment of that waste.

### **National planning policy**

#### National Policy Statement for National Networks (NPSNN) (2014)

- 10.2.16 The *NPSNN* [17] requires that evidence of appropriate mitigation measures (incorporating engineering plans on the configuration and layout of the proposed scheme and use of materials) during both design and construction needs to be presented, together with the arrangements for managing any wastes that are produced. It specifically states at paragraph 5.42 that:
- 'The applicant should set out the arrangements that are proposed for managing any waste produced. The arrangements described should include information on the proposed waste recovery and disposal system for all waste generated by the development. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome.'*
- 10.2.17 The *NPSNN* identifies that government policy on waste is intended to protect the environment and human health by producing less and using it as a resource wherever possible. Where this is not possible, the *NPSNN* identifies that waste

management regulation ensures that the waste hierarchy is utilised, and that waste is disposed of in a way that is least damaging to the environment and to human health. This includes consideration of the ability for the waste from the development to be dealt with appropriately by waste infrastructure, without having an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area.

#### National Planning Policy for Waste (2014)

- 10.2.18 The *National Planning Policy for Waste* [18] sets out the national planning policy on waste and provides the planning framework to enable local authorities to put forward, through waste local plans, strategies that identify sites and areas suitable for new or enhanced facilities to meet the waste management needs of their areas. This plan details waste planning policies for England and has been considered in conjunction with the *National Planning Policy Framework* (NPPF) [19], the *Waste Management Plan for England* [20] and *National Policy Statements for Waste Water* [21] and *Hazardous Waste* [22].

#### National Planning Policy Framework (2021)

- 10.2.19 The *NPPF* [19] set out the government's planning policies for England. It does not contain specific materials or waste management policies; however, the framework includes reference to waste management by advocating that waste minimisation forms part of the environmental objective role of achieving sustainable development.

#### Waste Management Plan for England (2021)

- 10.2.20 The Department for Environment, Food and Rural Affairs published the *Waste Management Plan for England* in January 2021 [20]. The plan provides an overview of waste management in England. The plan does not introduce new policies or change how waste is managed in England. Its aim is to bring current waste management policies together under one national plan. It fulfils the requirements of the *Waste (England and Wales) Regulations 2011* for the waste management plan to be reviewed every six years.
- 10.2.21 The plan also includes changes to waste management plan requirements which have been made by the *Waste (Circular Economy) (Amendment) Regulations 2020* [14] where these could be incorporated into the Plan.
- 10.2.22 The plan also includes changes to any authority's waste management plan requirements which have been brought about by the *Waste (Circular Economy) (Amendment) Regulations 2020*.

### **Local planning policy**

#### Somerset Waste Core Strategy: Development Plan Document up to 2028

- 10.2.23 The *Somerset Waste Core Strategy* [23] guides Somerset County Council's (SCC's) approach to planning for sustainable waste management in Somerset until the year 2028. It covers all forms of waste including household, commercial, industrial and construction waste.
- 10.2.24 *WCS1 Waste Prevention*: this policy states that SCC, as Waste Planning Authority, will work with local residents, businesses and other partners to maximise the scope for waste prevention.

- 10.2.25 For proposed development, SCC will work with local planning authorities to promote and require the following supporting information to be submitted with planning applications:
- A site waste management statement for the construction of minor developments (less than 10 dwellings or where the floorspace to be created by the development is less than 1,000m<sup>2</sup>).
  - A Site Waste Management Plan (SWMP) for the construction of 10 or more dwellings or where the floor space to be created by the development is 1,000m<sup>2</sup> or more.
  - A site waste management strategy for the construction of large-scale major projects (200 or more dwellings or where the development covers more than 10,000m<sup>2</sup>) or for multi-site projects within the same application.
- 10.2.26 On completion of development, the documents listed above will support the Somerset Waste Partnership in its work on waste minimisation including, but not limited to, the delivery of its municipal waste management strategy and its work with the supply chain to reduce the negative impacts of packaging.
- 10.2.27 *WCS2 Recycling and Reuse*: this policy states that planning permission will be granted for waste management development that will maximise reuse and/or recycling of waste subject to the applicant demonstrating that the proposed development will, in particular, be in accordance with Development Management Policies 1-9.
- 10.2.28 *WCS3 Other Recovery*: this policy states that planning permission will be granted for proposed waste management development that will maximise other recovery from waste, subject to the applicant demonstrating that the proposed development:
- will not treat waste that could viably be recycled or composted
  - will facilitate the recovery of energy from waste
  - will, in particular, be in accordance with Development Management Policies 1-9

### **Standards and guidance**

- 10.2.29 The assessment of the environmental effects associated with the use of material assets and the disposal or recovery of waste related to the construction of the proposed scheme has been undertaken in accordance with DMRB LA 110 *Material assets and waste* [1].
- 10.2.30 Reference has also been made to the following:
- DMRB LA 101 *Introduction to environmental assessment* [24]
  - DMRB LA 104 *Environmental assessment and monitoring* [25]
  - The Definition of Waste: Development Industry Code of Practice, Version Two (Contaminated Land: Applications in Real Environments (CL:AIRE)) [26]

### Highways England Sustainable Development Strategy (2017)

- 10.2.31 The *Highways England Sustainable Development Strategy* [27] sets out Highways England's approach and priorities for sustainable development to their key stakeholders. The strategy outlines several ambitions relating to financial capital (climate change adaptation), human capital (sustainability leadership), natural capital (carbon management), social capital (responsible sourcing), and

manufactured capital (circular economy). Of these ambitions, the following are of relevance to this assessment:

- *“We will more actively manage our carbon emissions: we will examine and focus on new business areas where efficiencies can be achieved through reducing fuel, energy and raw material consumption, and waste generation.”*
- *“We will increase our knowledge of where all goods or materials are sourced from... ensuring we responsibly source materials is essential, as their production and handling can have local, national and global impacts - on human and social health and also on the environment and climate change.”*
- *“We will push towards a circular approach to our management of resources: minimising our demand for primary resources extracted from the ground and maximise the reuse of the resource is already in use on the network. Reutilising them in as higher value function as possible.”*

### 10.3 Assessment methodology

10.3.1 This section sets out the methodologies that have been employed to undertake the material assets and waste assessment, with reference to published standards, guidelines and best practise.

10.3.2 The assessment of the environmental effects associated with the use of material assets and the disposal or recovery of waste resulting from the construction of the proposed scheme have been undertaken in accordance with DMRB LA 110 *Material assets and waste* [1], alongside the use of professional judgement and emerging best practise.

#### Method of establishing baseline conditions

10.3.3 The existing baseline conditions have been identified as receptors which have the potential to be impacted by the proposed scheme. This includes the source of materials required for the construction of the proposed scheme, and waste management facilities which may be used for the treatment or disposal of waste. The baseline conditions have been informed by desk-based studies, including (but not limited to) data from:

- the Environment Agency
- SCC
- authorities in the wider regional area of South-West of England, including Cornwall, Devon, Dorset, Bristol, Wiltshire and Gloucestershire
- South West Aggregates Working Party (SWAWP)
- local development policies and topic papers

10.3.4 To identify the baseline conditions, data has also been collected from Highways England and members of the design team on the materials that are likely to be used during each stage of the proposed scheme and the waste that is likely to arise.

#### Assessment of construction impacts

10.3.5 For the purposes of assessing the material assets, a preliminary assessment has been undertaken based on current buildability advice. In accordance with DMRB LA 110 *Material assets and waste* [1], the assessment of environmental effects associated with the consumption of material assets resulting from construction has considered the proposed scheme design relating to:

- the types and quantities of materials required for the project

- information on materials that contain secondary or recycled content.
- information on any known sustainability credentials of materials to be consumed
- the type and volume of materials that would be recovered from off-site sources for use in the project
- the cut and fill balance
- details of on-site storage and stockpiling arrangements, and any supporting logistical details

10.3.6 In accordance with DMRB LA 110 *Material assets and waste* [1], the assessment of environmental effects associated with the production and disposal of waste resulting from the construction of the proposed scheme is a quantitative exercise which identifies the following:

- The amount of waste (by weight) that will be recovered or diverted from landfill either on-site or off-site (i.e. for use on other projects).
- The types and quantities of waste arising from the project (demolition, excavation arisings and remediation) requiring disposal to landfill.
- Details of on-site storage and segregation arrangements for waste and any supporting logistical arrangements; and potential for generation of hazardous waste (type and quantity).

10.3.7 The receptors that have been considered by this preliminary assessment have been included in Table 10-3.

**Table 10-3 Receptors considered in the materials chapter**

Receptor	Description
Material resources	Availability and depletion of material resources
Local designated Mineral Safeguarding Areas (MSA)	The SCC Minerals Plan [3] does not show any MSAs within the proposed scheme area.
Peat deposits	There are no peat resources located within the proposed scheme area.
Waste management facilities and landfill sites	Use of waste management facilities or permanent reduction of landfill capacity

#### Assessment criteria

10.3.8 DMRB LA 110 *Material assets and waste* [1] defines a specific methodology for assessing the environmental significance of a material resource or for determining the magnitude of the impact on such resource. The significance of the material assets or waste within the study area is determined on the basis of the descriptions described in Table 3-13 of DMRB LA 110 *Material assets and waste* [1], reproduced in Table 10-4.

**Table 10-4 Significance category descriptions**

Significance	Description
Very large	Material assets <ul style="list-style-type: none"> <li>• No criteria: use criteria for large categories.</li> </ul> Waste

Significance	Description
	<ul style="list-style-type: none"> <li>• &gt;1% reduction or alteration in national capacity of landfill, as a result of accommodating waste from a project.</li> <li>• Construction of new (permanent) waste infrastructure is required to accommodate waste from a project.</li> </ul>
Large	<p>Material assets</p> <ul style="list-style-type: none"> <li>• Project achieves &lt;70% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste (CDW) to substitute the use of primary materials.</li> <li>• Aggregates required to be imported to site comprise &lt;1% re-used/recycled content.</li> <li>• Project sterilises ≥1 mineral safeguarding site and/or peat resource.</li> </ul> <p>Waste</p> <ul style="list-style-type: none"> <li>• &gt;1% reduction in the regional capacity of landfill as a result of accommodating waste from a project.</li> <li>• &gt;50% of project waste for disposal outside of the region.</li> </ul>
Moderate	<p>Material assets</p> <ul style="list-style-type: none"> <li>• Project achieves less than 70% overall material recovery/recycling (by weight) of non-hazardous CDW to substitute the use of primary materials.</li> <li>• Aggregates required to be imported to site comprise re-used/recycled content below the relevant regional percentage target.</li> </ul> <p>Waste</p> <ul style="list-style-type: none"> <li>• &gt;1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project.</li> <li>• 1-50% of project waste for disposal outside of the region.</li> </ul>
Slight	<p>Material assets</p> <ul style="list-style-type: none"> <li>• Project achieves 70 - 99% overall material recovery/recycling (by weight) of non-hazardous CDW to substitute use of primary materials.</li> <li>• Aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional percentage target.</li> </ul> <p>Waste</p> <ul style="list-style-type: none"> <li>• ≤1% reduction or alteration in the regional capacity of landfill.</li> <li>• Waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising the integrity of the receiving infrastructure (design life or capacity) within the region.</li> </ul>
Neutral	<p>Material assets</p> <ul style="list-style-type: none"> <li>• Project achieves &gt;99% overall material recovery/recycling (by weight) of non-hazardous CDW to substitute the use of primary materials.</li> <li>• Aggregates required to be imported to site comprise &gt;99% re-used/recycled content.</li> </ul> <p>Waste</p> <ul style="list-style-type: none"> <li>• No reduction or alteration in the capacity of waste infrastructure within the region.</li> </ul>

Note: 'Region' means the local authority/authorities comprising the second study area.

Note: 'Primary materials': Materials that are from a non-renewable source (also referred to as 'virgin' materials.).

Note: 'Peat resource': existing or potential peat extraction sites.

10.3.9 Table 10-5 outlines the approach for determining significance, incorporating professional judgement by the competent expert.

**Table 10-5 Significance criteria for material assets and waste**

Significance category	Description
Significant (one or more criteria met)	Material assets <ul style="list-style-type: none"> <li>• Category description met for moderate or large effect.</li> </ul> Waste <ul style="list-style-type: none"> <li>• Category description met for moderate, large or very large effect.</li> </ul>
Not significant	Material assets <ul style="list-style-type: none"> <li>• Category description met for neutral or slight effect.</li> </ul> Waste <ul style="list-style-type: none"> <li>• Category description met for neutral or slight effect.</li> </ul>

*Note: Where projects have a material surplus, re-use/recycling of material can be achieved by use on other sites in line with sustainability principles and the CL:AIRE Definition of Waste Code of Practice ISBN 978-1-905046-23-2 [26]*

## 10.4 Assessment assumptions and limitations

- 10.4.1 The information provided within this chapter is considered to provide an appropriate level based on the assessment methodology outlined in DMRB LA 110 *Material assets and waste* [1].
- 10.4.2 The assessment for material assets and waste receptors has been based on a review of publicly available information, presented within Appendix 10.1 Material Assets and Waste Baseline, at the time of undertaking the assessment. Whilst the baseline data sources used in this assessment have been obtained from the most recently available information, it is still possible that conditions could have changed since their publication. Consultation will be undertaken with SCC to obtain the most recent information held on the capacity of waste management infrastructure to inform the Environmental Statement (ES).
- 10.4.3 Construction of the proposed scheme would be carried out in accordance with industry standard good working practice, which will be outlined in the Environmental Management Plan (EMP) to be submitted as part of the DCO application. This will include the environmental measures that would be adopted during the construction phase.
- 10.4.4 Given the early stages of design, estimates relating to the quantity of primary and secondary materials required are not available, nor are there estimates available relating to the quantity of waste arisings anticipated, sources of materials and mode of transport for materials and waste. As such, a high-level assessment has been carried out at this stage, limited to identifying activities that are likely to require significant quantities of materials, or are likely to produce significant quantities of waste. Values have been estimated based on the proposed scheme design. However, the assessment has been conducted within the limits of deviation (LoD) outlined in Chapter 2 The Project. Variations within the LoD could result in minor changes to the quantities of material assets required and estimated waste arisings to construct the proposed scheme. It is considered unlikely that the localised alignment changes permitted by the LoD would have a significant effect on material volumes. Therefore, the proposed LoD would not

give rise to any materially new or materially worse adverse environmental effects from those reported in this chapter.

- 10.4.5 Indicative cut and fill volumes for the proposed scheme are provided in Table 10-8. These volumes have been estimated based on the latest design information available and are likely to change as the design of the proposed scheme evolves. Therefore, the estimated cut and fill volumes will be reviewed and updated to inform the assessment for the ES. An overview of the gaps and uncertainties is provided in Table 10-6.

**Table 10-6 Gaps and uncertainties**

Gaps and uncertainties	Description
Confirmation of types and quantities of materials required for the proposed scheme and estimated waste arisings	To be developed pending further ground investigation.
Earthworks strategy including management of excess material.	To be developed as part of the Environmental Impact Assessment. Potential opportunity for reuse on local projects
Off-site material sources and suppliers.	To be confirmed by the contractor at detailed design stage.
Measures for transporting materials and waste to and from site including any access or haul roads.	To be confirmed by the contractor at detailed design stage.
Measures incorporated into the design to ensure sustainable use of resources and minimisation of waste arisings.	The EMP will include a SWMP. Proposals for the handling of waste material will be in accordance with the CL:AIRE Definition of Waste Code of Practice [26].
Whether any invasive species would need to be removed from site.	An Invasive Species Management Plan will be produced as part of the EMP.

- 10.4.6 The maintenance works would be carried out in accordance with the Maintenance and Repair Strategy Statement that will be submitted as part of the DCO application. DMRB LA 110 *Material assets and waste* [1] requires that environmental assessment for material assets and waste should only report on the first year of operational activities (opening year) in addition to the construction phase. It is not anticipated that any significant maintenance activities should occur during the first year of operational activity and therefore, no significant material asset use or waste generation should arise.

## 10.5 Study area

- 10.5.1 The material assets and waste assessment has been undertaken in line with DMRB LA 110 *Material assets and waste* [1] for the following study areas:

- The first study area is based on the construction footprint and project boundary (red line) of the proposed scheme (including compounds and temporary land take), this constitutes the area within which construction materials would be consumed (used, re-used and recycled) and waste would be generated.
- The second study area covers an area sufficient to identify feasible sources and availability of construction materials typically required for road schemes, and suitable waste infrastructure that could accept arisings of waste generated by the proposed scheme. The second study area encompasses the county of Somerset and includes the waste infrastructure that is suitable (licensed for waste volume and type) to accept arisings and/or waste generated by the

project. However, given the extent of waste infrastructure within the county, consideration has also been given to the possible need to use facilities over the wider South-West region (Cornwall, Devon, Dorset, Bristol, Wiltshire and Gloucestershire). As indicated within DMRB LA 110 *Material assets and waste* [1], professional judgement has been used to provide consideration on a balance of the proximity principle and value for money principle for establishing the second study area.

- 10.5.2 Based on DMRB LA 110 *Material assets and waste* [1], it is outside the scope of the assessment to consider the indirect environmental effects associated with the extraction of raw materials from their original source and the manufacture of products which occur off-site. This stage of a material's lifecycle is likely to have already been subject to an environmental assessment. These effects are therefore not addressed in this chapter.

## 10.6 Baseline conditions

- 10.6.1 The baseline environment is comprised of receptors which have been identified based on the likely impacts set out in DMRB LA 110 *Material assets and waste* [1]. A review of relevant information sources has been undertaken to establish existing and future baseline data and current understanding with regards to materials impacts. A summary is provided in the following paragraphs, with more detailed information in Appendix 10.1 Material Assets and Waste Baseline.

### Material assets

- 10.6.2 The proposed scheme would require both primary raw materials, such as aggregates and soil, and manufactured construction materials such as concrete, asphalt and steel.
- 10.6.3 The SCC Local Aggregate Assessment (LAA) (second revision 2017) for 2006 - 2015 indicates that Somerset remains a major producer of crushed rock aggregates and has sufficient permitted reserves to maintain a steady and adequate supply of crushed rock.
- 10.6.4 The LAA also indicates that Mineral Planning Authorities for Somerset, Devon and Cornwall have signed a Memorandum of Understanding that provides a mechanism for sharing data and maintaining a joint sand and gravel landbank (with a significant contribution from Devon).
- 10.6.5 The Devon LAA for 2009 - 2018 [28] indicates that landbanks for land-won aggregates remain above the minimum levels required by the NPPF [19] and provides for up to 9.2 million tonnes of sand and gravel at two sites. The *Somerset Minerals Plan Development Plan Document up to 2030* (adopted 2015) [3] estimates that the potential capacity of existing facilities for recycled and secondary aggregates in Somerset is over 160,000 tonnes per year. However, the Minerals Plan considers this figure to be an under-estimate and that it does not fully represent the potential supply of secondary and recycled aggregate.
- 10.6.6 The SCC Minerals Plan [3] does not show any MSAs within the proposed scheme area. The nearest is for building stone to the east of Stoke St Mary, approximately 400m to the west/south-west of the proposed scheme. The SCC Mineral and Waste Development Framework – Minerals Topic Paper 6 for MSAs indicates that this MSA is designated for Blue Lias bedrock.
- 10.6.7 There are no peat resources located within the proposed scheme study area.

## Waste

- 10.6.8 Environment Agency Waste Data Interrogator [29] data for the South-West indicates that 1,573,000 tonnes of waste were received/handled in Somerset in 2019, with 20,390,000 tonnes in the South-West region. Environment Agency records relating to landfill inputs in Somerset for 2019 indicate that 484,000 tonnes of waste were accepted by landfills in Somerset and 3,211,000 tonnes in the South-West region. However, the remaining landfill capacities for Somerset and the South-West Region in 2019 were 2,017,000 and 25,038,000 tonnes, respectively. The Waste Management Data Interrogator 2019 [29] shows that hazardous waste (merchant) capacity in the South-West region is all located in Gloucestershire (Wingmoor Landfill Site – GL52 4DG) and Wiltshire (Parkgate Farm Hazardous Waste Landfill – SN5 4HG), which are both located approximately 90 miles from the proposed scheme.
- 10.6.9 The Environment Agency Waste Data Interrogator [29] data indicates there is no remaining inert waste capacity in Somerset and only 2,017,000m<sup>3</sup> of non-hazardous waste capacity (including non-hazardous sites with stable non-reactive hazardous waste capacity). However, there was 11,494,000m<sup>3</sup> of inert waste capacity within the overall South-West region in 2019.
- 10.6.10 The Environment Agency Waste Data Interrogator [29] indicates there were three permitted non-hazardous landfills in Somerset and 26 in the wider South-West region in 2019.

## **Future baseline**

- 10.6.11 Chapter 4 Environmental assessment methodology sets out the 'Do Minimum' and 'Do Something' scenarios. The 'Do Minimum' scenario represents the future baseline with minimal interventions and without new infrastructure. Potential changes to future material asset and waste receptors would not be noticeable to those identified in the baseline text above. Therefore, the future baseline would remain the same as set out above.

## **10.7 Potential impacts**

- 10.7.1 There is potential for the following impacts relating to material assets and waste arising to occur during construction of the proposed scheme:
- Impacts on-site generated materials (e.g. soils) and waste arisings have on the existing capacity of landfill
  - Impacts on primary (i.e. non-recycled) material resources used for construction
- 10.7.2 Mitigation measures are being incorporated in the design and construction of the proposed scheme, which are set out in Section 10.8. The potential impacts on material assets and waste are outlined below in relation to construction and operation.

## **Construction impacts**

- 10.7.3 Construction of the proposed scheme will require the use of materials such as aggregates from primary, secondary and recycled sources, along with manufactured construction products, which can include road surfacing, retaining walls, pre-cast elements for the construction of structures such as bridges, gantries and signage, barriers, lighting and fencing. However, some of the

material could be generated on-site, for example excavated soils or recycling of concrete for use as aggregate from existing structures.

- 10.7.4 Construction is expected to result in potentially significant volumes of surplus materials and waste, leading to potential impacts on the available waste management infrastructure (in particular through the permanent use of landfill void space). Waste would predominantly arise from excavations and demolition of existing structures, and also from materials brought to site that may be damaged, off cuts and / or surplus.

#### Construction compounds

- 10.7.5 The location of the construction compounds has been selected to be local to works to be carried out and near haul roads, to prevent pollution, reduce waste and to encourage ease of use. The selection of locations has also taken into account environmental considerations including the potential for leakage and contamination. Such environmental considerations will be described in the EMP. Storage of any suspected contaminated material prior to treatment or disposal off-site would be in a designated, bunded area on an impermeable surface, in line with the requirements that will be set up in the EMP and submitted as part of the DCO application. Material will be tested prior to reuse or off-site disposal.
- 10.7.6 There will be two construction compounds comprising one main compound and a second compound for material processing (including stockpiles and a crusher) and stockpiling. The main compound will be located at chainage 0+100, located in the fields adjacent to the westbound carriageway.
- 10.7.7 To reduce the distance between the major excavation area and the location where the material would be processed, the material processing (crusher) and material stockpile compound would be located in the fields south of the new alignment of the A358 between Ch 2+300 and Ch 2+600. To facilitate movement of material to and from this compound, and to reduce the amount of construction traffic using the existing road network, haul routes would be created. Where practicable, these are likely to be routed along or immediately adjacent to the proposed mainline route; however, where this is not practicable, additional temporary land use may be required adjacent to the works to enable access to the local roads network.
- 10.7.8 Satellite compounds for the construction of junctions and local road overbridge and underbridges will be located at the following locations:
- Stoke Road overbridge
  - Mattock's Tree Green junction overbridge
  - Griffin Lane underbridge
  - Bickenhall Lane overbridge
  - Village Road link (south) overbridge
  - Ashill junction overbridge
  - Southfields roundabout

#### Material asset impacts

##### *Material assets required*

- 10.7.9 Material assets required for the construction of road schemes include both primary raw materials, such as aggregates and minerals, and secondary

manufactured products. Many material assets would originate off-site and some, such as excavated soils and rock, would arise on-site.

- 10.7.10 The production, sourcing, transport, handling, storage and use of these materials, as well as the disposal of any surplus (where necessary), have the potential to adversely affect the environment.
- 10.7.11 The consumption of material assets has the potential to result in direct and indirect impacts on the environment. For material asset use, the potential environmental effects are associated with the sourcing of primary raw materials and secondary products, and their subsequent use during construction. There are also potential environmental effects associated with site won material, such as the requirement to store and possibly process any materials during construction.

#### *Earthworks*

- 10.7.12 Construction of the proposed scheme would generate earthworks material, including cut (excavation of material removed from an area) and fill (placement of material into an area to make, for example, embankments).
- 10.7.13 The proposed scheme has the potential to have an impact on the waste management capacity in the South-West region, depending on the balance of the cut and fill.

#### *Mineral resource areas and MSAs*

- 10.7.14 The SCC Minerals Plan [3] does not show any MSAs within the proposed scheme area. Therefore, the proposed scheme does not have the potential to impact on any MSA. In addition, there are no peat resources located within the proposed scheme area.

#### Waste impacts

- 10.7.15 In considering waste impacts, it is important to define when, under current legislation and understanding, a material is considered to be a waste. The definition of waste is important because the classification of substances as waste is the basis for the formulation of waste management and the application of controls to protect the environment and human health with respect to waste.
- 10.7.16 With regards to this assessment, the material excavated and re-used within the proposed scheme area should not be classified as waste, subject to it meeting requirements such being suitable for its intended use as earthwork embankments and landscaping.

#### *Waste arisings*

- 10.7.17 For waste materials, the potential environmental impacts are associated with the production, storage, processing and ultimate disposal of waste arisings from the proposed scheme to alternative sites or landfill during construction.
- 10.7.18 The types and quantities of waste generated during construction, demolition and excavation activities would vary in their impact depending on the management route opportunities (re-use, off-site recycling, off-site composting or off-site recovery) and the potential recovery rate.
- 10.7.19 In terms of potentially hazardous waste arisings, sources of contamination within the proposed scheme boundary have been considered. There are no authorised or historical landfills within the first study area. However, as indicated in Chapter 9 Geology and soils, there may be potential contamination risks from general

highway use and agricultural land use, which could be encountered during the construction phase including tar bound road planings from existing highways. For more information on the potential contamination risks see Chapter 9 Geology and soils.

#### *Waste management infrastructure*

- 10.7.20 The proposed scheme has the potential to generate large amounts of construction, demolition and excavation waste, which may affect the capacity of Somerset and the wider South-West region's waste management infrastructure. This is due to the need to occupy landfill space, limiting the short-term use of available waste storage and the potential to impact the proposed scheme's ability to comply with relevant waste policies and plans.

#### **Operational impacts**

- 10.7.21 Operation of the proposed scheme would result in smaller impacts on material assets and waste to those described above for the construction phase. The design process will seek to minimise the consumption of materials and the generation and disposal of waste throughout the lifecycle of the proposed scheme.
- 10.7.22 DMRB LA 110 *Material assets and waste* [1] requires that environmental assessment for material assets and waste should only report on the first year of operational activities (opening year), in addition to the construction phase.
- 10.7.23 Significant effects are considered unlikely during the operation of the proposed scheme, from both the use of material assets and the disposal or recovery of waste. As such, operational impacts have been scoped out of the assessment, on the basis that no likely significant effects would occur within the first year of operation.

## **10.8 Design, mitigation and enhancement measures**

- 10.8.1 Environmental considerations have influenced the proposed scheme throughout the design development process, from early route options assessment through to refinement of the proposed scheme's design. An iterative process has facilitated design updates and improvements, informed by environmental assessment and input from the proposed scheme's engineering team, stakeholders and public consultation.
- 10.8.2 The proposed scheme will include a range of environmental commitments. Commitments of relevance to material assets and waste are set out in this section under the following categories:
- Embedded mitigation: measures that form part of the engineering design, developed through the iterative design process.
  - Essential mitigation: any additional scheme-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered to be significant in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Essential mitigation has been identified by environmental topic specialists, taking into account the embedded and good practice mitigation.
  - Enhancement mitigation: any additional scheme-specific measures needed to avoid, reduce or offset potential impacts after the proposed development is complete.

## Embedded mitigation

10.8.3 Embedded mitigation involves project design principles adopted to avoid or prevent adverse environmental effects. Embedded mitigation relating to material assets and waste is outlined in Chapter 2 The Project. Such measures are therefore not proposed or reported in this PEI Report as mitigation. However, measures have been developed by applying the five key principles for Designing out Waste as outlined by the Waste and Resources Action Programme (WRAP): A Design Team Guide for Civil Engineering [30], which has been summarised below:

- Design for Reuse and Recovery - this includes the reuse of materials and components recovered from on site or from other sites, use of recycled materials and use of “new” materials that contain a high percentage of recycled material. For example, non-contaminated excavated materials will be reused onsite to achieve a cut and fill balance.
- Design for Off-Site Construction - this includes identifying if any part of the design can be prefabricated / manufactured off-site and assembled on-site rather than constructed in-situ.
- Design for Material Optimisation - consideration should be focussed on using less material and producing less waste; for example, through “lean design” and reducing variables and bespoke elements in materials and design.
- Design for Waste Efficient Procurement – this includes utilising the procurement process of materials and services to inform design development, reducing waste in the supply chain, consideration where waste arises and where waste can be reduced in construction methods.
- Design for Deconstruction and Flexibility - consider maintenance and adaptability for future uses, how constructions can be deconstructed effectively at end of life and avoiding the use of materials that prevent future recycling.

## Essential mitigation

10.8.4 The following mitigation measures will be implemented during the design and construction phases of the proposed scheme:

- Waste arisings will be prevented and designed out where practicable.
- Design for re-use, recovery and materials optimisation.
- Confirmation of types and quantities of materials, alongside information on materials that contain secondary and recycled content will be developed following detailed design.
- Opportunities to reuse material resources will be sought.
- Opportunities to support the circular economy will be considered.

10.8.5 An EMP will be prepared in parallel with the development of the proposed scheme design and construction methodology and will include a Materials Management Plan (MMP), and will be submitted as part of the ES to accompany the DCO application. This approach for managing materials is consistent with the waste hierarchy defined in the *Waste Framework Directive (Directive 2008/98/EC)*. Adopting the waste hierarchy would significantly reduce the amount of material requiring off-site disposal and hence reduce potential impacts relating to the movement of materials both on to and off-site.

### Materials

- 10.8.6 A MMP will be prepared prior to construction. The MMP will outline how site won materials would be managed and reused, in accordance with best practice requirements and the controls for material management and storage. This approach for managing materials is consistent with the waste hierarchy defined in England by the Waste (England and Wales) Regulations 2011 (S.I. 2011 No. 988) [31].
- 10.8.7 In line with the target set out in DMRB LA 110 *Material assets and waste* [1], a minimum of 22% of aggregates used in construction will be recycled or secondary, for those applications where it is technically and economically feasible to substitute these alternative materials for primary aggregates. To facilitate compliance with this target, the contractor will calculate the total aggregate required to achieve the detailed design, and the total where the design specification dictates only primary aggregate is used. During construction, the contractor will record the amount of primary and secondary/recycled aggregate by weight and calculate compliance with the target (offsetting the amount excluded by the design specification).
- 10.8.8 The contractor will use the Building Research Establishment (BRE) Framework Standard for Responsible Sourcing (BES 6001) [32] to verify that imported materials are sustainably sourced and managed, in order to reduce the environmental impacts throughout the supply chain.
- 10.8.9 The contractor will be required to review the design and investigate opportunities to standardise (where practicable) construction components to increase efficiency of materials' use in production and reduce waste production. This initiative will be progressed through detail design and documented in a Material Efficiency Design Report submitted to Highways England prior to construction.

### Waste

- 10.8.10 Waste materials may arise due to the nature of the material (e.g. contamination) or the timing of arising. A SWMP will be developed during the design process and form part of the EMP, which will be submitted as part of the DCO application. The SWMP would outline the proposals for the identification, segregation, handling and storage of wastes identified as arising from the proposed scheme.
- 10.8.11 The EMP will contain measures to ensure that contaminated material is addressed during construction and unacceptable risks are mitigated.
- 10.8.12 The WRAP and Environment Agency *Quality Protocol: Aggregates from inert waste* [33] will be followed with respect to the production and use of aggregates from inert waste.
- 10.8.13 In line with the target set out in DMRB LA 110 *Material assets and waste* [1], the proposed scheme will target 70% recycling and reuse on site of suitable, uncontaminated concrete from demolition activities as a substitute for the use of primary material. Where reuse is not practical, recycling and recovery will be the next preferred option. To facilitate this, the contractor will use the methodology in the Waste Framework Directive to demonstrate the recovery of non-hazardous construction waste, with a target of 90%. The contractors will aim to achieve a minimum recovery of 70% (by weight) of non-hazardous construction waste.
- 10.8.14 It may be necessary to remove some unsuitable and excess materials from site, which could result in impacts on waste management infrastructure and the local road network. When applying the waste hierarchy, measures will be implemented

to ensure the options that deliver compliance with *The Waste (England and Wales) Regulations 2011* are selected to ensure the best environmental outcome.

10.8.15 Waste management measures to be documented in the EMP to minimise the likelihood of any localised impacts of waste on the surrounding environment would comprise:

- damping down of surfaces during spells of dry weather and brushing or water spraying of heavily used site entrances or tracks
- off-site prefabrication, where possible
- burning of waste or unwanted material would not be permitted on-site
- all hazardous material including fuels, chemicals, cleaning agents or solvent products to be kept in sealed containers and stored and managed appropriately
- all contaminated materials encountered on site to be assessed through further ground investigation and site-specific risk assessment to determine the requirement for treatment and potential for re-use (as per Chapter 9 Geology and Soils)
- materials requiring removal from the site would be transported using licensed carriers and records would be kept detailing the types of waste moved

10.8.16 The re-use of excavated materials should be undertaken in accordance with the Contaminated Land: Application in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice [26]. This can also be applied where materials require treatment (including crushing and screening) prior to re-use to meet the required engineering specification.

10.8.17 Where practicable approaches implemented to minimise the quantities of waste requiring disposal would comprise:

- agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme
- implementation of just-in-time material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste
- attention to material quantity requirements to avoid over-ordering and generation of waste materials
- during site clearance and construction, re-use of materials wherever feasible e.g. re-use of excavated soil for earthwork embankments and landscaping
- the materials would be sorted or processed and, where materials excavated on-site are initially unable to meet the re-use criteria, they would either be treated to make them suitable for use or, as a last resort, disposed off-site as waste
- segregation of waste at source, where practical
- the proposed scheme would be designed to maximise the earthworks balance
- re-use of materials within the construction works, for example, the re-use of pavement planings as subbase in footpaths
- re-use and recycling off-site where re-use on-site is not practical

### Earthworks

10.8.18 An earthworks surplus of approximately 58,700m<sup>3</sup> has been identified as outlined in Table 10-8. This material is comprised of two types of material: mudstone and limestone. Measures would be taken to reduce this excess material to the point

that no surplus material will remain after the required cut and fill construction operations. These measures include:

- highway alignment changes to reduce cut volumes
- changes to landscape earthworks cross section and slope design to increase placed fill volumes
- changes to cut slope design and cross sections at locations in deep cutting to reduce cut volumes
- utilisation of excavated materials in pavement construction

10.8.19 As the general cut/fill quantities are approximately in balance, there is likely to be a limited volume available for landscaping fill.

10.8.20 The design would incorporate earthworks with the landscape design to mitigate the visual impact of the proposed scheme and integrate it into the surrounding landscape. The offline section would make use of cuttings through the higher ground around Henlade and Mattock's Tree Green. Much of the online section of the route would be close to the general ground level, matching the existing A358 alignment. The new grade-separated junctions would require embankments for the slip roads, connecting local roads and bridges. The amount of landscaping fill available is expected to be very limited and therefore, mitigation measures such as earthworks screening bunds would be restricted to selected locations.

10.8.21 The above measures will be documented in the EMP, which will be submitted as part of the DCO application.

### Enhancement

10.8.22 No enhancement measures have been included in the proposed scheme design for materials and waste.

## 10.9 Assessment of likely significant effects

10.9.1 This section assesses the potential effects of the material assets used and waste generated during construction of the proposed scheme. In accordance with the applied methodology, the assessment of effects has been undertaken based on a reasonably worst-case scenario, one that is precautionary, but it is reasonable to assume could occur, rather than an extreme scenario that is on balance unlikely.

### Material assets

10.9.2 Aggregates will need to be imported for construction of the proposed scheme, including pavement, concrete and manufactured products. The regional recycled aggregate target, outlined in Appendix 10.1, states that the recycled content target for alternative materials in the South-West is 22%.

10.9.3 The types of materials required for the construction phase of the proposed scheme are listed in Table 10-7, these would be refined during future detailed design.

**Table 10-7 Material assets required**

Project activity	Detail of likely material assets required for the proposed scheme	Quantities of material assets required (tonnes)	Additional information on material assets
Fill	General fill, including earth embankments (mainline and local roads) and earthbunds	29,000	Sourced from material won on-site

Project activity	Detail of likely material assets required for the proposed scheme	Quantities of material assets required (tonnes)	Additional information on material assets
	General fill	340,000	Sourced from local suppliers where possible
	General fill, required for landscape	55,000	Sourced from material won on-site
Installation of pavement	Mainline (including sub-base, base, binder course and surface course)	637,000	Potential to re-use site won materials. If not suitable or due to programme requirements, material would be sourced from local suppliers
	Local roads (including sub-base, base, binder course and surface course)	173,000	
	Central reserve (including sub-base, binder course and sub course)	37,000	
	Other concrete pavement, footpaths or maintenance access	5,000	
Installation of manufactured products	Drainage	21,000	Sourced from local suppliers where possible
	Concrete step barrier	17,000	
	Timber post and rail fencing	4,000	
	Steel Vehicle Restrain System and kerbs	1,000	
Structures	Ding Mill culvert extension	500	Local batching plants. Majority of precast factories in the UK are situated in the Midlands. Steel composite likely to be sourced from a national supplier, closest availability would be Somerset or South Wales
	A358 Gas main protection slab	200	
	Ashill junction overbridge	16,000	
	Black Brook tributary culvert 1	2,000	
	Black Brook tributary culvert 2	2,000	
	Cad Brook bridge extension	2,000	
	Ding Bridge eastbound	2,000	
	Fivehead River underbridge	1,000	
	Griffin Lane underbridge eastbound	12,000	
	Hatch Park cattle creep extension	2,000	
	High Bridge underbridge North	2,000	
	M5 junction 25 southbound diverge offside retaining wall	100	
	Mattock's Tree Green junction overbridge	21,000	
	River Tone tributary culvert	2,000	
	Stoke Road overbridge	12,000	
	Sunnyside underpass extension	1,000	
	Venner's Bridge extension	2,000	
	Venner's Bridge (Stewley Link)	2,000	
	Village Road overbridge	26,000	
West Sedgemoor main drain culvert extension (culvert 1928)	1,000		

Note: Values have been rounded to the nearest 1,000 tonnes.

10.9.4 The proposed scheme has been designed to reduce the quantity of imported construction materials, alongside reducing the quantities of waste taken off-site by re-using or recycling the available existing materials within the proposed scheme.

- 10.9.5 Following the material re-use assessment, material to be produced on the proposed scheme includes Class 1B and 1C (general fill), Class 2A, 2B, 2C and 2D (cohesive general fill) and Class 4 (landscape fill). The cut and fill and landscaping material assets are likely to be derived from site won material. Re-using Class 1 and 2 fill for embankments and Class 4 material for landscape bunds would reduce the amount of material required to be sourced from off-site.
- 10.9.6 The contractor will seek to re-use as much site won material as possible, this would be detailed within the MMP.
- 10.9.7 The proposed scheme would cut into existing topography. Based on preliminary design figures, the excavated material would be used as general fill for earthwork embankments and landscaping. On this basis, it is expected that the proposed scheme would achieve an overall earthworks balance of cut and fill materials, subject to consideration of unacceptable material.
- 10.9.8 From preliminary design figures, it is predicted that approximately 5,100m<sup>3</sup> (11,000 tonnes) of earthworks material will be classified as contaminated unacceptable U2 material requiring off-site disposal. Therefore, as a percentage of the total cut, the proposed scheme is estimated to have an 99% material earthworks recovery recycling rate based a desk top review of the local geology. Geotechnical investigations are being carried out during this preliminary design stage and further details will be provided in the ES to confirm the material earthworks recovery recycling rate.
- 10.9.9 The materials required for the installation of the pavement are likely to be imported to site, with the potential to re-use some site won material. Other imported materials related to the installation of manufactured products are likely to be sourced from local, established suppliers who regularly provide materials for similar sized projects.
- 10.9.10 The contractor will ensure that the suppliers have adequate capacity to meet demand, without having a negative impact on their resources. When identifying the suppliers, the contractor will consider the distance from the proposed scheme to ensure the distance the materials travel is as short as possible, with a preference for sourcing locally to support the local and regional economy.
- 10.9.11 The proposed scheme has been designed to reduce the quantity of imported construction materials, alongside reducing the quantities of waste taken off-site, by re-using or recycling the available existing materials along the proposed scheme.
- 10.9.12 Overall, in terms of earthwork material assets, the proposed scheme is predicted to achieve a 99% material recovery recycling rate. Therefore, in line with Table 10-5, the assessment of effects on material assets is slight and therefore not significant. The preliminary scheme cut, fill and surplus quantities which arise from the earthwork figures are outlined in Table 10-8.

**Table 10-8 Proposed scheme design earthworks estimates**

Description	Cut (m <sup>3</sup> )	Fill (m <sup>3</sup> )	Surplus (m <sup>3</sup> )
Total after topsoil and pavement strip adjustment	731,300	680,300	51,000
Total after acceptability corrections	621,600	680,300	-58,800

- 10.9.13 As outlined in paragraph 10.8.18, measures will be taken to reduce this excess volume of fill to the point that no surplus material will remain following the cut and fill construction operations.

### Imported materials

- 10.9.14 The proposed scheme is predicted to achieve a 99% earthworks material recovery rate; and material won on-site from excavations is likely to be reused on-site as general fill for embankments and topsoil. Table 10-7 identifies the material assets that would not be able to be sourced on-site and would need to be imported.
- 10.9.15 The imported manufactured material assets would be sourced from established suppliers who regularly provide materials for similar sized projects. The contractor will determine the suppliers involved in the proposed scheme, ensuring they have adequate resources to meet the quantitative needs of the proposed scheme without having negative influence on their resources.
- 10.9.16 The SCC LAA (second revision 2017) for 2006 - 2015 states that the countywide landbank for crushed rock in 2015 was 380 million tonnes, equivalent to crushed rock aggregate reserves being able to meet projected demand for 28.4 years. The landbank for all land-won sand and gravel was estimated at 7 million tonnes in 2015, and the remaining landbank was estimated at 12.5 years.
- 10.9.17 Material would be imported to site in line with the recycled content target for the South-West of 22% by the contractor. Therefore, the assessment of effects on material assets is considered slight and not significant.

### **Waste**

#### Waste arisings

- 10.9.18 The main types of waste arisings associated with the construction phase of the proposed scheme and the potential recovery rates are shown in Table 10-9.

**Table 10-9 Estimated waste arisings**

Project activity	Likely waste from the proposed scheme	Quantity (tonnes)	Quantity (m <sup>3</sup> )	Potential management routes	Anticipated Potential Recovery rate (%) [34]
Site remediation, preparation or earthworks	Excavated material		621,600	Suitable material for fill	100%
	Excavated material		109,700	Suitable material for landscape	95%
	Vegetation arising from site clearance	Vegetation has not been included in the modelling at this stage. Quantities will be estimated in the ES.		All assumed to keep and re-use on-site, or undertake off-site composting	100%
Demolition	Asphalt from removal of existing road, some of which may contain coal tar	70	200	Off-site recycling or disposal depending on coal tar content	95%
	Materials from demolition of buildings and structures	300	1,000	Segregated during demolition to allow for off-site recycling or disposal	75%
Construction	Asphalt and bituminous material	10,063	17,000	Off-site recycling or disposal	95%

Project activity	Likely waste from the proposed scheme	Quantity (tonnes)	Quantity (m <sup>3</sup> )	Potential management routes	Anticipated Potential Recovery rate (%) [34]
	Concrete (ready mixed)	735	2,000	Off-site recycling or disposal	95%
	Steel	35	300	Off-site recycling or disposal	100%
	Timber	168	500	Off-site recycling or energy recovery	90%
Waste from the compounds	General office waste/construction worker waste	Domestic waste is considered to be minimal		Off-site recycling or disposal	85%
	Packaging from materials delivered to site	Packaging is considered to be minimal		Taken back by suppliers for re-use or recycling, sorted and taken off-site for recycling or disposal	85%
Operation	Typically, highway schemes have a material life span of 20-40 years before maintenance or upgrading is required, dependent on material properties, maintenance and usage. Maintenance would be carried out in accordance with DMRB when the deterioration is judged to affect the standards of the service provided to the road user and the integrity of the pavement structure [35]	Minimal due to the re-use of planned material		This would be managed by Highways England and is likely to consist of a combination of local recycling facilities, disposal at an inert or non-hazardous landfill site	N/A
<b>Total</b>	N/A	1,499,400	752,400	N/A	N/A

Note: Values have been rounded to the nearest 100 or 1,000 tonnes.

10.9.19 Measures would be implemented such that material is handled in accordance with the Waste (England and Wales) Regulations 2011 to ensure the best environmental outcome. The proposed scheme would re-use as much material as possible on-site. A ground investigation will be undertaken to assess material suitability and testing will be undertaken during construction to confirm that excavated materials meet the specification requirements. This would ensure that excavated material can be used directly within the proposed scheme, subject to being suitable for use or following site treatment, in line with the CL:AIRE *Definition of Waste: Development Industry Code of Practice* [26]. Any material that does not meet this specification, or could not be treated to meet the specification, would be disposed of appropriately.

10.9.20 Should hazardous waste be encountered during construction that needs to be removed off-site, this would be handled in specially designated areas in storage

compounds (likely mostly to be at the main compound), prior to transfer to external waste management sites. Non-hazardous materials for removal would be segregated and appropriately re-distributed to alternative projects or transported to waste management facilities.

- 10.9.21 Construction of the proposed scheme is expected to generate 752,400m<sup>3</sup> (1,499,400 tonnes) of waste arisings of which 621,600m<sup>3</sup> (83% of the total waste) would be re-used on-site and around 124,000m<sup>3</sup> (16% of the total waste) could potentially be recycled off-site. Therefore, the proposed scheme could potentially achieve a diversion from landfill of 99%.
- 10.9.22 The remaining landfill capacity in the South-West of England in 2019 for all non-hazardous and hazardous waste as determined by the Environment Agency [29] is 25,038,000m<sup>3</sup>. Based on a worst-case scenario, whereby all estimated waste arisings generated by the proposed scheme would be disposed of at landfill, it is anticipated this would utilise less than 1% of the South-West's landfill capacity. In practice, a large proportion of waste produced by the proposed scheme would likely be reprocessed or recycled rather than being disposed of in landfill, therefore further reducing the quantities of waste produced.
- 10.9.23 The proposed scheme is anticipated to account for less than a 1% reduction or alteration in the regional capacity of waste management infrastructure, and there is adequate disposal capacity in the South-West (although in practice, a large amount of this waste would be reprocessed or recycled). Therefore, the assessment of effects on waste arisings would be slight and therefore not significant.

#### *Waste management infrastructure*

- 10.9.24 All materials arising from construction will be managed in accordance with the waste hierarchy defined within *The Waste (England and Wales) Regulations 2011*.
- 10.9.25 Some site won materials will not be required for re-use on-site and, where this is the case, efforts will be made to reduce the need to export this to local waste management facilities.
- 10.9.26 Should any asbestos be found on-site during construction, demolition or excavation works, the contractor will treat this as hazardous waste and assess the risk of those materials to ensure that a management system is in place that responds correctly and appropriately to the materials present.
- 10.9.27 The location of waste management facilities for CDW within the second study area are shown in Figure 10.1 Waste management infrastructure. This figure includes six types of waste infrastructure facility with data gathered from Somerset. The waste management sites comprise composting, waste transfer station, waste treatment station, metal recovery / recycling facilities, incineration facilities and landfill.
- 10.9.28 Overall, there would be a limited amount of waste that would be removed from site and therefore, it is unlikely that waste would be disposed of outside of the region. Therefore, the assessment of effects on waste management infrastructure is slight and not significant.

#### **Operation effects**

- 10.9.29 The proposed scheme has limited potential to generate significant effects during the first year of operational activities as there are no requirements to import or

export materials or to generate waste on a day-to-day basis. Routine maintenance would include gully emptying, litter collection and periodic maintenance activities including resurfacing. Waste arisings from these maintenance activities would be expected to be equivalent to the existing road and the waste would be managed using the established procedures and facilities that are used across the strategic highways network. During the first year of operational activities, there is not expected to be a requirement for the use and disposal of any significant volume of material, therefore the assessment of effects on waste is neutral, and not significant overall.

## 10.10 Monitoring

10.10.1 In line with DMRB LA 110 *Material assets and waste* [1], the assessment provides a framework for assessing and managing the effects associated with the use of material assets and the disposal or recovery of waste by promoting:

- Reduction in overall impacts and improvements in the efficiency of resource use.
- Prevention and/or reduction of adverse effects associated with the generation and management of waste.

10.10.2 Procedures will be adopted by the contractor during construction to control the use of materials and further reduce the impact. For example, materials such as soil, concrete and demolition materials will be documented in the MMP. Once a contractor has been appointed, engagement will be undertaken to ensure that environmental permitting requirements are met and solutions are developed to reduce conflict and delays. Materials will be responsibly sourced (i.e. must have a certified provenance, traceability and sustainability), in order to reduce the impact on the highways network and material assets. Responsible sourcing is defined in BS8902 [36] Responsible Sourcing Sector Certification Schemes for Construction Projects – Specification as “the management of sustainable development in the provision or procurement of a product”.

10.10.3 In order to comply with responsible sourcing principles, the contractor will, for example:

- Refer to standard BES 6001 - Responsible Sourcing of Construction Products.
- Ensure suppliers are certified by the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC).

10.10.4 The EMP will set out monitoring to be undertaken during the construction stage to ensure that the mitigation measures embedded in the proposed scheme design are secured and implemented.

## 10.11 Summary

10.11.1 This chapter has considered the potential environmental effects associated with the use of material assets and disposal and recovery of waste for the proposed scheme, following DMRB LA 110 *Material assets and waste* [1].

### Construction assessment

10.11.2 There are no significant effects anticipated during the construction of the proposed scheme.

**Operational assessment**

10.11.3 There are no significant effects anticipated during operation of the proposed scheme.

**Further work**

10.11.4 The information presented is preliminary and is based on the proposed scheme, as described in Chapter 2 The Project. The earthworks strategy is to be developed further and has the potential to change following any scheme design changes resulting from consultation feedback.

10.11.5 Further assessment as part of the Environmental Impact Assessment (EIA) process will be undertaken to confirm the scale of environmental impacts and significance of environmental effects arising from the proposed scheme. The final assessment will be reported within the ES, which will accompany the DCO application.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 11  
Noise and Vibration

HE551508-ARP-ENV-ZZ-RP-LA-000002

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# 11 Noise and vibration

## 11.1 Introduction

- 11.1.1 This chapter assesses the potential noise and vibration impacts of the construction and operation of the proposed scheme. This follows the methodology set out in the *Design Manual for Roads and Bridges* (DMRB), LA 111 *Noise and vibration* [1]. Annex E/1 of DMRB LA 111 *Noise and vibration* provides instruction on how to take account of government noise policy when assessing road schemes.
- 11.1.2 This chapter details the methodology followed for the assessment, summarises the regulatory and policy framework related to noise and vibration and describes the existing environment in the area surrounding the proposed scheme. Following this, the mitigation and the preliminary assessment of residual effects associated with the proposed scheme are discussed, along with the limitations of the assessment.
- 11.1.3 An explanation of technical terms is given in Appendix 11.1 Glossary of acoustic terminology.

## 11.2 Legislative and policy framework

- 11.2.1 As documented in the Preliminary Environmental Information (PEI) Report Chapter 1 Introduction, the primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the *National Policy Statement for National Networks* (NPSNN) [2], which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered. Table 11-1 identifies the NPSNN policies relevant to noise and specifies where in this chapter information is provided to address the policy.

**Table 11-1 Relevant NPSNN policies for applicant's noise and vibration**

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the chapter is information provided to address this policy.
5.186	NPSNN states that excessive noise can impact on the “... <i>use and enjoyment of areas of value (such as quiet places) and areas with high landscape quality</i> ”.	Section 11.9 Assessment of likely significant effects include non-residential sensitive receptors but outdoor amenity such as public rights of way (PRoW) will be considered in more detail in the Environmental Statement (ES).
5.187	<i>Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed in accordance with the Biodiversity and Geological Conservation section of this NPS.</i>	The noise impact data from this assessment has been used in Chapter 8 Biodiversity.
5.188	NPSNN notes that the degree of noise impact will depend on:	Section 11.9 Assessment of likely significant effects

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the chapter is information provided to address this policy.
	<ul style="list-style-type: none"> <li>• <i>Construction noise and the inherent operational noise from the proposed development and its characteristics</i></li> <li>• <i>The proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces)</i></li> <li>• <i>proximity of the proposed development to quiet places and other areas that are particularly valued for their tranquillity, acoustic environment or landscape quality such as National Parks, the Broads or Areas of Outstanding Natural Beauty; and</i></li> <li>• <i>the proximity of the proposed development to designated sites where noise may have an adverse impact on the special features of interest, protected species or other wildlife.</i></li> </ul>	<p>Proximity is taken into account in the detailed operational noise modelling and the distance calculations for construction reported in Section 11.9</p> <p>No such features have been identified in the noise study area at this stage.</p> <p>The effects of noise and vibration on ecological receptors have not been included in this chapter. However, the noise impact data from this assessment has been used in Chapter 8 Biodiversity.</p>
5.189	<p><i>Where a development is subject to Environmental Impact Assessment (EIA) and significant noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment, which should form part of the environment statement:</i></p> <ul style="list-style-type: none"> <li>• <i>a description of the noise sources including likely usage in terms of number of movements, fleet mix and diurnal pattern. For any associated fixed structures, such as ventilation fans for tunnels, information about the noise sources including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise. [continued below]</i></li> </ul>	Section 11.4 Assessment assumptions and limitations.
	<ul style="list-style-type: none"> <li>• <i>identification of noise sensitive premises and noise sensitive areas that may be affected.</i></li> </ul>	Paragraph 11.3.3 Value of receptor.
	<ul style="list-style-type: none"> <li>• <i>the characteristics of the existing noise environment.</i></li> </ul>	Section 11.6 Baseline conditions.
	<ul style="list-style-type: none"> <li>• <i>a prediction on how the noise environment will change with the proposed development:</i></li> <li>• <i>in the shorter term such as during the construction period</i></li> <li>• <i>in the longer term during the operating life of the infrastructure</i></li> </ul>	Construction effects are detailed in section 11.9 Assessment of likely significant effects and impact bands are shown graphically on Figure 11.6 Construction noise study area and impact bands.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the chapter is information provided to address this policy.
	<ul style="list-style-type: none"> <li><i>at particular times of the day, evening and night as appropriate</i></li> </ul>	<p>Operational effects are detailed in section 11.9 Assessment of likely significant effects and noise level changes are shown graphically in Figure 11.3 Operational noise difference contour map – opening year (2023), Figure 11.4 Operational noise difference contour map between Do-Minimum opening year (2023) and Do-Something future year (2038) and tabulated in Appendix 11.4 Predicted operational noise levels and reporting tables.</p> <p>The above sections describe day effects for construction noise and day and night effects for operational noise.</p>
	<ul style="list-style-type: none"> <li><i>an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas.</i></li> </ul>	<p>Construction effects are detailed in section 11.9 Assessment of likely significant effects and impact bands are shown graphically on Figure 11.6 Construction noise study area and impact bands.</p> <p>Operational effects are detailed in section 11.9 Assessment of likely significant effects and noise level changes are shown graphically in Figure 11.3 Operational noise difference contour map – opening year (2023), Figure 11.4 Operational noise difference contour map between Do-Minimum opening year (2023) and Do-Something future year (2038) and tabulated in Appendix 11.4 Predicted operational noise levels and reporting tables.</p>
	<ul style="list-style-type: none"> <li><i>measures to be employed in mitigating the effects of noise. Applicants should consider using best available techniques to reduce noise impacts.</i></li> </ul>	<p>Section 11.8 Design, mitigation and enhancement measures sets out embedded mitigation in the current design. Full consideration of mitigation measures will be presented in the ES.</p>
5.190	<p><i>The potential noise impact elsewhere that is directly associated with the development, such as changes in road and rail traffic movements elsewhere on the national networks, should be considered as appropriate.</i></p>	<p>Areas within 50m of other non-scheme road links, or beyond 600m from new or altered scheme roads, with the potential to experience short-term Basic Noise Level<sup>1</sup> (BNL) change of more than 1dB(A) in are considered in paragraphs 11.9.80 to 11.9.84.</p>
5.191	<p><i>Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and</i></p>	<p>The magnitude of impacts related to construction noise and operational noise</p>

<sup>1</sup> BNL: the 'Basic Noise Level' at a reference distance of 10m from the nearside carriageway edge, as defined in CRTN.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the chapter is information provided to address this policy.
	<i>other guidance. The prediction of road traffic noise should be based on the method described in Calculation of Road Traffic Noise. The prediction of noise from new railways should be based on the method described in Calculation of Railway Noise. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies</i>	are given in paragraphs 11.3.12 and 11.3.17 respectively.
5.192	<i>The applicant should consult Natural England with regard to assessment of noise on designated nature conservation sites, protected landscapes, protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account.</i>	The noise impact data from this assessment has been used in Chapter 8 Biodiversity.
5.193	<i>Developments must be undertaken in accordance with statutory requirements for noise. Due regard must have been given to the relevant sections of the Noise Policy Statement for England, National Planning Policy Framework and the Government's associated planning guidance on noise.</i>	Assessment of significance is described in paragraph 11.3.30.
5.194	<i>The project should demonstrate good design through optimisation of scheme layout to reduce noise emissions and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission.</i>	Operational mitigation is described in paragraphs 11.8.6 - 11.8.7. Whilst no specific noise mitigation, such as noise barriers, have been considered in the modelling undertaken to inform this PEI Report, noise mitigation will be considered for the ES.
5.195	<p><i>The Secretary of State should not grant development consent unless satisfied that the proposals will meet, the following aims, within the context of Government policy on sustainable development:</i></p> <ul style="list-style-type: none"> <li>• <i>avoid significant adverse impacts on health and quality of life from noise as a result of the new development</i></li> <li>• <i>mitigate and minimise other adverse impacts on health and quality of life from noise from the new development</i></li> <li>• <i>contribute to improvements to health and quality of life through the effective management and control of noise, where possible.</i></li> </ul>	Provided in Table 11-25 Scheme compliance with government policy.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the chapter is information provided to address this policy.
5.198	<p><i>Mitigation measures for the project should be proportionate and reasonable and may include one or more of the following:</i></p> <ul style="list-style-type: none"> <li>• <i>engineering: containment of noise generated</i></li> <li>• <i>materials: use of materials that reduce noise, (for example low noise road surfacing)</i></li> <li>• <i>lay-out: adequate distance between source and noise-sensitive receptors; incorporating good design to minimise noise transmission through screening by natural or purpose built barriers</i></li> <li>• <i>administration: specifying acceptable noise limits or times of use (e.g., in the case of railway station Public Address (PA) systems).</i></li> </ul>	Provided in section 11.8 Design, mitigation and enhancement measures.
5.199	<p><i>For most national network projects, the relevant Noise Insulation Regulations will apply. These place a duty on and provide powers to the relevant authority to offer noise mitigation through improved sound insulation to dwellings, with associated ventilation to deal with both construction and operational noise. An indication of the likely eligibility for such compensation should be included in the assessment. In extreme cases, the applicant may consider it appropriate to provide noise mitigation through the compulsory acquisition of affected properties in order to gain consent for what might otherwise be unacceptable development. Where mitigation is proposed to be dealt with through compulsory acquisition, such properties would have to be included within the development consent order land in relation to which compulsory acquisition powers are being sought.</i></p>	Provided in Noise insulation eligibility paragraph 11.9.79.
5.200	<p><i>Applicants should consider opportunities to address the noise issues associated with the Important Areas as identified through the noise action planning process.</i></p>	Provided in section 11.9 Assessment of likely significant effects under noise important area headings.

## Legislation

### The Environmental Noise (England) Regulations 2006

11.2.2 The *Environmental Noise (England) Regulations 2006* [3] enact the requirements for noise action planning to promote good health and good quality of life (wellbeing) through the effective management of noise. The *Environmental Noise (England) (Amendment) Regulations 2018* [4] provide for new common noise assessment methods for five-yearly Action Plans.

11.2.3 Regulation 15(1)(a) of *The Environmental Noise (England) Regulations 2006* is amended by *The Environment (Amendment etc.) (EU Exit) Regulations 2019* [5] which now state action plans must:

- aim to prevent and reduce environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health
- aim to preserve environmental noise quality where it is good

#### Control of Pollution Act 1974

11.2.4 The *Control of Pollution Act 1974 (c.40)* [6] gives the Local Authority powers to control construction site noise. This may include specific controls to restrict certain activities identified as causing particular problems. Conditions regarding hours of operation will generally be specified and noise and vibration limits at certain locations may be applied in some cases. All requirements must adhere to established guidance and be consistent with best practicable means to control noise and vibration only as far as is necessary to prevent undue disturbance.

#### Land Compensation Act 1973

11.2.5 Part 1 of the *Land Compensation Act 1973 (c.26)* [7] entitles property or landowners to apply for compensation if the value of their property goes down because of pollution or disturbance from the use of a new or altered road – this includes for reasons of increased noise.

#### Noise Insulation Regulations 1975

11.2.6 The *Noise Insulation Regulations 1975 (NIR)* [8] define the conditions under which dwellings are eligible for noise insulation to control internal noise levels. The conditions relate to the level of traffic noise at the façade, the increase in noise levels as a result of the highway, and the contribution of the new or altered highway to the noise level received at the façade. In summary, noise insulation qualification criteria require that:

- the façade noise threshold of 68dB<sub>LpA10,18h</sub> is met or exceeded
- there must be a noise increase of at least 1dB(A) compared to the prevailing noise level immediately before the works to construct or improve the highway were begun
- the noise caused by traffic on new or altered roads makes an effective contribution of at least 1dB(A)
- the property is 300m or less from the nearest point on the carriageway of a highway to which the *Noise Insulation Regulations 1975* apply

#### **National planning policy**

11.2.7 The UK government's noise policy is set out in the *Noise Policy Statement for England (NPSE)* [9]. In legislative and policy terms, noise is taken to include vibration.

11.2.8 Government noise policy sets three aims, which are to be met within the context of government policy on sustainable development:

- To avoid significant adverse impacts on health and quality of life.
- To mitigate and reduce adverse impacts on health and quality of life.
- Where possible, contribute to the improvement of health and quality of life.

11.2.9 The same three aims are also reflected in:

- The *National Planning Policy Framework* (NPPF) [10]
- *Planning Practice Guidance – Noise* (PPG-Noise) [11]
- The *National Policy Statement for National Networks* (NPSNN) [12]

11.2.10 PPG-Noise provides guidance on the application of government noise policy. PPG-Noise sets out in the linked noise exposure hierarchy table that unacceptable adverse effects on health and quality of life due to noise exposure (set at a level higher than significant adverse impacts on health and quality of life) should be ‘prevented’<sup>2</sup>.

11.2.11 Thresholds for identifying adverse effect levels in terms of government noise policy are not clearly defined numerically in NPSE, NPPF, PPG-Noise, or NPSNN. The threshold values adopted for this assessment were taken from DMRB LA 111 *Noise and vibration* and are set out in section 11.3 Assessment methodology.

### **Local planning policy**

11.2.12 Local planning policy relevant to noise and vibration is found within the *South Somerset Local Plan (2006-2008)* [13] and the *Taunton Deane Borough Council Adopted Core Strategy 2011-2028* [14].

#### South Somerset planning policy

11.2.13 Noise and vibration policy is contained within Policy EQ7: Pollution control:

*“Development that, on its own or cumulatively, would result in air, light, noise, water quality or other environmental pollution or harm to amenity, health or safety will only be permitted if the potential adverse effects would be mitigated to an acceptable level by other environmental controls, or by measures included in the proposals. This may be achieved by the imposition of planning conditions or through a planning obligation.”*

#### Somerset West and Taunton planning policy

11.2.14 Noise and vibration policy is captured in policies DM1 General requirements and DM5 Use of resources and sustainable design.

11.2.15 Policy DM1 sets out that:

*“Proposals for development, taking account of any mitigation measures proposed, will be required to meet the following criteria, in addition to any other Development Management policies which apply in a particular case:...*

*b. Additional road traffic arising, taking account of any road improvements involved, would not lead to overloading of access roads, road safety problems or environmental degradation by fumes, noise, vibrations or visual impact...*

*e. Potential air pollution, water pollution, noise, dust, lighting, glare, heat, vibration and other forms of pollution or nuisance which could arise as a result of the development will not unacceptably harm public health or safety, the amenity of*

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<sup>2</sup> PPG-Noise (noise exposure hierarchy table) defines an unacceptable adverse effect as ‘present and very disruptive’, with outcomes described as ‘Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory’.

*individual dwellings or residential areas or other elements of the local or wider environment.”*

11.2.16 Policy DM5 sets out the requirement to:

*“Minimise the emission of pollutants, including noise, water and light pollution into the wider environment.”*

### **Standards and guidance**

11.2.17 Details of relevant noise and vibration guidance and standards considered as part of the assessment in this chapter have been provided in Appendix 11.2 Noise and vibration guidance and standards. The key documents referred to in this assessment are:

- DMRB LA 111 *Noise and vibration* (2020).
- *Calculation of Road Traffic Noise*, HMSO (1988). [15]
- TAG Unit A3 *Environmental Impact Appraisal* (2021). [16]
- British Standard (BS) 5228-1:2009+A1:2014 [17] and BS 5228-2:2009+A1:2014 [18] *Code of practice for noise and vibration on construction and open sites*.
- BS 7385-2: 1993 *Evaluation and measurement for vibration in buildings – Guide to damage levels from groundborne vibration*. [19]

## **11.3 Assessment methodology**

11.3.1 The assessment methodology is outlined in this section.

11.3.2 Note that the noise and vibration assessment has been based on the Design Fix 1 proposed scheme design for this PEI Report due to the time required to complete modelling of noise impacts following scheme design freeze. The assessment will be updated to reflect the Design Fix 2 scheme design for the ES.

### **Value of receptor**

11.3.3 In addition to residential receptors, DMRB LA 111 *Noise and vibration* identifies a range of non-residential properties as noise sensitive, which should also be considered in the assessment. These include hospitals, healthcare facilities, education facilities, community facilities, designated quiet areas, international and national or statutorily designated sites, and PRoW. Cultural heritage assets which are not included within the preceding descriptions are considered in Chapter 6 Cultural heritage.

11.3.4 DMRB LA 111 *Noise and vibration* does not specifically assign levels of sensitivity to different types of noise sensitive receptor. However, sensitivity has been considered in the assessment based on the type of receptor (e.g. the presence of noise sensitive non-residential receptors above). More detailed consideration of the use of receptors and the context of the impact (e.g. times of use of the receptor) will be given in the ES.

### **Baseline approach**

#### Construction

11.3.5 DMRB LA 111 *Noise and vibration* states that construction baseline shall be determined via one or more of the following methods:

- Noise measurements, based upon actual survey data.
- Predicted noise levels (noise model outputs).
- Existing noise mapping undertaken by public bodies or as part of other developments.

11.3.6 Due to the national lockdown which was in place during the preparation of this report due to the Covid-19 pandemic, baseline noise surveys were not undertaken and instead the construction baseline has been based entirely on predicted (modelled) noise levels.

11.3.7 As per DMRB LA 111 *Noise and vibration*, construction vibration has been assumed to be absent in the baseline scenario for the purpose of construction vibration assessment.

#### Operation

11.3.8 DMRB LA 111 *Noise and vibration* states that the operational baseline shall be determined from Do-Minimum<sup>3</sup> noise levels in each assessment year and that noise monitoring should be used to inform baseline noise modelling results and to provide data for public consultation purposes.

11.3.9 As outlined above, baseline noise surveys were not undertaken during the preparation of this report due to the national lockdown which would have resulted in atypical baseline noise levels as a result of lower than usual traffic flows. A baseline noise survey is planned to be undertaken, once traffic levels are considered to be representative of typical baseline conditions, to inform the ES.

11.3.10 Baseline noise levels have been predicted at each noise sensitive receptor using a detailed noise model calculating in accordance with *Calculation of Road Traffic Noise (CRTN)* [15].

11.3.11 Baseline noise levels for the construction and operational noise assessments have been determined by modelling of the Do-Minimum noise levels for the opening year (2023) and the future year (2038). This is based on the assumed opening year in the PCF stage 2 traffic assessment on which this assessment has been based. This will be updated in the ES to reflect the currently expected opening year of 2028 based on updated PCF stage 3 traffic assessments.

### **Magnitude of impacts**

#### Construction noise

11.3.12 The noise assessment from the construction of the proposed scheme has been determined according to DMRB LA 111 *Noise and vibration* which makes reference to BS 5228-1:2009+A1:2014 [17]. This standard provides information on the prevention and control of construction noise and includes a procedure for predicting construction noise. Calculations of noise levels in distance bands have been based on typical noise levels for construction processes (taken from BS 5228 and based on experience from similar road construction projects). Calculations have assumed that the ground cover between the noise source and the receptor is predominantly soft, however, at this stage no account has been taken of topography or screening (e.g. where the works would be in cutting or sensitive receptors are screened by other buildings) hence presenting a worst-

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<sup>3</sup> Do-Minimum is the scenario without the proposed scheme.

case scenario. Predicted construction noise levels include a 3dB façade reflection correction.

11.3.13 Construction noise levels have been predicted as the logarithmic average noise level over the daytime assessment period as an  $L_{Aeq,T}$ <sup>4,5</sup>. The predictions are based on the following range of activities, considered to represent the worst-case activities, which are likely to continue for more than the significance time period thresholds (see paragraph 11.3.37):

- Excavation of cuttings (major – including rock breaking)
- Excavation of cuttings (minor)
- Road construction (sub-base - representing noisiest road construction activity)
- Earthworks (major)
- Earthworks (minor)
- Structures (assumes augered piling methods)

11.3.14 For each activity the likely variation in the working area for the period assessed has been taken into account.

#### Construction vibration

11.3.15 Groundborne vibration during the construction of the proposed scheme may potentially arise due to the use of compaction plant or rock-breaking machinery. Should impact piling be required this may also give rise to vibration impacts. Impacts at sensitive receptors would be dependent on their proximity to the works, the intensity with which the equipment is operated and the intervening ground conditions.

11.3.16 BS 5228–2:2009+A1:2014 [18] provides a methodology for predicting typical levels of vibration from certain types of construction activities, based on case study data and empirical models. This and data from similar road construction projects have been used, where appropriate, to consider the likelihood that vibration from the works may exceed the thresholds for perception and disturbance.

#### Operational noise

11.3.17 Traffic noise level calculations were carried out according to DMRB LA 111 *Noise and vibration* which makes reference to the CRTN methodology. Noise levels were calculated across a grid of receptor positions over the study area to produce contours of noise level exposure. Additional calculations were also conducted at specific assessment locations to represent noise sensitive receptors (NSR) (e.g. residential properties). The study area is defined in DMRB LA 111 *Noise and vibration* and described in paragraph 11.6.1 and shown in Figure 11.1 Noise study area, non-residential sensitive receptors and baseline noise contour. The noise contours are shown on the figure are representative of the noise levels at 4 metres (m) above local ground level (i.e. first-floor level for a typical house, generally worst case in terms of exposure to noise from the highway).

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<sup>4</sup> The equivalent continuous sound level ( $L_{Aeq,T}$ ) is the level of a notional steady sound, which at a given position and over a defined period of time (T), would have the same A-weighted acoustic energy as the fluctuating noise.

<sup>5</sup> For the purposes of this assessment, T is assumed to be a 12-hour working day.

- 11.3.18 The traffic data used in the model were those forecasted under the Do-Something<sup>6</sup> and Do-Minimum scenarios in the opening year and those in the future assessment year (long-term) at PCF stage 2. In this case taken as 2023 for opening year, and 2038 for the future assessment year.
- 11.3.19 The traffic modelling approach and data verification is described in the PCF stage 2 *Combined Modelling and Appraisal (ComMA)* report [20].
- 11.3.20 For the purposes of this assessment, the  $L_{A10,18h}$  results are converted to the corresponding  $L_{Aeq}$  scale for daytime noise, i.e.  $L_{Aeq,16h}$  (see Appendix 11.1 Glossary of acoustic terminology). This provides a direct comparison with the quantitative  $L_{Aeq}$  criteria described later for assessing significance with respect to the government's noise policy (NPSE). The  $L_{Aeq,16h}$  scale has also been adopted for traffic noise assessment as part of the government's TAG unit A3 *Environmental impact appraisal* [16] which will be undertaken alongside the ES.

#### Operational night-time noise

- 11.3.21 The LA 111 methodology requires that night-time noise is also assessed. The  $L_{night}$  descriptor is used to represent the noise level at dwellings between the hours of 23:00 and 07:00. A procedure known as 'Method 3' from the Transport Research Laboratory (TRL) report PR/SE/451/02 [21] was used for predicting  $L_{night}$  noise levels. Method 3 uses daily traffic flow data for converting predicted 18 hour daytime noise levels ( $L_{A10,18h}$ ) to night-time noise levels. This method was considered appropriate as there was nothing atypical in the proportionate traffic flow volumes for this route between daytime and night-time<sup>7</sup>.
- 11.3.22 The assessment of impact magnitude for night-time noise follows the same method as that for daytime.

#### **Assessment of significance**

##### Approach to assessment of effects – all sources and receptors

- 11.3.23 The method for identifying likely significant effects of noise and vibration from construction and operation of the proposed scheme, as required by the EIA Regulations, is aligned with DMRB LA 111 *Noise and vibration* and government noise policy.
- 11.3.24 It follows from government noise policy NPSE, PPG-Noise and NPSNN that thresholds should be set to define the onset of the following levels of effect:
- Significant Observed Adverse Effect Levels (SOAEL) to identify the onset of significant impacts on health and quality of life.
  - Lowest Observed Adverse Effect Levels (LOAEL) to identify the onset of adverse impact on health and quality of life.

##### Significant adverse effects on health and quality of life

- 11.3.25 Where the calculated noise or vibration exceeds the relevant SOAEL threshold – criteria defined in Table 11-2 to Table 11-9, then this is assessed as a likely

<sup>6</sup> Do-something is the scenario with the proposed scheme.

<sup>7</sup> Appendix A2 of DMRB LA 111 *Noise and vibration* notes that TRL Method 3 provides reliable results for most UK roads. Exceptions to this can include roads where the proportion of night-time traffic to daytime traffic is atypical.

significant adverse effect at each receptor<sup>8</sup>. Above the SOAEL threshold, such noise levels are perceived as 'present and disruptive' according to the assessment framework referred to in PPG-Noise. The NPSE states that these effects should be avoided.

#### Adverse effects on health and quality of life

- 11.3.26 The assessment also identifies likely adverse effects where the calculated noise or vibration is less than the SOAEL but greater than the relevant LOAEL. Between these thresholds, such noise levels are perceived as 'present and intrusive' according to the assessment framework referred to in PPG-Noise. The NPSE states that these effects should be mitigated and reduced to a minimum.
- 11.3.27 These effects may be identified in this assessment as likely significant adverse effects. This describes effects at lower noise exposures that are an adverse impact on health and quality of life and are assessed as 'significant' in the EIA, but which are 'not significant' in terms of government noise policy (paragraph 11.3.24).
- 11.3.28 In this case, the basis for determining a likely significant effect is primarily the change in noise caused by the proposed scheme, with consideration of other factors such as the existing level of noise exposure.
- 11.3.29 The DMRB LA 111 *Noise and vibration* criteria used to assess the significance of effects (adverse and beneficial) for different receptor types and noise exposure levels are described under 'Assessment criteria', from paragraph 11.3.30.

#### Assessment criteria

- 11.3.30 The assessment uses criteria as set out in DMRB LA 111 *Noise and vibration* that responds to the requirements of:
- government policy set out in NPSE, NPPF, NPSNN and PPG-Noise
  - relevant regulations, guidance and standards
  - best practice as set by previous relevant projects

#### *Construction noise assessment criteria*

- 11.3.31 Potential adverse effect thresholds in government policy terms have been established based upon DMRB LA 111 *Noise and vibration* which refers to the ABC Method described in BS5228-1:2009+A1:2014 [17]. These thresholds, described in Table 11-2, have been used to establish assessment criteria for construction noise levels. The numerical thresholds for the ABC method are defined in Table 11-4.
- 11.3.32 These criteria have been used to derive LOAEL and SOAEL thresholds for this assessment. Note that although BS5228-1 only sets out these thresholds as an example for residential receptors, DMRB LA 111 *Noise and vibration* requires them to be used for all types of receptor

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<sup>8</sup> Any beneficial effects would also be identified due to noise reductions.

**Table 11-2 LOAEL and SOAEL thresholds for construction noise at all receptors in terms of government policy (from DMRB LA 111 Noise and vibration)**

Time period	LOAEL	SOAEL
Day (07:00-19:00 weekday and 07:00-13:00 Saturdays)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 (see below)
Night (23:00-07:00)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228:2009 + A2014 section E3.2 and Table E.1

11.3.33 The threshold of potential adverse effect described in Table E.1 of BS5228-1 according to the ABC method is reproduced in Table 11-3.

**Table 11-3 Threshold of potential significant effect at dwellings according to ABC method (from Table E.1, BS 5228–1:2009 + A1:2014)**

Assessment category and threshold value period	Threshold value, dB(A)		
	Category A	Category B	Category C
Night-time (23:00 – 07:00)	45	50	55
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Other: Weekday evenings (19:00 – 23:00) Saturdays (13:00 – 23:00) Sundays (07:00 – 23:00)	55	60	65

Category A: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are less than these values  
Category B: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are the same as Category A values  
Category C: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are higher than Category A values.

11.3.34 Using the DMRB LA 111 *Noise and vibration* methodology, the construction noise impact level is determined from Table 11-4.

**Table 11-4 Magnitude of impact and construction noise descriptions (from DMRB LA 111 Noise and vibration)**

Magnitude of impact	Construction noise level
Major	Above or equal to SOAEL +5dB
Moderate	Above or equal to SOAEL and below SOAEL +5dB
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

11.3.35 Construction traffic BNL increases should be calculated for roads within the construction traffic study area. The magnitude of impact is then determined using Table 11-5.

**Table 11-5 Magnitude of impact for construction traffic noise (from DMRB LA 111 Noise and vibration)**

Magnitude of impact	Increase in Basic Noise Level (BNL) of closest public road used for construction traffic (dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

11.3.36 When full carriageway closures are required at night on major roads during the construction period, the resultant increase in traffic on local roads is highly likely to cause disturbance and therefore a major magnitude of construction noise impact is determined at any NSRs within the diversion route study area<sup>9</sup>.

11.3.37 From DMRB LA 111 *Noise and vibration*, construction noise and construction traffic noise is taken as a significant effect for all NSRs where it is determined that a major or moderate magnitude of impact would occur for a duration exceeding either of the following:

- Ten or more days or nights in any 15 consecutive days or nights.
- A total number of days exceeding 40 in any six consecutive months.

*Construction vibration assessment criteria*

11.3.38 DMRB LA 111 *Noise and vibration*, which refers to BS 5228-2:2009+A1:2014 [18], states that Peak Particle Velocity (PPV) vibration levels are considered to be an appropriate vibration parameter to be used when considering construction vibration, and the standard provides guidance upon the 'instantaneous' human response to vibration in buildings in terms of overall vibration velocity levels (Table 11-6)<sup>10</sup>. These criteria have been used to derive LOAEL and SOAEL thresholds for this assessment.

**Table 11-6 LOAEL and SOAEL thresholds of likely effects of vibration for building occupants (from DMRB LA 111 Noise and vibration, derived from BS 5228-2:2009+A1:2014)**

Time period	LOAEL	SOAEL	Notes
All time periods	0.3mm/s PPV	1.0mm/s PPV	LOAEL is set at the lowest level at which vibration may be perceptible in residential environments. SOAEL is set where levels can be tolerated with prior warning (ref BS5228:2).

11.3.39 Using the DMRB LA 111 *Noise and vibration* methodology, the construction vibration impact level is determined from Table 11-7.

<sup>9</sup> Note that this exercise has not been undertaken at present due to lack of information on night-time closures and diversion routes.

<sup>10</sup> BS 5228-2 notes in Table B.1: 'The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.' Consideration has been given to other guidance with regard to time varying exposure where appropriate – the BS 6472 guidance makes use of the 'Vibration Dose Value' metric (VDV).

**Table 11-7 Magnitude of impact and vibration level (from DMRB LA 111 Noise and vibration)**

Magnitude of impact	Construction vibration level
Major	Above or equal to 10mm/s
Moderate	Above or equal to SOAEL and below 10mm/s PPV
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

11.3.40 Construction vibration is taken as a significant effect for all vibration sensitive receptors where it is determined that a major or moderate magnitude of impact would occur for a duration exceeding either of the following:

- Ten or more days or nights in any 15 consecutive days or nights.
- A total number of days exceeding 40 in any six consecutive months.

11.3.41 Risk of damage to buildings from groundborne vibration is assessed using the criteria in Table 11-8. The criteria are derived from BS 5228-2:2009+A1:2014 [18], and BS 7385, Part 2 [19]. This ensures there is no risk of the lowest damage category ('cosmetic') being exceeded, as defined in BS ISO 4866 [22]. However, effects in terms of even cosmetic damage to buildings would occur only for vibration exposures much higher than the lowest perceptible levels.

**Table 11-8 Vibration impact criteria for buildings (conservative criteria below which there is no risk of cosmetic damage)**

Category of building	Peak particle velocity <sup>1</sup> (mm/s)	
	Transient <sup>2</sup> vibration	Continuous <sup>3</sup> vibration
Potentially vulnerable building	6	3
Structurally sound buildings	12	6

Notes:  
<sup>1</sup> At the building foundation  
<sup>2</sup> Transient relative to building response e.g. from percussive piling  
<sup>3</sup> Continuous relative to building response e.g. from vibratory piling, vibrating rollers

### *Operational noise assessment criteria*

11.3.42 Adverse effect levels have been set in accordance with DMRB LA 111 *Noise and vibration* which references government noise policy (including NPPF, NPSE, NPSNN, and PPG-Noise). The thresholds also relate to the guidance from the World Health Organization (WHO) *Guidelines for Community Noise* [23], WHO *Night Noise Guidelines for Europe* [24], WHO *Environmental Noise Guidelines* [25]<sup>11</sup>, the *Noise Insulation Regulations 1975* [8], and best practice from other projects. These criteria have been used to derive LOAEL and SOAEL thresholds for this assessment as shown in Table 11-9.

<sup>11</sup> The WHO Environmental Noise Guidelines for the European Region (2018) recommend traffic noise levels below 53dB<sub>Lden</sub> (i.e. day/evening/night) and 45dB<sub>Lnight</sub> to avoid adverse health effects. It should be noted that the thresholds for lowest observed adverse effect level (LOAEL) for this assessment are set at lower noise exposures (i.e. more sensitive criteria) to represent the onset of adverse health effects associated with traffic noise

**Table 11-9 Operational noise LOELs and SOAELs for all receptors (from LA 111)**

Time period	LOAEL	SOAEL	Notes
Day (06:00-24:00)	55dB <sub>L<sub>A10,18h</sub></sub> (façade)  50dB <sub>L<sub>Aeq,16h</sub></sub> (free-field)	68dB <sub>L<sub>A10,18h</sub></sub> (façade)  63dB <sub>L<sub>Aeq,16h</sub></sub> (free-field)	The daytime LOAEL is based on the onset of moderate community annoyance, and the daytime SOAEL is based on the Noise Insulation Regulations threshold.
Night	40dB <sub>L<sub>Aeq,8hr</sub></sub> <sub>L<sub>night,outside</sub></sub> (free-field)	55dB <sub>L<sub>Aeq,8hr</sub></sub> <sub>L<sub>night,outside</sub></sub> (free-field)	The night time LOAEL is defined using the WHO Night Noise Guidelines, and the night time SOAEL is equivalent to the levels above which cardiovascular health effects become the major public health concern (WHO Night Noise Guidelines).

11.3.43 The magnitude of the impact and effect caused by short-term and long-term change in noise levels attributable to the proposed scheme is evaluated in accordance with Table 11-10 and Table 11-11 respectively.

**Table 11-10 Magnitude of noise impact in the short term (from DMRB LA 111 Noise and vibration)**

Noise change [dB(A)]	Magnitude of impact in the short term
0	No change
0.1 – 0.9	Negligible
1.0 – 2.9	Minor
3.0 – 4.9	Moderate
5.0 +	Major

**Table 11-11 Magnitude of noise impact in the long term (from DMRB LA 111 Noise and vibration)**

Noise change [dB(A)]	Magnitude of impact in the long term
0	No change
0.1 – 2.9	Negligible
3.0 – 4.9	Minor
5.0 – 9.9	Moderate
10.0 +	Major

11.3.44 The initial assessment of likely significant effect on noise sensitive buildings is determined using Table 11-12.

**Table 11-12 Initial assessment of operational noise significance (from DMRB LA 111 Noise and vibration)**

Significance	Short term magnitude of change
Significant	Major
Significant	Moderate
Not significant	Minor
Not significant	Negligible

11.3.45 DMRB LA 111 *Noise and vibration* goes on to say that for NSRs where the magnitude of change in the short term is minor, moderate or major at noise sensitive buildings, Table 11-13 shall be used, together with the output of Table 11-12 to determine final significance. For the purposes of this PEI Report, only assessment factor 3 from Table 11-13 has been used to give an initial indication of significance. Full consideration of all factors will be undertaken and reported in the ES.

**Table 11-13 Determining final operational significance on noise sensitive buildings (from DMRB LA 111 Noise and vibration)**

Assessment factor	Local circumstance	Influence on significance judgement
1	Noise level change (is the magnitude of change close to the minor to moderate boundary?)	1) Noise level changes within 1 dB of the top of the 'minor' range can indicate that it is more appropriate to determine a likely significant effect. Noise level changes within 1 dB of the bottom of a 'moderate' range can indicate that it is more appropriate to consider a change is not a likely significant effect.
2	Differing magnitude of impact in the long term and/or future year to magnitude of impact in the short term	1) Where the long-term impact is predicted to be greater than the short-term impact, it can be appropriate to conclude that a minor change in the short term is a likely significant effect. Where the long term impact is predicted to be less than the short term it can be appropriate to conclude that a moderate or major change in the short term is not significant. 2) A similar change in the long term and non-project noise change can indicate that the change is not due to the project and not an indication of a likely significant effect.
3	Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	1) A noise change where all do-something absolute noise levels are below SOAEL requires no modification of the initial assessment. 2) Where any do-something absolute noise levels are above the SOAEL, a noise change in the short term of 1.0dB (decibel) or over results in a likely significant effect.
4	Location of noise sensitive parts of a receptor	1) If the sensitive parts of a receptor are protected from the noise source, it can be appropriate to conclude a moderate or major magnitude change in the short term and/or long term is not a likely significant effect. 2) Conversely, if the sensitive parts of the receptor are exposed to the noise source, it can be more appropriate to conclude a minor change in the short term and/or long term is a likely significant effect. 3) It is only necessary to look in detail at individual receptors in terms of this circumstance where the decision on whether the noise change gives rise to a significant environmental effect is marginal.
5	Acoustic context	1) If a project changes the acoustic character of an area, it can be appropriate to conclude a minor magnitude of change in the short term and/or long term is a likely significant effect.
6	Likely perception of change by residents	1) If the project results in obvious changes to the landscape or setting of a receptor, it is likely that noise level changes will be more acutely perceived by the NSRs. In these cases, it can be appropriate to conclude that a minor change in the short term and/or long term is a likely significant effect.

Assessment factor	Local circumstance	Influence on significance judgement
		2) Conversely, if the project results in no obvious changes for the landscape, particularly if the road is not visible from the receptor, it can be appropriate to conclude that a moderate change in the short term and/or long term is not a likely significant effect.

11.3.46 For residential receptors where noise impacts occur in areas below the LOAEL, there would be no noise effect in government policy terms (Table 11-11). However, there could be noise effects in EIA terms for certain cases in very quiet, rural settings. This aligns with the requirement in DMRB LA 111 *Noise and vibration* to consider 'changes to the landscape or setting', as referred to in the final row of Table 11-13. The absence of man-made sound is a factor (amongst other aspects of the setting) in assessing areas as having a particularly tranquil character. Tranquillity is assessed as part of Chapter 7 Landscape.

### Stakeholder engagement

- 11.3.47 A request was made to South Somerset District Council (SSDC), Somerset West and Taunton Council (SWTC), and Somerset County Council (SCC) to respond to consultation on the methodology and any noise and vibration sensitivities within the study area. The Environmental Health Officer (EHO) at SSDC and SWTC reported that they accepted the assessment approach.
- 11.3.48 The EHO at SWTC commented that night-time measurements are desirable during baseline noise surveys. The Royal Naval Air Station (RNAS) Merryfield is located approximately 2km to the east of the proposed scheme. The site is used by aircraft, especially helicopters, which would fly over the study area. These types of activities are not considered as typical activities in the area. Therefore, consideration should be given during the baseline surveys.
- 11.3.49 Details of construction activities will be discussed with the relevant local authorities, prior to and during the construction works. This will include prediction and evaluation methods, location of sensitive receivers, the resulting noise and vibration levels and mitigation controls.
- 11.3.50 The Councils agreed to construction works hours 08:00-18:00 Monday-Friday, 08:00-13:00 Saturday. Considering the size of the proposed scheme, it may be inevitable that construction working may require extended working hours. In which case, it requires prior agreement before commencement of construction works.
- 11.3.51 For the operational noise assessment, the Councils agreed that the DMRB highway noise assessment methodology (DMRB LA 111 *Noise and vibration*) would be appropriate to assess noise effects to NSRs potentially impacted by the proposed scheme.

## 11.4 Assessment assumptions and limitations

### Construction

- 11.4.1 Detail of construction methods, programme and hours of working (including potential for night-time working) were not available at the time of writing and therefore a high-level worst-case assessment has been presented based on noise levels from typical road construction activities derived from similar road

projects. Areas where impacts may occur around particular proposed scheme elements such as cuttings, earthworks and structures have been taken from the current proposed scheme design as shown in Figure 2.1 General Arrangement.

- 11.4.2 The construction assessment does not take into account screening, including from existing buildings, which will result in worst-case predictions of significant effects; however, propagation has been assumed to be over soft ground, providing additional sound attenuation compared with hard reflective ground.
- 11.4.3 Predictions have been made based on works being undertaken by teams (or gangs) of construction workers undertaking the same activity spaced at 100m centres along the proposed scheme. For each team or gang, it has been assumed that they work in an area of 50m along the trace of the proposed scheme each day.
- 11.4.4 No information about construction traffic was available at the time of writing and hence no assessment could be undertaken for this PEI Report. This will be addressed in the ES once further information is available.
- 11.4.5 No information about diversion routes at night was available at the time of writing and hence no assessment could be undertaken for this PEI Report. This will be addressed in the ES once further information is available.
- 11.4.6 A generic qualitative assessment of construction vibration has been undertaken in the absence of detail of proposed methods of construction and plant lists.
- 11.4.7 Due to a programme of works not being available it has not been possible to assess the duration that impacts are likely to occur for, however, it is likely that the assessed activities would all endure for longer than the temporal significance thresholds.

### **Operation**

- 11.4.8 Road traffic flows and speeds used in the assessment were based on traffic assessment undertaken at PCF stage 2. Traffic modelling to inform PCF stage 3 is ongoing and the noise assessment will be updated using the latest traffic data and reported in the ES.
- 11.4.9 Ordnance Survey (OS) MasterMap© Highways Network has been used to generate the road centre lines for modelling.
- 11.4.10 No benefit of lower noise surfaces has been assumed for this assessment at this stage as the existing A358 road surface is unknown. This is to avoid overstating the benefit of a new low noise surface in the case where one may already exist. Assumptions on road surfaces for Do-Minimum (DM) and Do-Something (DS) roads will be updated and reported in the ES.

## **11.5 Study area**

- 11.5.1 The determination of the assessment study area (as shown in Figure 11.1 Noise study area, non-residential sensitive receptors and baseline noise contour) has been based on the methodology in DMRB LA 111 *Noise and vibration* (requirements are described below). DMRB LA 111 *Noise and vibration* allows for the study area to be extended where considered appropriate according to the needs of the assessment and stakeholder expectations, as described below.

## Construction

11.5.2 For construction noise and vibration, the study area shall include all NSRs:

- that are potentially affected by construction noise or vibration
- in areas where there is a reasonable stakeholder expectation that a construction noise or vibration assessment will be undertaken

### Noise

11.5.3 DMRB LA 111 *Noise and vibration* notes that a study area of 300 metres from the closest construction activity is normally sufficient to encompass NSRs, although variations in the study area can be defined for individual projects. BS 5228 (referenced within DMRB LA 111 *Noise and vibration*) notes that the prediction results should be treated with caution at distances greater than this.

11.5.4 DMRB LA 111 *Noise and vibration* requires that a diversion route study area be defined where a project requires full carriageway closures during the night (23:00-07:00) to enable construction works to take place. DMRB LA 111 *Noise and vibration* states that the study area shall include a 25-metre width from the kerb line of the diversion route. No information is currently available for diversion routes and therefore this will be considered further in the ES.

11.5.5 DMRB LA 111 *Noise and vibration* specifies that a construction traffic study area shall be defined to include a 50m width from the kerb line of public roads with the potential for an increase in BNL of 1dB(A) or more as a result of the addition of construction traffic to existing traffic levels.

11.5.6 Information on additional construction traffic is not available at present and therefore no study area has been defined for this element.

### Vibration

11.5.7 DMRB LA 111 *Noise and vibration* notes that a study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors. However, variations in the study area can be defined for individual projects.

11.5.8 In the absence of detailed construction methodology, no quantitative assessment has been undertaken at the present time. The vibration study area is shown on Figure 11.7 Construction vibration study area.

## Operation

11.5.9 The assessment procedure requires that an operational noise<sup>12</sup> impact study is defined to include:

- NSRs that are potentially affected by operational noise changes generated by the proposed scheme, either on the route of the proposed scheme or other roads not physically changed by the proposed scheme
- NSRs in areas where there is a reasonable stakeholder expectation that noise assessment is undertaken

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<sup>12</sup> DMRB LA 111 *Noise and vibration* Paragraph 1.4 notes that: "Operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects".

11.5.10 For most projects the following areas are suitable, but DMRB LA 111 *Noise and vibration* notes that the assessor can reduce or extend this such that it is proportionate to the risk of likely significant effects:

- The area within 600m of new road links or road links physically changed or bypassed by the proposed scheme.
- The area within 50m of other road links with potential to experience a BNL change of more than 1dB(A) in the short term or 3dB(A) in the long term, as a result of the proposed scheme.

11.5.11 At this stage of the assessment, the study area as described above is considered adequate to assess the potential impacts and effects of the proposed scheme.

## 11.6 Baseline conditions

11.6.1 The baseline noise conditions (i.e. Do-Minimum 2023) for the construction and operational noise assessments have been determined by the CRTN noise prediction model for a forecast traffic scenario of 2023. This has provided a detailed coverage of noise levels across the entire study area.

11.6.2 Figure 11.1 shows the locations of sensitive non-residential receptors<sup>13</sup>, the predicted traffic noise level contours for the baseline year (i.e. Do-Minimum 2023) and noise important areas (NIA) [26]. The NIAs identify dwellings in areas of relatively high noise exposure recognised by the Department for Environment, Food and Rural Affairs (Defra).

11.6.3 DMRB LA 111 *Noise and vibration* requires that noise level calculations are carried out to compare noise changes between the Do-Minimum and Do-Something scenarios to assess the impact of the proposed scheme.

### Future baseline

11.6.4 The DM future year scenario (2038) represents the future baseline taking into account any expected traffic changes as a result of other committed development or infrastructure that would occur without the proposed scheme in operation by 2038. Only sensitive receptors that would be in existence prior to the opening year of the proposed scheme are included in the assessment in the future year.

## 11.7 Potential impacts

### Construction impacts

11.7.1 Considering the scale of the proposed scheme, it is likely that project-related noise and vibration associated with construction of the proposed scheme would have the potential to adversely affect noise or vibration sensitive receptors, on both the online and offline sections of the proposed scheme. Moderate to major construction noise related impacts are likely at receptors within distances of around 50m from the construction works, with minor impacts occurring at greater distances. It is also likely that stakeholders, more than 300m from the construction works, in areas such as Hatch Beauchamp, would have an expectation that a construction noise impact assessment would be undertaken for their properties. At present the assessment focusses on areas within 300m of the

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<sup>13</sup> Residential areas can also be identified from the basemapping.

works but consideration of other areas where there is a stakeholder expectation of construction noise assessments will be given following public consultation and reported in the ES.

- 11.7.2 Construction vibration impacts may occur at the closest NSRs to works such as piling and compaction activities.
- 11.7.3 Construction noise and vibration are therefore scoped-in to the assessment.

### **Operational impacts**

- 11.7.4 Operational noise impacts are likely to occur due to a combination of alignment changes and speed and flow increases as a result of a new improved road standard. The greatest adverse impacts would occur where the proposed scheme would be closer to nearby NSRs than the existing highway. Minor changes in alignment, particularly where the receptors are some distance from the existing highway, would be less likely to result in impacts as the proportionate change in distance would be small. Conversely, there are locations where the proposed scheme would be substantially further from receptors such that there is the potential for significant beneficial effects.
- 11.7.5 Changes in traffic on non-scheme roads as a result of the proposed scheme could give rise to adverse or beneficial changes at adjacent properties.

## **11.8 Design, mitigation and enhancement measures**

- 11.8.1 The proposed scheme alignment has been designed to minimise environmental effects resulting from noise impacts. Additional opportunities for embedded mitigation are being considered through the process of design development and consideration of good design principles.

### **Construction mitigation**

- 11.8.2 The construction noise and vibration assessments assume that the works would be undertaken following the principles and processes to be set out in the Environmental Management Plan (EMP) which will be produced as part of the ES and submitted as part of the DCO application. The EMP will include a commitment for a Noise and Vibration Management Plan (NVMP) to be prepared in advance of construction for the consented project. This will include the requirement to undertake noise and vibration monitoring to ensure compliance with, and early warning of exceedances of agreed threshold levels.
- 11.8.3 Best Practicable Means (BPM) is assumed as embedded mitigation to control construction noise in the form of low noise emission plant and processes (as specified in BS 5228 Annex B – *Noise sources, remedies and their effectiveness*).
- 11.8.4 Further consideration of specific mitigation measures will be considered in the ES once more detail is known about the proposed construction programme and logistics.
- 11.8.5 If situations arise where, despite the implementation of BPM and any specific mitigation measures on-site, the noise exposure exceeds the criteria that will be defined in the EMP, the contractors may offer noise insulation to affected properties, or ultimately, temporary re-housing; however, it is not anticipated that the latter will be required for the proposed scheme.

### Operational mitigation

- 11.8.6 The alignment of the proposed scheme (horizontal and vertical) has been considered as part of the design factors to minimise noise impacts.
- 11.8.7 No specific noise mitigation has been considered in the modelling undertaken to inform this PEI Report. Mitigation options are being considered currently and where found to be effective and sustainable will be incorporated into the proposed scheme design and reported on in the ES.

### Enhancement

- 11.8.8 Further to the avoidance and mitigation measures integrated along the length of the proposed scheme to reduce adverse noise effects, consideration will be given to developing enhancements during detailed design of the proposed scheme. For example, when more design detail can be confirmed, there may be opportunities to provide noise fence barriers in certain areas, if it can be shown that this would provide beneficial enhancements with regard to noise.
- 11.8.9 Any such enhancement would have to be shown to be sustainable based on the following tests:
- Stakeholder engagement and consultation responses
  - Engineering practicability
  - Consideration of noise benefit compared to cost of the mitigation
  - Other environmental effects potentially caused by the mitigation (e.g. landscape or visual effects)

## 11.9 Assessment of likely significant effects

### Construction effects

#### Noise

- 11.9.1 Construction noise effects have been calculated based on reasonable worst-case assumptions taking into account the main construction activities expected and the likely durations and on-times of individual plant items. At the time of the assessment, information about the programme and construction methods was not available and hence the assessment has been based on data from similar road projects. Assumptions are set out in section 11.4 and Appendix 11.3 Construction plant list and assumptions.
- 11.9.2 In the absence of detailed information, the primary activities most likely to give rise to significant effects have been assessed taking into account the current scheme design as follows:
- Excavation of cuttings (major – including rock breaking)
  - Excavation of cuttings (minor)
  - Road construction (sub-base – representing noisiest activity)
  - Earthworks (major)
  - Earthworks (minor)
  - Structures (assumes augered piling methods)
- 11.9.3 The majority of these activities are assumed to be linear (i.e. taking place along the proposed scheme) e.g. cuttings, earthworks and road construction (sub-base). The activities associated with the structures stage, including Stoke Road

overbridge, Ashill junction, Mattock's Tree Green junction, Hatch Beauchamp junction and other overbridges and underbridges (see Table 11-14) will take place in particular locations of the proposed scheme (see Figure 2.1 General Arrangement) and so affect only some of the receptors.

- 11.9.4 Other activities which are likely to be required but are not assessed quantitatively are:
- Site clearance, tree and vegetation removal
  - Boundary fence
  - Topsoil strip
  - Drainage
  - Surface water channel
  - Pavement and surfacing
- 11.9.5 Data from previous road schemes would indicate that these activities would not exceed the predicted levels for the other assessed activities; however, in-combination they would serve to increase the time period of impact at individual receptors. This will be assessed further as the design of the construction works and programming progresses and be reported in the ES.
- 11.9.6 Compounds are proposed within the Nexus 25 development, north-west of Stoke Road overbridge and east of Mattock's Tree Green junction. These locations are all next to existing busy roads and therefore it would not be expected that the levels of noise from the compounds would be significant in these locations. Further assessment of the compounds and construction traffic travelling along haul roads and the public road network to access the compounds will be undertaken once more information is available and be reported in the ES.
- 11.9.7 Construction impacts for the assessed activities have been predicted in distance bands based on the assumed plant lists and on-times set out in Appendix 11.3 Construction plant list and assumptions. It has been assumed that works are undertaken by work gangs spaced at 100m centres and it has been assumed that they work up and down a 50m trace along the proposed scheme daily which presents a reasonable 'worst-case' assessment.
- 11.9.8 The predicted impact band distances for each activity are set out in Appendix 11.3 Construction plant list and assumptions. It should be noted that all predictions at this stage do not include the benefit of screening e.g. rows of houses beyond the front row, in built-up areas, are likely to experience much reduced levels of construction noise than those predicted. The assessment is therefore worst-case.
- 11.9.9 Baseline (Do-Minimum 2023) noise levels have been predicted at each affected property using the road traffic noise model based on the ground floor façade facing towards the proposed scheme works. The baseline noise levels have been used to determine the appropriate BS5228 Category (see Table 11-3). The predicted construction noise level at each property has then been compared with the applicable BS5228 category to determine the DMRB LA 111 *Noise and vibration* impact magnitude.
- 11.9.10 DMRB LA 111 *Noise and vibration* requires that significance of effect be determined based on whether a moderate or major magnitude of impact is likely to endure for ten or more days in any consecutive 15 days, or 40 days in a consecutive six-month period at any individual receptor.

11.9.11 The results of the impact assessment are shown in Table 11-14 showing impacts related to individual locations (including structures, earthworks and cuttings associated with individual proposed scheme elements) and the total combined impacts including other linear works away from specific structures (note some properties would be impacted by multiple activities).

**Table 11-14 Predicted major and moderate construction noise impacts at residential and non-residential receptors**

Location	Properties predicted to experience a major impact	Properties predicted to experience a moderate impact	Total
Ashill junction	3	3	6
Griffin bridge	1	1	2
Kenny overbridge	2	2	4
Mattock's Tree Green junction	18	6	24
New Cad Brook underbridge	0	4	4
Stoke Road overbridge	131	82	213
Hatch Beauchamp junction overbridge	1	0	1
New High Bridge underbridge	3	0	3
Venner's bridge (watercourse)	5	0	5
<b>Total impacts for all works*</b>	<b>199</b>	<b>146</b>	<b>345</b>

\* Includes earthworks, cuttings and sub-base activities not specific to a particular junction or structure.

11.9.12 In summary, based on the preliminary assessment a total of 199 properties are predicted to experience major impacts during one or more construction activities and 146 properties are predicted to experience moderate impacts. It is likely that durations of these works would exceed ten days in 15 consecutive days or 40 days in a consecutive six months and therefore temporary direct significant adverse effects are predicted at these receptors.

11.9.13 The above impacts all relate to noise levels predicted to exceed the SOAEL threshold. There may be further negligible or minor impacts affecting properties between the LOAEL and SOAEL.

11.9.14 Figure 11.6 Construction noise study area and impact bands shows the construction predicted noise level bands graphically; however, note that not all properties predicted to experience noise levels above 65dB  $L_{Aeq,T}$  would experience a moderate or major impact dependent on the baseline noise level (and hence BS5228 category threshold).

11.9.15 Impacts at night-time will be assessed once more detail of the programme and working hours are known and be reported in the ES.

11.9.16 The potential requirements for diversion routes during the night-time, in the case of full carriageway closures, are not yet known. If required, a full assessment of these routes will be undertaken and reported in the ES.

## Vibration

- 11.9.17 A quantitative vibration assessment has not been undertaken at this time due to the lack of detail available on the types of plant and processes that will be used during construction.
- 11.9.18 Experience on similar road construction projects would indicate that activities with the potential to give rise to vibratory impacts include vibratory compaction plant during earthwork and road pavement construction activities, rock breaking for cuttings and impact piling if required.
- 11.9.19 BS 5228–2:2009+A1:2014, as referred to in DMRB LA 111 *Noise and vibration*, provides a methodology for predicting typical levels of vibration from compaction and impact piling, based on case study data and empirical models. An empirical method for predicting vibration from rock breaking is not provided but would be expected to be of equal or lesser impact than impact piling.
- 11.9.20 Based on typical levels from vibratory compaction plant<sup>14</sup>, there is a low risk that the SOAEL for human annoyance (1mm/s (millimetres per second) would be exceeded at properties beyond 100m from the compaction works. Above this level, impacts would be considered significant if lasting for more than ten days in any consecutive 15 days or 40 days in any consecutive six-month period. This takes into account the potential magnification factor for vibration at the first floor of buildings and is therefore worst-case.
- 11.9.21 Based on the empirical formulae of BS5228-2, it would be expected that impact piling in most soil types would give rise to vibration levels below SOAEL at 100m at the foot of buildings. It is possible that due to magnification effects, vibration levels at upper storeys of buildings may be somewhat higher and therefore it is possible that moderate vibration impacts from impact piling could extend beyond 100m. However, it would be expected that, in accordance with BPM, piling works will be undertaken with low vibration piling methods wherever reasonably practicable. Should it become apparent that impact piling methods may be necessary, a full assessment will be undertaken and reported in the ES.
- 11.9.22 The levels above which damage to property (risk of cosmetic damage) may occur are much higher than those for human annoyance. The potential for these levels to be reached will be limited to properties within very close proximity to the works e.g. around 20m for impact piling or vibratory compaction in most soil types<sup>15</sup>. A full assessment of the potential for these effects will be undertaken and reported in the ES once further information regarding construction methods has been developed. Where potential impacts are identified, mitigation measures (such as alternative plant and operating conditions) would be put in place to avoid these impacts.
- 11.9.23 Actual vibration levels will be dependent on ground conditions, coupling between the ground and the structure and resonances within the receptor building. DMRB LA 111 *Noise and vibration* also sets out that a study area of 100m is normally sufficient to encompass vibration sensitive receptors. The construction vibration

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<sup>14</sup> In calculations the data for the BOMAG BW 213 D-4 vibratory compactor were assumed.

<sup>15</sup> Note that impact piling is transient in nature which affords it a higher threshold of significance than vibratory compaction which is continuous in nature (see Table 11-8).

study area is shown together with the locations of buildings on Figure 11.7 Construction vibration study area.

### **Operational effects**

11.9.24 Daytime and night-time traffic noise levels within the study area have been predicted and are assessed in terms of direct and indirect effects for:

- Residential receptors exceeding the SOAEL
- Residential receptors between the LOAEL and SOAEL
- Non-residential receptors

11.9.25 Table 11-16 to Table 11-25 summarise the assessment of the significant effects for daytime and night-time resulting from the proposed operational scheme in the opening year.

11.9.26 Figure 11.2 shows the noise level contours in the Do-Something scenario in the opening year (2023). Figure 11.3 Operational noise difference contour map – opening year (2023) shows the noise difference contours (i.e. the changes in noise) resulting from the proposed operational scheme between the Do-Minimum and Do-Something scenarios in the opening year (2023) and Figure 11.4 shows the noise difference contours between the Do-Minimum scenario in the opening year and the Do-Something scenario in the future year (2038). Figure 11.5 shows the significantly affected receptors with beneficial or adverse effects. These figures should be referred to for the following assessment description. The noise contours shown on these figures are representative of the noise levels at 4m above local ground level. Appendix 11.4 Predicted operational noise levels and reporting tables provides tabulated noise level results at selected NSRs within the study area.

### Assessment of significant effects

11.9.27 In the paragraphs below, the overall noise impacts are summarised separately for settlements around the proposed scheme, west to east, i.e.:

- Taunton
- Ruishton
- Henlade
- Thornfalcon and Mattocks Tree Green Junction
- West Hatch and Meare Green
- Hatch Beauchamp
- Hatch Green
- Ashfill
- Rapps
- Horton Cross

11.9.28 The following sections summarise the numbers of receptors affected above the SOAEL threshold, and the numbers affected between the SOAEL and LOAEL thresholds. Effects below the LOAEL are assumed to be not significant for the purposes of this PEI Report. Further consideration will be given in the ES to special cases, in quiet rural settings, where noise effects could be significant.

11.9.29 Further details on the type of effect as well as effects in NIAs and on non-residential locations (e.g. schools, places of worship, community facilities etc.) are described. The assessment is based upon the change in noise caused by the

proposed scheme, with consideration of other factors relating to the context of the impact such as the level of noise exposure with and without the proposed scheme.

### Taunton

#### *Residential receptors*

11.9.30 Table 11-15 summarises significant effects on residential receptors in the Taunton area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-15 Summary of preliminary significant operational noise effects (Taunton)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	-
Significant beneficial above the SOAEL	-
Significant adverse (between LOAEL and SOAEL)	-
Significant beneficial (between LOAEL and SOAEL)	-
Not significant	1,024

11.9.31 In Taunton, noise levels would be subject to negligible change (i.e. less than 1dB(A) increase or decrease). No dwellings in the Taunton area are predicted to experience an adverse or beneficial significant effect.

#### *Noise important areas*

11.9.32 There is one NIA (NIA ID 3496) in the Taunton area also within the A358 study area. Residential receptors situated in the vicinity of NIA ID 3496 are affected by traffic on the A358 to the north-west of M5 junction 25 and although they are predicted to experience noise levels above the SOAEL, there would be a negligible change with the proposed scheme in operation.

### Ruishton

#### *Residential receptors*

11.9.33 Table 11-16 summarises significant effects in the Ruishton area within 600m of the proposed scheme.

**Table 11-16 Summary of preliminary significant operational noise effects (Ruishton)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	-
Significant beneficial above the SOAEL	-
Significant adverse (between LOAEL and SOAEL)	-
Significant beneficial (between LOAEL and SOAEL)	1
Not significant	405

11.9.34 There is one dwelling with a moderate level of beneficial impact predicted in the opening year of the proposed scheme. This would be subject to direct permanent likely significant beneficial effects. This dwelling is situated on Bushy Cross Lane close to the existing A358.

*Noise important areas*

11.9.35 There is one NIA (NIA ID 3497) which is partially within this assessment area along the existing A358. The one dwelling has already been reported in paragraph 11.9.34.

Henlade*Residential receptors*

11.9.36 Table 11-17 summarises significant effects on residential receptors in the Henlade area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-17 Summary of preliminary significant operational noise effects (Henlade)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	2
Significant beneficial above the SOAEL	55
Significant adverse (between LOAEL and SOAEL)	108
Significant beneficial (between LOAEL and SOAEL)	37
Not significant	47

11.9.37 There are two dwellings situated on Stoke Road subject to direct permanent likely significant adverse effects above SOAEL as a result of the proposed scheme. The level of adverse impact would be major for those dwellings in the opening year.

11.9.38 There are 55 dwellings currently exceeding the SOAEL where noise reductions would occur as a result of the proposed scheme. At these 55 dwellings, noise exposure would fall below the SOAEL threshold with the proposed scheme in operation. The noise reductions would be greater than 1 dB(A) in the opening year. As the baseline noise level would be above the SOAEL, this level of reduction to below the SOAEL threshold is assessed as a direct permanent likely significant beneficial effect for those 55 dwellings. These dwellings are situated along the existing A358.

11.9.39 There are 108 dwellings predicted to be subject to major or moderate adverse noise impacts in the opening year between LOAEL and SOAEL. These are assessed as direct permanent likely significant adverse effects as a result of the proposed scheme. These dwellings are located along Lipe Lane, the A358, Stoke Road, in Ivy house park and Greenway Lane.

11.9.40 There are 37 dwellings subject to direct permanent likely significant beneficial effects between the LOAEL and SOAEL as a result of the proposed scheme. The level of beneficial impact would be major or moderate for all these dwellings in the opening year. These beneficial effects are generally located around the existing A358.

*Non-residential sensitive receptors*

11.9.41 Ivy House Social Club would be subject to moderate noise reductions between 3 and 5dB(A). This is assessed as a direct permanent likely significant beneficial effect.

*Noise important areas*

11.9.42 There is one NIA (NIA ID 3497) which is partially within this area along the existing A358. Noise exposure levels at dwellings in NIA ID 3497 would fall below the SOAEL with the proposed scheme in operation. The noise reductions would be greater than 1dB(A) in the opening year, and because the baseline noise levels would be above the SOAEL, these reductions are assessed as direct permanent likely significant beneficial effects.

Thornfalcon and Mattock's Tree Green junction*Residential receptors*

11.9.43 Table 11-18 summarises significant effects on residential receptors in the Thornfalcon and Mattock's Tree Green junction area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-18 Summary of preliminary significant operational noise effects (Thornfalcon and Mattock's Tree Green junction)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	5
Significant beneficial above the SOAEL	7
Significant adverse (between LOAEL and SOAEL)	42
Significant beneficial (between LOAEL and SOAEL)	5
Not significant	57

11.9.44 There are five dwellings currently exceeding the SOAEL where noise increases would occur as a result of the proposed scheme. These dwellings are situated on the A378 where Mattock's Tree Green junction would be connected to the existing A378 and along the existing A358. The noise increases would be greater than 1 dB(A) in the opening year and hence these are assessed as direct permanent likely significant adverse effects above SOAEL as a result of the proposed scheme.

11.9.45 For a further seven dwellings that would already exceed the SOAEL in the baseline year in the absence of the proposed scheme, there would be noise reductions as a result of the proposed scheme. For four of these dwellings, noise exposure with the proposed scheme would fall below SOAEL. These dwellings are all adjacent to the existing A358. Noise reductions would be greater than 1dB(A) in the opening year, and because the baseline noise levels would be above the SOAEL, these reductions at seven dwellings are assessed as direct permanent likely significant beneficial effects.

11.9.46 There are 42 dwellings with a moderate or major magnitude of adverse impact predicted with the proposed scheme in the opening year between the LOAEL and the SOAEL. These would be subject to direct permanent likely significant adverse effects. Most of these are scattered properties on the west and east side of the proposed scheme.

11.9.47 There are five dwellings subject to direct permanent likely significant beneficial effects between the LOAEL and SOAEL as a result of the proposed scheme. The level of beneficial impact would be major or moderate for all these dwellings in the

opening year. These beneficial effects are generally located around Thornfalcon facing the existing A358.

*Non-residential sensitive receptors*

11.9.48 Somerset Progressive School is situated immediately to the west of the existing A358 and noise levels currently exceed the SOAEL. Noise increases would occur as a result of the proposed scheme. This school would be subject to a noise increase of between 3 and 5dB(A) above SOAEL. This level of increase in noise levels are assessed as direct permanent likely significant adverse effects as a result of the proposed scheme.

*Noise important areas*

11.9.49 There are five NIAs that lie within the study area along the existing A358 in this area. Most properties are currently exposed to noise levels above the SOAEL.

11.9.50 At NIA 3498, there are two properties which would be subject to a reduction in noise levels with the proposed scheme. The level of beneficial impact would be major or moderate for these dwellings in the opening year. Hence these properties would be subject to direct permanent likely significant beneficial effects.

11.9.51 At NIA 3499, there are two properties currently exceeding the SOAEL situated at this location. One property would be subject to an increase in noise level and greater than 1dB(A) in the opening year. This is assessed as direct permanent likely significant adverse effects above SOAEL as a result of the proposed scheme. The other property would be subject to a reduction in noise level greater than 1dB(A) in the opening year. This is assessed as direct permanent likely significant beneficial effects in the opening year with the proposed scheme. These properties are situated between the existing A358 and the proposed scheme and property facades face either the existing A358 or the proposed scheme.

11.9.52 At NIA 12939, there is a single dwelling at this location would be subject to noise increase of more than 10dB(A). These noise increases are assessed as a direct permanent likely significant adverse effect. This is as a result of a large noise change on the façade of the building facing the new alignment (opposite to the façade currently with the highest noise level).

11.9.53 At NIA 3500, there are three dwellings at this location. Two dwellings would be subject to a reduction in noise levels and are assessed as direct permanent likely significant beneficial effect and one dwelling would be subject to an increase in noise levels and is assessed as a direct permanent likely significant adverse effect. This is due to the introduction of the junction and associated slip roads in this area as part of the proposed scheme.

11.9.54 At NIA 3501, there is only one dwelling currently, which is subject to a compulsory purchase order and therefore has not been assessed.

West Hatch and Meare Green

*Residential receptors*

11.9.55 Table 11-19 summarises significant effects on residential receptors in West Hatch and Meare Green area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-19 Summary of preliminary significant operational noise effects (West Hatch and Meare Green)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	-
Significant beneficial above the SOAEL	-
Significant adverse (between LOAEL and SOAEL)	22
Significant beneficial (between LOAEL and SOAEL)	-
Not significant	13

11.9.56 There are 22 dwellings with a moderate or major level of adverse impact predicted with the proposed scheme in the opening year. These would be subject to direct permanent likely significant adverse effects between the LOAEL and SOAEL as a result of the proposed scheme. Most of these are scattered properties on the either side of the proposed scheme.

Hatch Beauchamp

*Residential receptors*

11.9.57 Table 11-20 summarises significant effects on residential receptors in the Hatch Beauchamp area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-20 Summary of preliminary significant operational noise effects (Hatch Beauchamp)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	-
Significant beneficial above the SOAEL	-
Significant adverse (between LOAEL and SOAEL)	55
Significant beneficial (between LOAEL and SOAEL)	-
Not significant	171

11.9.58 There are 55 dwellings with a moderate level of adverse impact predicted with the proposed scheme in the opening year. These would be subject to direct permanent likely significant adverse effects between the LOAEL and SOAEL as a result of the proposed scheme. All of these are situated on the eastern side of the proposed scheme.

Hatch Green

*Residential receptors*

11.9.59 Table 11-21 summarises significant effects on residential receptors in Hatch Green area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-21 Summary of preliminary significant operational noise effects (Hatch Green)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	2

Type of effects	Number of dwellings
Significant beneficial above the SOAEL	1
Significant adverse (between LOAEL and SOAEL)	21
Significant beneficial (between LOAEL and SOAEL)	3
Not significant	6

- 11.9.60 There are two dwellings currently exceeding the SOAEL where noise increases would occur as a result of the proposed scheme. These dwellings are situated on the existing A358. There would be major or moderate adverse impacts at these dwellings in the opening year which are assessed as direct permanent likely significant adverse effects.
- 11.9.61 For a further individual dwelling that would already exceed the SOAEL in the baseline year in the absence of the proposed scheme, there would be a noise reduction as a result of the proposed scheme. This dwelling is Windsor House. Noise exposure would fall below the SOAEL with the proposed scheme in operation. The noise reductions would be greater than 1dB(A) in the opening year, and because the baseline noise levels would be above the SOAEL, this reduction at Windsor House is assessed as a direct permanent likely significant beneficial effect.
- 11.9.62 There are 21 dwellings with a moderate or major level of adverse impact predicted with the proposed scheme in the opening year. These would be subject to direct permanent likely significant adverse effects. Most of these are scattered properties on the west and east side of the proposed scheme.
- 11.9.63 There are three dwellings subject to direct permanent likely significant beneficial effects between the LOAEL and SOAEL as a result of the proposed scheme. The level of beneficial impact would be moderate for all these dwellings in the opening year. These beneficial effects are generally located on the west of the proposed scheme on Bickenhall Lane, Bickenhall.

#### *Noise important areas*

- 11.9.64 There is one NIA (NIA ID 12940) that lies within the A358 study area along the existing A358. Windsor House is within this NIA and is currently exposed to noise levels above SOAEL as discussed above and would be subject to direct permanent likely significant beneficial effects.

#### Ashill

#### *Residential receptors*

- 11.9.65 Table 11-22 summarises significant effects on residential receptors in the Ashill area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-22 Summary of preliminary significant operational noise effects (Ashill)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	11
Significant beneficial above the SOAEL	1
Significant adverse (between LOAEL and SOAEL)	115
Significant beneficial (between LOAEL and SOAEL)	2
Not significant	14

- 11.9.66 There are 11 dwellings currently exceeding the SOAEL where noise increases would occur as a result of the proposed scheme. These dwellings, on Wood Road and in Kenny would be subject to noise increases as a result of the proposed scheme (moderate to major adverse impact range) which are assessed as direct permanent likely significant adverse effects.
- 11.9.67 For a further individual dwelling, Kendalwood on the existing A358, that would already exceed the SOAEL in the baseline year in the absence of the proposed scheme, there would be noise reductions as a result of the proposed scheme. For Kendalwood, noise exposure would fall below the SOAEL with the proposed scheme in operation. The noise reductions would be greater than 1dB(A) in the opening year, and because the baseline noise levels would be above the SOAEL, these reductions are assessed as direct permanent likely significant beneficial effects.
- 11.9.68 There are 115 dwellings with a moderate or major level of adverse impact predicted with the proposed scheme in the opening year between LOAEL and SOAEL. These would be subject to direct permanent likely significant adverse effects. The majority of these are situated to the south side of the proposed scheme, with just a few scattered dwellings also affected to the north of the proposed scheme. These receptors are mostly situated more than 100m from the proposed scheme.
- 11.9.69 There are two dwellings subject to direct permanent likely significant beneficial effects between the LOAEL and SOAEL as a result of the proposed scheme. The level of beneficial impact would be major or moderate for these dwellings in the opening year. These effects would be as a result of changes in road traffic noise associated with non-scheme roads. These beneficial effects are generally located along Wood Road, beyond around 450m from the proposed scheme.

*Non-residential sensitive receptors*

- 11.9.70 The Blessed Virgin Mary church and Ashill Community Primary School are situated approximately 400m from the proposed scheme and would be subject to noise increases as a result of the proposed scheme (moderate adverse impact) in the opening year. These non-residential sensitive receptors are subject to direct permanent likely significant adverse effects between the LOAEL and SOAEL as a result of the proposed scheme.
- 11.9.71 Ashill Village Hall is situated approximately 200m from the proposed scheme and would be subject to an increase in noise levels as a result of the proposed scheme (major adverse impact) in the opening year. This non-residential sensitive receptor is subject to direct permanent likely significant adverse effects between the LOAEL and SOAEL as a result of the proposed scheme.

*Noise important areas*

- 11.9.72 There is one NIA (NIA ID 3502) that lies within the A358 study area along the existing A358. There is a single property at NIA 3502, Kendalwood, is currently exposed to noise levels above the SOAEL. This residential property would be subject to a direct permanent likely significant beneficial effect.

Rapps*Residential receptors*

11.9.73 Table 11-23 summarises significant effects on residential receptors in Rapps area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-23 Summary of preliminary significant operational noise effects (Rapps)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	-
Significant beneficial above the SOAEL	-
Significant adverse (between LOAEL and SOAEL)	32
Significant beneficial (between LOAEL and SOAEL)	-
Not significant	40

11.9.74 There are 32 dwellings with a moderate or major level of adverse impact predicted with the proposed scheme in the opening year. These would be subject to direct permanent likely significant adverse effects between the LOAEL and SOAEL as a result of the proposed scheme. All of these are scattered properties on the west and east side of the proposed scheme.

*Non-residential sensitive receptors*

11.9.75 St Aldhelm & St Eadburgha's church would be subject to a moderate impact in the opening year and minor impact in the future year (long term). This non-residential sensitive receptor would be subject to noise levels between the LOAEL and SOAEL as a result of the proposed scheme, hence this is assessed as a direct permanent likely significant adverse effect.

Horton Cross*Residential receptors*

11.9.76 Table 11-24 summarises significant effects on residential receptors in Horton Cross area within the detailed calculation area within 600m of the proposed scheme.

**Table 11-24 Summary of preliminary significant operational noise effects (Horton Cross)**

Type of effects	Number of dwellings
Significant adverse above the SOAEL	5
Significant beneficial above the SOAEL	-
Significant adverse (between LOAEL and SOAEL)	14
Significant beneficial (between LOAEL and SOAEL)	-
Not significant	138

11.9.77 There are five dwellings currently exceeding the SOAEL where noise increases would occur as a result of the proposed scheme. These five dwellings would be subject to minor adverse noise impacts in the opening year. As the predicted noise levels would be above the SOAEL, noise increases are assessed as direct permanent likely significant adverse effects. These dwellings are situated along the existing unaltered section of the A358 branching out from Southfields

roundabout to the west but are also affected by the new and altered sections of the A358 to the north-east.

11.9.78 There are 14 dwellings subject to direct permanent likely significant adverse effects between the LOAEL and SOAEL as a result of the proposed scheme. The level of adverse impact would be moderate for all these dwellings in the opening year. These adverse effects are generally located on the west side of the proposed scheme along the existing unaltered section of the A358 off Southfields roundabout.

#### Noise insulation eligibility

11.9.79 The assessment has indicated that there are 32 dwellings that would exceed the criteria to be eligible for noise insulation under the NIR. LA 111 (Annex E/2) requires that potential noise insulation eligibility is considered as part of the assessment. The potential noise insulation qualifiers will be confirmed based on the mitigated scheme design and updated traffic modelling and reported in the ES.

#### Non-scheme road links beyond 600m from the proposed scheme where noise levels change by 1dB(A) in the opening year

11.9.80 In the wider area where the current traffic patterns would be indirectly influenced as a result of the proposed scheme, dwellings located within 50m from the road edges would be subject to reductions in noise levels (as shown by green squares on Figure 11.5 Operational noise significantly affected receptors) on the following roads:

- Shoreditch Road, B3170 and Chestnut Drive in Taunton
- Thurlbear Road in Orchard Portman
- Staple Hill and New Road in Staple Fitzpaine
- Unnamed roads between Staple Fitzpaine and Buckland St Mary
- Pound Road in Horton

11.9.81 Indirect noise reductions would occur at 43 receptors (41 dwellings and two non-residential receptors) that would already exceed the SOAEL in the baseline year in the absence of the proposed scheme. At 21 receptors (including one non-residential receptor), noise exposure would fall below the SOAEL with the proposed scheme in operation. The noise reductions would be greater than 1dB(A) in the opening year (short term), and because the baseline noise levels would be above the SOAEL, these are assessed as indirect permanent likely significant beneficial effects.

11.9.82 There are 168 receptors (165 dwellings and 3 non-residential receptors) that would experience indirect permanent likely significant beneficial effects between the LOAEL and SOAEL. The level of beneficial impact would be major or moderate for all these dwellings in the opening year. These are assessed as indirect permanent likely significant beneficial effects.

11.9.83 Dwellings located on the following road would be subject to increases in noise levels (as shown by red squares on Figure 11.5 Operational noise significantly affected receptors):

- Windmill Hill and Stoke Road in North Curry
- Meare Green

- Curload Road in Curload
- Stanmoor Road in Burrowbridge
- Headwell and Higher Street in Curry Mallet
- Broadway Road in Boradway
- Hanning Road in Horton

11.9.84 Indirect noise increases would occur at 374 receptors (366 dwellings and 8 non-residential receptors) that would be subject to moderate or major adverse noise impacts between LOAEL and SOAEL. These are assessed as indirect permanent likely significant adverse effects. This would be as a result of changes in road traffic noise associated with non-scheme roads in the listed areas above.

11.9.85 The government policy objectives (see paragraph 11.2.8) are also defined in the *England National Application Annex to DMRB LA 111 Noise and vibration*. In accordance with the assessment requirements, the proposed scheme’s compliance against these objectives is set out in Table 11-25.

**Table 11-25 Proposed scheme compliance with government policy**

Government policy objective (NPSNN)	Compliance with policy requirements
<p>Aim 1: Avoid significant adverse impacts on health and quality of life from noise as a result of the new development. (NPSE describes this aim in relation to impacts above the SOAEL)</p>	<p>Significant adverse impacts from construction noise and vibration would be avoided through construction BPM mitigation, and noise insulation where established thresholds are exceeded. These controls would follow the principles and processes set out in the EMP to be developed alongside the ES.</p> <p>Some significant adverse effects are reported in this assessment for construction noise. Mitigation, as far as is practicable and sustainable, would be detailed in the NVMP that will be prepared as required by the EMP which will be produced alongside the ES, following dialogue with local authorities.</p> <p>For operational noise, a number of properties are predicted to be subject to significant adverse effects above the SOAEL. Screening and other potential mitigation measures will be considered where effective to practicably, and sustainably, avoid these impacts. Noise insulation measures will be offered where appropriate (see paragraph 11.9.79).</p>
<p>Aim 2: Mitigate and minimise other adverse impacts on health and quality of life from noise from the new development. (NPSE describes this aim in relation to impacts between the LOAEL and SOAEL)</p>	<p>Adverse impacts from construction noise and vibration would be mitigated and minimised through construction BPM mitigation. These controls would follow the principles and processes set out in the EMP to be developed alongside the ES.</p> <p>Some significant adverse effects for operational noise between the LOAEL and SOAEL are reported in this assessment. All appropriate measures will be applied in these cases as far as it is practicable and sustainable to do so to mitigate and minimise these effects.</p>
<p>Aim 3: Contribute to improvements to health and quality of life through the effective management and control of noise, where possible. (Applies to all noise levels)</p>	<p>Beneficial effects would occur at communities, outdoor amenity areas in some NIAs as a result of the proposed scheme.</p>

## 11.10 Monitoring

- 11.10.1 The requirements of DMRB LA 111 *Noise and vibration* (Section 4) regarding monitoring and evaluation shall be followed.
- 11.10.2 The prediction and assessment methodologies set out in section 11.3 Assessment methodology of this chapter would be used to support the verification of the effectiveness of any mitigation measures which may be incorporated into the proposed scheme. Monitoring of the effectiveness would be carried out as part of Highways England's project evaluation procedures, which evaluates how highway schemes are delivered and would highlight any issues with meeting the accepted design.
- 11.10.3 Where access is required onto private land for monitoring purposes, prior consultation would be undertaken with the occupier and appropriate arrangements would be made to enable the monitoring to be undertaken.
- 11.10.4 Highways England has a duty under Regulation 6 of the NIR to assess noise levels following the opening of the proposed scheme to traffic. The purpose of this is to establish the buildings previously not identified as qualifying for an original offer of carrying out or making a grant in respect of carrying out noise insulation work, which may have become eligible by increased traffic flow. Assessments would be carried out in accordance with the obligations set out in the NIR.

## 11.11 Summary

- 11.11.1 Construction noise and operational traffic noise have been assessed in terms of government policy and EIA significance. These different types of effect are explained in paragraph 11.3.23.

### **Construction assessment**

- 11.11.2 A high-level construction noise assessment has been undertaken based on data from similar road construction projects and the proposed scheme design.
- 11.11.3 The principal activities considered with the potential to cause noise effects are cutting and earthworks, structures and road construction works.
- 11.11.4 At the time of preparation of this report, no information was available for haul roads, construction traffic flows on public highways, night-time works and night-time diversion routes and therefore these will be assessed and reported in the ES.
- 11.11.5 A qualitative vibration assessment has been undertaken at this stage, due to the lack of available detail on types of plant and processes that will be used during construction.

### Significant effects

- 11.11.6 Based on the high-level worst-case assessment presented for construction noise, direct temporary likely significant adverse noise effects have been assessed at 345 residential and non-residential properties during the daytime only (see Table 11-14). These are direct effects above the SOAEL threshold, as described in government policy.
- 11.11.7 Experience on similar road construction projects would indicate that there is a low risk of significant vibration effects beyond approximately 100m from vibratory

works, based on the usual methods of piling that would be employed for this type of project. Further assessment will be undertaken and reported in the ES, when there is a clearer understanding of the likely methods of construction to be employed.

### **Operational assessment**

11.11.8 Daytime and night-time traffic noise levels within the study area (see Figures 11.1-11.4) have been predicted and are assessed in terms of:

- residential receptors exceeding the SOAEL
- residential receptors between the LOAEL and SOAEL
- non-residential receptors

#### Significant effects

11.11.9 Based on the detailed assessment of operational noise the following significant effects have been identified:

#### *Exceeding the SOAEL*

11.11.10 Twenty-six sensitive receptors are assessed as being subject to direct permanent likely significant adverse effects where there is at least a 1dB(A) impact as a result of the proposed scheme. These sensitive receptors are situated in close proximity to the proposed scheme in Henlade, Thornfalcon, Mattock's Tree Green junction, Hatch Green, Ashill and Horton Cross.

11.11.11 Eighty-one sensitive receptors that would already exceed the SOAEL would be subject to larger than negligible noise reductions as a result of the proposed scheme. These receptors would be subject to reduction in noise levels such that the noise exposure with the proposed scheme in operation would fall below the SOAEL. All the above noise reductions would be greater than 1dB(A) and because the baseline noise levels would be above the SOAEL, these reductions are assessed as direct permanent likely significant beneficial effects. The majority (60) of these properties are located in Henlade, Thornfalcon, Mattock's Tree Green junction and Hatch Green. Otherwise, receptors are located on Shoreditch Road (Taunton), Thurlbear Road (Orchard Portman), and unnamed roads between Staple Fitzpaine and Buckland St Mary.

11.11.12 A further 26 sensitive receptors that would already exceed the SOAEL in the baseline would be subject to larger than negligible noise reductions with the proposed scheme in operation but noise exposure would remain above SOAEL. These reductions are assessed as indirect permanent likely significant beneficial effects. These properties are located in Thornfalcon, Mattock's Tree Green junction, Ashill, Orchard Portman and Staple Fitzpaine.

#### *Between LOAEL and SOAEL*

11.11.13 Approximately 413 sensitive receptors would be subject to direct permanent likely significant adverse effects between the LOAEL and SOAEL. These receptors are located in Henlade, Thornfalcon, Mattock's Tree Green junction, West Hatch, Hatch Beauchamp, Hatch Green, Ashill, Rapps and Horton Cross. All of these are assessed as direct permanent likely significant adverse effects.

11.11.14 Approximately 374 receptors that would be subject to indirect permanent likely significant adverse effects between the LOAEL and SOAEL. This is because of changes in road traffic noise associated with non-scheme roads. These properties

are located in North Curry, Meare Green, Curload, Burrowbridge and Broadway. All of these are assessed as indirect permanent likely significant adverse effects.

11.11.15 Approximately 49 sensitive receptors would be subject to direct permanent likely significant beneficial effects between the LOAEL and SOAEL. These dwellings are located near the existing alignment in Ruishton, Henlade, Thornfalcon and Mattock's Tree Green junction.

11.11.16 There are approximately 168 properties would be subject to indirect permanent likely significant beneficial effects between the LOAEL and SOAEL. These dwellings are located in Hatch Green, Ashill, Staple Fitzpaine, Buckland St Mary and Horton.

#### *Noise Important Areas (NIAs)*

11.11.17 There are nine Noise Important Areas near the existing A358 where most NSRs would be subject to reductions in noise levels as a result of the proposed scheme, with the exception of NIA ID 3496 where there would be no change in noise level and one property in each of NIA 3499, NIA 3500 and NIA 12939 where there would be increases in noise level.

#### **Further work**

11.11.18 As part of the EIA, the preliminary operational assessment will be updated to reflect the Design Fix 2 scheme design.

11.11.19 The operational assessment will be updated to include the PCF stage 3 traffic modelling outputs and updated road surface information.

11.11.20 Additional noise mitigation will be incorporated into the design and updated significant effects will be reported in the ES.

11.11.21 An assessment of noise impacts from night-time construction works and diversion routes at night will be undertaken if applicable and reported in the ES.

11.11.22 An assessment of noise impacts of construction traffic on site haul roads and the public highway will be undertaken and reported in the ES.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

## References

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 12  
Population and Health

HE551508-ARP-EGN-ZZ-RP-LE-000014

27/09/21

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## 12 Population and health

### 12.1 Introduction

- 12.1.1 This chapter provides an assessment of the construction and operational effects of the A358 Taunton to Southfields Dualling Scheme (the 'proposed scheme') on population and human health. This chapter follows the methodology set out in the *Design Manual for Roads and Bridges* (DMRB) LA 112 *Population and human health* [1] and DMRB LA 104 *Environmental assessment and monitoring* [2]. These are followed as the extant methodology which has been developed to guide assessment of projects on the Strategic Road Network (SRN) in England, Scotland, Northern Ireland and Wales.
- 12.1.2 This chapter considers the relevant regulatory and policy framework related to population and human health, defines the study area for the purposes of assessment, details the methodology followed for the assessment, describes the existing environment in the area surrounding the proposed scheme (the baseline) and presents the assessment of effects on identified receptors during both construction and operation of the proposed scheme. Following this, the design, mitigation, and residual effects are discussed, along with the limitations of the assessment, where necessary.
- 12.1.3 In line with DMRB LA 112 *Population and human health*, this chapter is structured under the following impact areas (receptor groups):
- Land-use and accessibility, including:
    - private property and housing
    - community land and assets
    - development land and businesses
    - agricultural land holdings
    - walkers, cyclists, and horse riders, including disabled users (WCH).
  - Human health, including:
    - health profiles of affected communities
    - health determinants (factors which affect health outcomes, e.g., noise or air pollution)
    - likely health outcomes

### 12.2 Legislative and policy framework

- 12.2.1 This section assesses the legislation and policy framework relevant to the proposed scheme. As documented in Chapter 1 Introduction, the *National Policy Statement for National Networks* (NPSNN) [3] is the primary planning policy for the proposed scheme and forms the principal basis for making decisions on Development Consent Order (DCO) applications in England. The *National Planning Policy Framework* (NPPF) [4] is noted as being 'important and relevant' and is to be considered, however, if there is a conflict between the NPSNN and NPPF, the NPSNN takes precedence.
- 12.2.2 Table 12-1 identifies the NPSNN policies relevant to population and human health and then specifies where in the PEI Report information is provided to address the policy.

**Table 12-1 Relevant NPSNN for applicant's population and human health assessment**

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the PEI Report is information provided to address this policy
2.1	<i>Well-connected and high-performing networks with sufficient capacity are vital to meet the country's long-term needs and support a prosperous economy.</i>	The overarching objectives of the proposed scheme are to create a network which has sufficient capacity and provides for future demands. For further details, refer to Chapter 1 Introduction.
2.6	<i>There is also a need for development on the national networks to support national and local economic growth and regeneration, particularly in the most disadvantaged areas. Improved and new transport links can facilitate economic growth by bringing businesses closer to their workers, their markets and each other. This can help rebalance the economy.</i>	Nexus 25 development is a strategically important employment site located at junction 25 of the M5 at Taunton. Improvements to the A358 would increase connectivity between Taunton and Ilminster, benefitting the Nexus 25 development. Refer to section 12.9 Assessment of likely significant effects.
2.12 to 2.27	<i>Considers the need for development of the national road network. Of relevance to this Chapter, the drivers include well-connected and high-performing networks with sufficient capacity to meet the country's long-term needs and support a prosperous economy. This includes both stimulating and supporting economic growth as well as meeting broader environmental, safety and accessibility goals.</i>	The effects of the proposed scheme on overall connectivity and economic growth are considered broadly with reference to development land and businesses in sections 12.7 Potential impacts and 12.9 Assessment of likely significant effects.
3.3	<i>In delivering new schemes, the Government expects applicants to avoid and mitigate environmental and social impacts in line with the principles set out in the NPPF and the Government's planning guidance. Applicants should also provide evidence that they have considered reasonable opportunities to deliver environmental and social benefits as part of schemes.</i>	Mitigation measures are considered and detailed as part of the assessment at sections 12.8 Design, mitigation, and enhancement measures. Opportunities for wider benefits have also been considered, particularly in relation to the walking, cycling and horse riding (WCH) and Public Rights of Way (PRoW) network.
3.17	<i>There is a direct role for the national road network to play in helping pedestrians and cyclists. The Government expects applicants to use reasonable endeavours to address the needs of cyclists and pedestrians in the design of new schemes. The Government also expects applicants to identify opportunities to invest in infrastructure in locations where the national road network severs communities and acts as a barrier to cycling and walking, by correcting historic problems, retrofitting the latest solutions, and ensuring that it is easy and safe for cyclists to use junctions.</i>	The needs of WCH are considered in detail in section 12.9 Assessment of likely significant effects.
3.22	<i>Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility.</i>	Where appropriate, the design has responded to potential severance effects and proposed infrastructure which seeks to reduce severance and

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the PEI Report is information provided to address this policy
		ensure continued accessibility. This is particularly considered in relation to agricultural land holdings and WCH at section 12.8 Design, mitigation, and enhancement measures.
5.162	<i>Access to high quality open spaces and the countryside and opportunities for sport and recreation can be a means of providing necessary mitigation and/or compensation requirements. Green infrastructure can also enable developments to provide positive environmental and economic benefit.</i>	The potential effects on community land and assets (including recreation space, common land, and open access land) are presented in section 12.9 Assessment of likely effects.
5.165 to 5.172	<i>Outline expectations in relation to land use including open space, green infrastructure. Of relevance to this assessment, it requires the application to:</i> <ul style="list-style-type: none"> <li>- Identify existing and proposed land uses near the project and consider effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing.</li> <li>- Existing open space, sports and recreational buildings and land should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location.</li> </ul>	The potential effects on community land and assets (including recreation space, common land, and open access land) are presented in section 12.9 Assessment of likely effects.
5.184	<i>Public rights of way, National Trails, and other rights of access to land (e.g., open access land) are important recreational facilities for walkers, cyclists, and equestrians. Applicants are expected to take appropriate mitigation measures to address adverse effects on coastal access, National Trails, other public rights of way and open access land and, where appropriate, to consider what opportunities there may be to improve access.</i>	The proposed approach to PRoW and open access land is detailed within sections 12.9 Assessment of likely significant effects.

12.2.3 This section presents wider legislation and policy of most relevance to the assessment and includes a summary of how the assessment has responded to the relevant policy requirements.

12.2.4 This section does not provide a review of the legislation and policy support for the proposed scheme itself. This would be provided within a separate planning statement (case for the proposed scheme) that would accompany the DCO application.

12.2.5 A list of relevant national, regional, and local policies is set out below.

### Legislation

12.2.6 The national legislation of relevance includes:

- *Countryside and Rights of Way Act 2000* [5]: The Act provides a new right of public access on foot to areas of open land. The Act also provides safeguards which consider the needs of landowners and occupiers, and of other interests, including wildlife. The Act improves the rights of way legislation by encouraging the creation of new routes and clarifying uncertainties about existing rights.

### **National planning policy and guidance**

12.2.7 The national policies of relevance include:

- *National Planning Policy Framework (NPPF)* (July 2021): The NPPF seeks a transport system which gives choice to people on how they travel, while recognising that opportunities to maximise sustainable transport solutions would vary from urban to rural areas. The policy on transport retains the priority on reducing the need to travel and policies in favour of sustainable transport modes.
- *National Infrastructure Strategy (November 2020)* [6]: *The National Infrastructure Strategy sets out plans to transform UK infrastructure in order to level up the country, strengthen the Union and achieve net zero emissions by 2050.*
- *National Planning Practice Guidance (PPG)* [7]: *Open Space, Sports and recreation facilities, public rights of way and local green space*: The guidance states that existing open space should be taken into account when considering development proposals.
- *Government White Paper: Healthy Lives, Healthy People* (2010) [8]: The white paper outlines the Government's commitment to helping people live longer, healthier and more fulfilling lives, while improving the health of the poorest, fastest.
- Department for Transport (DfT) *Gear Change: A bold vision of cycling and walking* [9]: Following the recent COVID-19 restrictions, the government has launched a new strategy to transform the role cycling and walking can play in our transport system, and get England moving differently. The vision seeks to create a travel revolution in our communities, which would make cycling and walking a natural first choice for many journeys.

### **National strategies**

12.2.8 The national strategies of relevance include:

- *Second Road Investment Strategy: 2020-2025* (2020) [10] (RIS2): The RIS2 includes the A358 as a committed project for Road Period (RP) 2, which runs between financial years 2020/21 to 2024/25.
- *Highways England Cycling Strategy* [11]: The Strategy sets out how the planned roads improvements programme would provide integrated schemes which improve cycling facilities, contributing towards the development of an integrated, safe, comprehensive and high-quality cycling network.
- *Highways England Accessibility Strategy* [12]: The vision for accessibility focuses on supporting road users' journeys, including pedestrians, cyclists, equestrians, those with disabilities and other vulnerable users, while delivering

longer-term benefits for communities and users alike. It aims to address the barriers that roads can sometimes create, help expand people's travel choices, enhance and improve network facilities, and make everyday journeys as easy as possible.

### Regional planning policy

12.2.9 The regional planning policies of relevance include:

- *Somerset County Council's Active Travel Strategy (2012) [13]*: Sets out the county's strategy to facilitate active travel choices by making these options easier to access and more attractive. It highlights the potential for improving health and wellbeing, air quality, and access to services without increasing congestion; and enhancing mobility options for vulnerable groups such as older people and those who are socially excluded.

### Local planning policy

12.2.10 The local planning policies of relevance include:

- *Taunton Deane Core Strategy 2011-2028 [14]*: Taunton Deane Core Strategy was adopted by the former Taunton Deane Borough Council in 2012. The relevant policies include:
  - Policy CP2: Economy  
Policies to enable the Borough to reach its full economic potential to provide sufficient, deliverable land in the right place and at the right time to enable sustainable growth.
  - Policy CP3: Town and other Centres  
Policies to promote the vitality and viability of town and other centres as important places for communities and as a major focus for employment and drivers of economic growth.
  - Policy CP6: Transport and Accessibility  
Policies seeking that development should contribute to reducing the need to travel, improve accessibility to jobs, services and community facilities, and mitigate and adapt to climate change.
  - Policy CP7: Infrastructure  
Policies that identify the infrastructure that local service providers and the Borough and County Councils have established as key to delivering future growth.
- In 2019, the local authorities of Taunton Deane and West Somerset merged together to become Somerset West and Taunton Council (SWTC). Once adopted, their joint Local Plan 2040 would replace the existing Local Plan documents of the former Taunton Deane Borough Council and West Somerset Council. The Council is currently at Stage 1, Regulation 18 of preparing the Local Plan, Regulation 18 of preparing the Local Plan, which marks the start of the engagement stage inviting organisations to make representations about what the policies update ought to contain.
- *South Somerset Local Plan 2006-2028, March 2015 [15]*: South Somerset Local Plan was adopted by South Somerset District Council (SDDC) in March 2015. The relevant policies include:
  - Policy SS3: Delivery New Employment Land

Policies to assist the delivery of 11,250 jobs as a minimum, and 149.51 hectares of land for economic development between April 2006 and March 2028.

- Policy PMT3: Ilminster Direction of Growth  
In order to accommodate the proposed level of residential development in Ilminster, a 'Direction of Growth' has been identified to the south-west of the town; and
- Policy EP1: Strategic Employment Sites  
Identifies employment allocations that are strategically significant for local and inward investment.

## 12.3 Assessment methodology

12.3.1 The assessment methodology for population and health and is separated out to cover the two elements of the topic.

### Assessment methodology for land use and accessibility elements

12.3.2 The significance of an environmental effect is a function of the 'value' of the receptor and the 'magnitude' or 'scale' of the impact, which are considered further below. The methodology set out below is taken from DMRB LA 112 *Population and human health*. The assessment has been undertaken within this framework with professional judgement also applied, as needed. Where professional judgement has been used, this is clearly explained within the assessment.

12.3.3 Certain elements of the assessment methodology have been developed in accordance with DMRB, where this provides an appropriate approach:

- DMRB LA 101 *Introduction to environmental assessment* [16];
- DMRB LA 102 *Screening projects for Environmental Impact Assessment* [17];
- DMRB LA 103 *Scoping projects for environmental assessment* [18]; and
- DMRB LA 104 *Environmental assessment and monitoring* [2].

12.3.4 As is cross referenced in DMRB LA 112 *Population and human health*, consultation with authorities likely to be affected by the proposed scheme has been undertaken in accordance with DMRB LA 104 *Environmental assessment and monitoring*.

### Baseline data gathering

12.3.5 The land use and accessibility baseline has been developed by:

- data collection (commencing at the screening/scoping stage and developed with greater detail where further assessment is required)
- spatial data mapping
- Farm Impact Assessment meetings
- consultation (where required to inform assessment conclusions). This is ongoing and would be reported in the Environmental Statement (ES) which supports the DCO application

12.3.6 Utilising these methods, the following data has been gathered for each of the broad receptor groups:

- Private property and housing:
  - The location and number of properties at risk of demolition, or from which land would be required or access affected by the proposed scheme.

- The location of residential development land and number of units that would be affected by the proposed scheme.
- Community land and assets:
  - The location of community land (e.g. common land, village greens, open green space, allotments, sports pitches) and amount of land which would be required/access affected by the proposed scheme.
  - The location of community assets (e.g. village halls, healthcare facilities, education facilities, religious facilities) and number of assets from which land would be required or access affected by the proposed scheme.
  - The level of existing accessibility restrictions or severance to community land and assets within the study area.
  - The frequency of use of community land and assets within the study area.
- Development land and businesses:
  - The location and number of businesses (and associated jobs) at risk or from which land would be required or access affected by the proposed scheme.
  - The location of land allocated for development by local authorities and the number of future jobs that would be affected by the proposed scheme.
  - Land not allocated by local authorities which is subject to planning application(s) supporting future jobs.
  - The level of existing accessibility restrictions or severance to development land and businesses within the study area.
- Agricultural land holdings:
  - Baseline farming circumstances including the size, location and use of the holding, the scale and nature of agricultural and non-agricultural enterprises, details of agri-environment schemes, details of farm infrastructure (e.g. buildings, drainage and tracks).
  - The physical and operational impacts on the structure and operation of agricultural land holdings arising from the proposed scheme.
  - The level of existing severance or accessibility restrictions to agricultural land holdings within the study area.
  - The frequency of use of the agricultural holdings/assets within the study area.
  - Options for mitigating likely significant environmental effects identified on an individual farm holding.
- WCH:
  - The type, location and extent of WCH provision (e.g. PRoW) within the study area.
  - The frequency of use of the WCH provision within the study area.

12.3.7 Where stakeholder consultation has not been possible, publicly available data has been gathered in order to provide information in relation to the frequency and type of use for community land and assets and agricultural land holdings.

12.3.8 Surveys are undertaken as part of the WCH Assessment and Review reports which provide useful usage data for the WCH network in the area surrounding the proposed scheme. Surveys will be completed and reported on in the ES to support of the DCO application.

12.3.9 In line with DMRB LA 112 *Population and human health*, it is considered that data collection and surveys undertaken to inform this assessment are proportionate and appropriate given the proposed scheme, local environment and potential effects.

12.3.10 Baseline conditions are identified and reported in Section 12.6.

Receptor value (sensitivity)

12.3.11 Where possible, environmental value/sensitivity has been applied as set out in Table 3.11 of DMRB LA 112 *Population and human health* and replicated in Table 12-2.

12.3.12 This provides a range of definitions/criteria to inform the environmental value (sensitivity) of key receptors. Whilst this provides a consistent framework for assessment, professional judgement is used where appropriate in order to provide further clarity on value descriptions.

12.3.13 In cases where the standard value description cannot be directly applied to a scheme specific receptor, the chapter describes the nature of the professional judgement applied within the framework of the standard.

**Table 12-2 Receptor sensitivity for land use and accessibility**

Receptor sensitivity	Criteria
Very high	<p>Private property and housing:</p> <ul style="list-style-type: none"> <li>• Existing private property or land allocated for housing located in a local authority area where the number of households are expected to increase by &gt;25% by 2041 (ONS data).</li> <li>• Existing housing and land allocated for housing (e.g. strategic housing sites) covering &gt;5ha (hectares) and/or &gt;150 houses.</li> </ul> <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> <li>• Complete severance between communities and their land/assets, with little/no accessibility provision.</li> <li>• Alternatives are only available outside the local planning authority area.</li> <li>• The level of use is very frequent (daily).</li> <li>• The land and assets are used by the majority (≥50%) of the community.</li> </ul> <p>Development land and businesses:</p> <ul style="list-style-type: none"> <li>• Existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering &gt;5ha.</li> </ul> <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> <li>• Areas of land in which the enterprise is wholly reliant on the spatial relationship of land to key agricultural infrastructure.</li> <li>• Access between land and key agricultural infrastructure is required on a frequent basis (daily).</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• National trails and routes likely to be used for both commuting and recreation that record frequent (daily) use. Such routes connect communities with employment land uses and other services with a direct and convenient WCH route. Little/no potential for substitution.</li> <li>• Routes regularly used by vulnerable travellers such as the elderly, school children and people with disabilities, who could be disproportionately affected by small changes in the baseline due to potentially different needs.</li> <li>• Rights of way for WCH crossing roads at grade with &gt;16,000 vehicles per day.</li> </ul>

Receptor sensitivity	Criteria
High	<p>Private property and housing:</p> <ul style="list-style-type: none"> <li>• Private property or land allocated for housing located in a local planning authority area where the number of households are expected to increase by 16-25% by 2041 (ONS data).</li> <li>• Existing housing and land allocated for housing (e.g. strategic housing sites) covering &gt;1-5ha and/or &gt;30-150 houses.</li> </ul> <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> <li>• There is substantial severance between community and assets, with limited accessibility provision.</li> <li>• Alternative facilities are only available in the wider local planning authority area.</li> <li>• The level of use is frequent (weekly).</li> <li>• The land and assets are used by the majority (≥50%) of the community.</li> </ul> <p>Development land and businesses:</p> <ul style="list-style-type: none"> <li>• Existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering &gt;1-5ha.</li> </ul> <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> <li>• Areas of land in which the enterprise is dependent on the spatial relationship of land to key agricultural infrastructure.</li> <li>• Access between land and key agricultural infrastructure is required on a frequent basis (weekly).</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• Regional trails and routes (e.g. promoted circular walks) likely to be used for recreation and to a lesser extent commuting, that record frequent (daily) use. Limited potential for substitution.</li> <li>• Rights of way for WCH crossing roads at grade with &gt;8,000-16,000 vehicles per day.</li> </ul>
Medium	<p>Private property and housing:</p> <ul style="list-style-type: none"> <li>• Houses or land allocated for housing located in a local authority area where the number of households are expected to increase by &gt;6-15% by 2041 (Office of National Statistics (ONS) data [19]).</li> <li>• Existing housing and land allocated for housing (e.g. strategic housing sites) covering =50%) of the community.</li> </ul> <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> <li>• There is severance between communities and their land/assets but with existing accessibility provision.</li> <li>• Limited alternative facilities are available at a local level within adjacent communities.</li> <li>• The level of use is reasonably frequent (monthly).</li> <li>• The land and assets are used by the majority (&gt;=50%) of the community.</li> </ul> <p>Development land and businesses:</p> <ul style="list-style-type: none"> <li>• existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering 4,000-8,000 vehicles per day.</li> </ul> <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> <li>• Areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure.</li> <li>• Access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly).</li> </ul> <p>WCH:</p>

Receptor sensitivity	Criteria
	<ul style="list-style-type: none"> <li>• PRow and other routes close to communities which are used for recreational purposes (e.g. dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys.</li> <li>• Rights of way for WCH crossing roads at grade with &gt;4,000-8,000 vehicles per day.</li> </ul>
Low	<p>Private property and housing:</p> <ul style="list-style-type: none"> <li>• Proposed development on unallocated sites providing housing with planning permission/in the planning process.</li> </ul> <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> <li>• Limited existing severance between community and assets, with existing full <i>Disability Discrimination Act 1995 (DDA)</i> [20] compliant accessibility provision.</li> <li>• Alternative facilities are available at a local level within the wider community.</li> <li>• The level of use is infrequent (monthly or less frequent).</li> <li>• The land and assets are used by the minority (<math>\leq 50\%</math>) of the community.</li> </ul> <p>Development land and businesses:</p> <ul style="list-style-type: none"> <li>• Proposed development on unallocated sites providing employment with planning permission/in the planning process.</li> </ul> <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> <li>• Areas of land which the enterprise is not dependent on the spatial relationship of land to key agricultural infrastructure.</li> <li>• Access between land and key agricultural infrastructure is required on an infrequent basis (monthly or less frequent).</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• Routes which have fallen into disuse through past severance or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes.</li> <li>• Rights of way for WCH crossing roads at grade with &lt;4,000 vehicles per day.</li> </ul>
Negligible	<p>Private property and housing:</p> <ul style="list-style-type: none"> <li>• N/A.</li> </ul> <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> <li>• no or limited severance or accessibility issues;</li> <li>• alternative facilities are available within the same community;</li> <li>• the level of use is very infrequent (a few occasions yearly); and</li> <li>• the land and assets are used by the minority (<math>\leq 50\%</math>) of the community.</li> </ul> <p>Development land and businesses:</p> <ul style="list-style-type: none"> <li>• N/A.</li> </ul> <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> <li>• areas of land which are infrequently used on a non-commercial basis.</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• N/A.</li> </ul>

12.3.14 For the purposes of this assessment, tourism and recreation receptors have been considered either as part of the community assets or development land and businesses assessment, depending on the nature of the receptor identified. Where this is the case, it has been explained.

12.3.15 When considering development land and businesses, ‘employment sites’ are taken to include any receptors that employ people.

### Magnitude of impact

12.3.16 Magnitude criteria have been applied as set out in Table 3.12 of DMRB LA 112 *Population and human health* and as listed in Table 12-3 to Table 12-4.

**Table 12-3 Magnitude of impact for land use and accessibility**

<b>Magnitude of impact</b>	<b>Typical description</b>
Major	Private property and housing, community land and assets, development land and businesses and agricultural land holdings: <ul style="list-style-type: none"> <li>• Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements e.g. direct acquisition and demolition of buildings and direct development of land to accommodate highway assets.</li> <li>• Introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision.</li> </ul> WCH: <ul style="list-style-type: none"> <li>• &gt;500m increase (adverse)/decrease (beneficial) in WCH journey length.</li> </ul>
Moderate	Private property and housing, community land and assets, development land and businesses and agricultural land holdings: <ul style="list-style-type: none"> <li>• Partial loss of/damage to key characteristics, features or elements, e.g. partial removal or substantial amendment to access or acquisition of land compromising viability of property, businesses, community assets or agricultural holdings.</li> <li>• Introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision.</li> </ul> WCH: <ul style="list-style-type: none"> <li>• &gt;250-500m increase (adverse) or decrease (beneficial) in WCH journey length.</li> </ul>
Minor	Private property and housing, community land and assets, development land and businesses and agricultural land holdings: <ul style="list-style-type: none"> <li>• A discernible change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements e.g. amendment to access or acquisition of land resulting in changes to operating conditions that do not compromise overall viability of property, businesses, community assets or agricultural holdings.</li> <li>• Introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.</li> </ul> WCH: <ul style="list-style-type: none"> <li>• &gt;50-250m increase (adverse) or decrease (beneficial) in WCH journey length.</li> </ul>
Negligible	Private property and housing, community land and assets, development land and businesses and agricultural land holdings: <ul style="list-style-type: none"> <li>• Very minor loss or detrimental alteration to one or more characteristics, features or elements e.g. acquisition of non-operational land or buildings not directly affecting the viability of property, businesses, community assets or agricultural holdings.</li> <li>• Very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision.</li> </ul> WCH: <ul style="list-style-type: none"> <li>• &lt;50m increase (adverse) or decrease (beneficial) in WCH journey length.</li> </ul>
No change	No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction.

12.3.17 In addition to the above descriptions, professional judgement has also been applied when appropriate throughout the assessment. For example, a change

could lead to a <500m increase in WCH journey length but drastically improve the safety and environmental quality of that route when compared to the baseline position. Professional judgement has been used to weigh the overall impacts of the environmental benefits against the increases to journey length. Given the importance of other factors such as these in assessing the magnitude of change, these are described and applied within the assessment in section 12.19 Assessment of likely significant effects.

- 12.3.18 For the purposes of this assessment, only those receptors situated within the DCO boundary are expected to experience direct effects. This approach helps to ensure that potential direct construction effects (e.g. where receptors interact with construction access routes and construction compounds) and potential direct operational effects (e.g. where a receptor interacts with the proposed scheme alignment) are considered.
- 12.3.19 For receptors situated outside of the DCO boundary, much of the assessment explores potential indirect and amenity effects, including impacts on access and the ongoing use of a receptor.
- 12.3.20 In considering significance, the assessment also makes a distinction between temporary and permanent impacts, with temporary effects during construction considered to have a reduced effect to that of a permanent effect during operation. For example, any local management of a route during construction with low sensitivity, which would have a negligible magnitude, would likely result in a neutral effect rather than a slight adverse effect given its temporary nature.

#### Assessment of significance

- 12.3.21 The significance of effect is derived by combining the assigned value (sensitivity) of receptors with the magnitude of change arising from a project, in accordance with DMRB LA 104 *Environmental assessment and monitoring*. The significance of effect shall be determined for each element of the land and accessibility subtopic (e.g. private property and housing, development land and businesses) affected by a project. It is noted that significant effects typically comprise effects after consideration of mitigation.
- 12.3.22 For the purposes of this assessment, the significance of impacts has been applied as per Table 12-4.
- 12.3.23 Significant effects are those where significance is deemed to be 'moderate' or greater, overall.
- 12.3.24 Where there are dual allocations (e.g. 'large or very large'), the assessment considers evidence and applies professional judgement to select a single category. Where it is possible to further clarify an allocation, this is explained in the assessment.

**Table 12-4 Significance of impacts for land use and accessibility**

Environmental value	Magnitude of impact					
		No change	Negligible	Minor	Moderate	Major
Very high		Neutral	Slight	Moderate or large	Large or very large	Very large
High		Neutral	Slight	Slight or moderate	Moderate or large	Large or very large

	<b>Medium</b>	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	<b>Low</b>	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	<b>Negligible</b>	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

### Design and mitigation

12.3.25 The following mitigation hierarchy has been implemented during design and assessment:

- Avoidance and prevention
  - Identify alternative design/route options that avoid the requirement to compulsory purchase property, land and assets.
  - Identify alternative design/route options that avoid introducing or worsening severance and avoid reducing WCH provision/increasing journey times.
- Reduction
  - Reduce impacts on property, land and assets by selecting route alignments that avoid land take from the most sensitive receptors/aspects of receptors thereby maintaining viability.
  - By altering alignment to reduce severance to communities and disruption to WCH provision.
- Remediation
  - Where it is not possible to avoid or reduce a significant adverse effect, e.g. community sports pitches have to be acquired to facilitate construction, provide equivalent facilities as close to the original location as possible.

12.3.26 Engagement with project designers and stakeholders early in the assessment and design process has been undertaken in an effort to increase the effectiveness of design and mitigation measures. Our approach and response to engagement and consultation would be provided in the separate Consultation Report that supports the DCO application.

12.3.27 WCH design, assessment and provision is being undertaken in accordance with DMRB GG 142 *Walking, cycling and horse-riding assessment and review* [21]. The WCH Review Report would be submitted as part of the ES in support of the DCO application.

### Environmental enhancement

12.3.28 Where possible, enhancement opportunities have been identified and reported including enhancement opportunities for land use and accessibility, for example returning non-operational highway to community use following completion of construction.

### Reporting

12.3.29 As part of the assessment, land use effects have been assessed during construction and for the first year of operation (future year scenario).

12.3.30 After the first year of operation, effects on land use are assumed to be associated with routine maintenance operations and are therefore unlikely to be significant.

## Assessment methodology for human health elements

- 12.3.31 The assessment of human health is a multidisciplinary process designed to identify and assess the potential health outcomes (both positive and negative) of a proposed project, plan or programme and to deliver evidence-based recommendations that optimise health gains and reduce or remove potential negative impacts or inequalities.
- 12.3.32 This section sets out the methodology for the human health assessment that has been followed, including baseline data for the study population (including identification of vulnerable and disadvantaged groups), information and data sources that were consulted, assessment criteria and initial assessment outcomes.
- 12.3.33 There is currently no statutory guidance for assessing the wider effects of projects on human health, however DMRB LA 112 *Population and human health* has been followed.
- 12.3.34 The assessment approach has been qualitative except where informed by quantitative findings from the PEI Report topic chapters, comprising: air quality, noise, population, material assets and waste, and climate change.

### Baseline data gathering

- 12.3.35 Baseline relevant to the population health assessment includes establishing health profiles for the study area (see section 12.6 Baseline Conditions) and consideration of determinants of health within the study area. Baseline health profiles for each of the wards have been collated from a range of sources to provide an overview of the following, as required by DMRB LA 112 *Population and human health*:
- percentage of the community with increased susceptibility to health issues (e.g. older people, 65 plus and young children)
  - percentage of the community with pre-existing health issues (e.g. respiratory disease and chronic obstructive pulmonary disease (COPD))
  - deaths from respiratory diseases
  - percentage of the community with long-term illness or disability
  - general health
  - life expectancy
  - income deprivation
- 12.3.36 Determinants of health are environmental and social factors which influence health outcomes. The following determinants are identified within DMRB LA 112 *Population and human health* as requiring consideration in the context of road schemes:
- recreational and education facilities and severance/separation of communities from such facilities
  - the location of green/open space and severance/separation of communities from such facilities
  - the location of healthcare facilities and severance/separation of communities from such facilities
  - transport and accessibility, including the surrounding road network, ProW (including bridleways), cycle ways, non-designated public routes and public transport routes

- air quality management areas and ambient air quality
- areas recognised as being sensitive to noise (e.g. noise important areas, noise management areas) and the ambient noise environment
- sources and pathways of potential pollution (e.g. land/water contamination)
- landscape amenity
- safety information associated with the existing Affected Road Network (ARN) (e.g. numbers of killed and seriously injured).

12.3.37 Information relating to the existing population baseline is included within the health baseline data gathering exercise. Health determinant baseline data predominantly features within the land use and accessibility baseline (see section 12.6 Baseline conditions).

#### Sensitivity of the study population

12.3.38 The sensitivity of the study population/s to changes in health determinants depends on the level of exposure and the vulnerability of the population to those changes.

12.3.39 The level of population exposure is defined by the size of the population exposed to an impact which is judged on a scale of high, medium and low, dependent on geographical area and number of people exposed. The vulnerability of the population is also judged on a scale of high, medium and low. Decisions on vulnerability are based on the baseline data collated for the study area. More vulnerable populations include those with higher levels of social deprivation or relatively poor health status (Table 12-5).

**Table 12-5 Guidelines for the assessment of population exposure and vulnerability**

Rating	Guidelines	
	Population exposure	Population vulnerability
High	A high level of exposure would occur over a wide geographical area and/or be likely to affect a large number of people (e.g. >500).	Affected population includes a higher than national average proportion of vulnerable or disadvantaged groups (such as children or older people) who are more likely to experience adverse health effects as a result of the impact in question.
Medium	A medium level of exposure would occur over a relatively localised area and/or be likely to affect a moderate-large number of people (e.g. 100-500).	Affected population includes an average or close to average proportion of vulnerable or disadvantaged groups who are more likely to experience adverse health effects as a result of the impact in question.
Low	A low level of exposure would occur over a small, local area and/or affect a small number of people (e.g. <100).	Affected population includes a below average proportion of vulnerable or disadvantaged groups who are more likely to experience adverse health effects as a result of the impact in question.

12.3.40 Population exposure and population vulnerability are combined to give an overall judgement on population sensitivity, on a scale of high, medium or low as show in Table 12-6.

**Table 12-6 Population sensitivity matrix**

Population exposure	Population vulnerability		
	High	Medium	Low
High	High	High	Medium
Medium	High	Medium	Low
Low	Medium	Low	Low
Negligible	Low	Low	Low

#### Literature review – linking health outcomes to health impacts

12.3.41 Using available literature, including previous health studies and recent research, an evidence base has been collated to identify links between the selected determinants and health impacts. Key reference material has included:

- government health policies, programmes and strategies
- previous health assessments for masterplans
- public health reports and research papers from a range of sources, including:
  - Public Health England
  - World Health Organisation (WHO)
  - National Institute for Health and Care Excellence (NICE)
  - Health Development Agency (HDA)

12.3.42 The literature review for each of the health determinants is included in Appendix 12.1 Health determinants evidence review which includes full details of reference material used.

#### Assessing human health effects

12.3.43 Changes to health determinants, as a result of the proposed scheme, in combination with the sensitivity of the population/community to these changes, may result in changes in health outcomes. DMRB LA 112 *Population and human health* does not provide guidance for the assignment of magnitude of change or significance, rather it sets out a requirement to provide a statement on whether the predicted health outcomes from changes in health determinants are likely to be positive, neutral, negative, or uncertain. These health outcomes are recorded as described in Table 12-7.

**Table 12-7 Human health outcome categories**

Human health category	Health outcome description
Positive	A beneficial health impact is identified
Neutral	No discerning health impact is identified
Negative	An adverse health impact is identified
Uncertain	Where uncertainty exists as to the overall health impact

## **12.4 Assessment assumptions and limitations**

12.4.1 This section sets out the assessment assumptions and limitations that has informed this Population and Health chapter. The assessment relies, in part, on data and information provided by third-parties (e.g. local councils and landowners), which are the most up to date records, available at the time of the assessment.

- 12.4.2 The assessment identifies and considers impacts at the stage they first materialise. For example, the permanent removal of built form or vegetation is assessed as part of the construction phase where works would be required to enable construction.
- 12.4.3 The assessment of impacts on the identified facilities/receptors has been carried out through the completion of a desk-based assessment and site verification exercise, taking into account the promoted use and function of the identified facilities/receptors in the study area (e.g. tourism and recreation assets).
- 12.4.4 Given that the majority of potential impacts are likely to be indirect (with receptors outside of the proposed scheme's DCO boundary), the assessment often focuses on indirect and amenity effects on the operation and accessibility of existing facilities during both construction and operation of the proposed scheme.
- 12.4.5 A review of development land and businesses has been informed by a desktop exercise to help identify receptors. The list may not be exhaustive.
- 12.4.6 Baseline agricultural holding data collection is currently ongoing, with every reasonable effort being made to discuss the potential effects of the proposed scheme on the agricultural land holdings affected. However, not all landowners or their agents have chosen to engage with this process.
- 12.4.7 Information on community facilities has been primarily obtained from desk-based research alongside site-based review.
- 12.4.8 Land ownership information has been collected using land registry data and is updated by the project team on an ongoing basis based on information gathered from site visits, landowner discussions and other information data gathering exercises. This PEI Report has utilised the information available at the time of this assessment.
- 12.4.9 Effects on property prices have not been considered as part of the assessment, given that they are not planning matters within the scope of considerations for the DCO application.
- 12.4.10 Socio-economic baseline data has largely been based on outputs from the 2011 Census [22], which despite being approximately ten years old at the time of this assessment, provides the most full and reliable dataset. Where more recent data is available, the appropriate references are provided.
- 12.4.11 The information contained within the PEI Report and other project documents has been used to characterise the study area and identify impacts on human health determinants.
- 12.4.12 The approach to the assessment of health impacts is generally qualitative, identifying likely positive and negative impacts based on the relationships between determinants and health outcomes identified within the literature reviewed.
- 12.4.13 Any reference to traffic flows and travel conditions relies on the outputs of the traffic model produced for the proposed scheme that are being updated and would be published within a Combined Modelling and Appraisal (ComMA) report to support the DCO application.
- 12.4.14 Literature and baseline data used in the study has been limited to readily available public and published sources.

12.4.15 The information contained within each of the chapters of the PEI Report and other project documents has been used to characterise the study area and identify impacts on health determinants.

## 12.5 Study area

12.5.1 This section assesses the context of the study area. DMRB LA 112 *Population and human health* sets out that:

- The study area shall be based on the construction footprint or project boundary (including compounds and temporary land take) plus a 500m area surrounding the project boundary.
- Where likely effects are identified outside of the 500m area surrounding the project boundary, the study area should be extended accordingly.
- Where effects are unlikely to occur within the 500m area surrounding the project boundary, the study area should be reduced accordingly.

12.5.2 The study area for each impact area has therefore been defined through consideration of the potential effects on key receptor groups as described above and the area over which an effect is likely to be experienced. This has been informed through both consideration of direct effects which would largely be limited to the extent of the proposed scheme (DCO boundary), and indirect effects which could be experienced over a wider area.

12.5.3 For the land use and accessibility receptors, the 500m study area has been applied and is considered appropriate for both direct and indirect effects. Specifically, in relation to WCH and the PRow network, whilst the baseline and assessment considers all PRow and recreational routes within 500m of the proposed scheme, the assessment focusses primarily on the potential direct effects where works would impact on the PRow network. Consideration is also given to potential indirect effects for those using the network in the areas surrounding the proposed scheme. These effects would be typically temporary following the implementation of mitigation measures which would negate any operational residual effects.

12.5.4 A more focussed assessment has also been undertaken when considering community land as effects relate to land take and direct impacts on these receptors only. This has therefore focussed on areas within the DCO boundary where land is required either permanently or temporarily in order to deliver the proposed scheme.

12.5.5 Figure 12.1 Population and Health Study Area shows the 500m extent of the study area and also includes a 250m extent for context. It also shows the DCO boundary as the area within which direct effects from the proposed scheme would be predicted to occur. Receptors outside of this area would be considered in the context of indirect effects only (e.g. effects from construction traffic and noise).

12.5.6 Where any part of an agricultural holding falls within the DCO boundary, the entire agricultural holding is part of the study area for impacts on this receptor as any effects would relate to the farm business as a whole.

12.5.7 Consideration of health effects is applied at a population level and therefore is based on data that is available at an appropriate scale. In this case, the most appropriate data is generally available at ward level. Where a scheme passes through several administrative areas, baseline data covers the population that lives within the wards through which the proposed scheme passes. Where data is

not available at local ward level, data from a different geographical scale is used. For example, in some cases data is only available at local authority or county level.

- 12.5.8 In relation to the quantification of air quality and noise effects, reference has been made to the air and noise assessments that have been prepared for the proposed scheme, which have used a 200m and 600m study area, respectively. However, the health assessment has used these results, together with an appreciation of the health status within the study area to make an assessment of population health with regards to these determinants.
- 12.5.9 In summary, the study areas considered for each of the impact areas that are taken into account within this chapter are summarised in Table 12-8. The wards considered within the human health assessment are shown on Figure 12.1 Population and Health Study Area.

**Table 12-8 Study areas**

Impact area	Study area for direct effects	Study areas for indirect or amenity effects
<b>Land use and accessibility</b>		
Private property and housing	Receptors located within the DCO boundary.	Receptors located within 500m of the DCO boundary.
Community land and assets	Receptors (assets and/or community land) located within the DCO boundary.	Receptors located within 500m of the DCO boundary.
Development land and businesses	Receptors located within the DCO boundary.	Receptors located within 500m of the DCO boundary.
Agricultural land holdings	All land which forms part of the affected receptor.	All land which forms part of the affected receptor.
Walkers, cyclists and horse riders (WCH)	The existing A358 and existing and proposed routes passing within the DCO boundary, both during construction and operation.	Existing and proposed routes located within 500m of the DCO boundary.
<b>Human health</b>		
Wards through which the proposed scheme passes (a ward is a local authority area, typically used for electoral purposes. The codes presented in the table are the national reference numbers)	<ul style="list-style-type: none"> <li>• West Monkton – E36005293.</li> <li>• Taunton Halcon – E36005284.</li> <li>• Taunton Blackbrook and Holway – E36005281.</li> <li>• Ruishton and Creech – E36005279.</li> <li>• North Curry and Stoke St Gregory – E36005277.</li> <li>• Neroche, Taunton Deane – E36005276.</li> <li>• Neroche, South Somerset – E36005253.</li> <li>• Islemoor – E36005248.</li> <li>• Ilminster – E36005247.</li> </ul>	<ul style="list-style-type: none"> <li>• West Monkton – E36005293.</li> <li>• Taunton Halcon – E36005284.</li> <li>• Taunton Blackbrook and Holway – E36005281.</li> <li>• Ruishton and Creech – E36005279.</li> <li>• North Curry and Stoke St Gregory – E36005277.</li> <li>• Neroche, Taunton Deane – E36005276.</li> <li>• Neroche, South Somerset – E36005253.</li> <li>• Islemoor – E36005248.</li> <li>• Ilminster – E36005247.</li> </ul>

## 12.6 Baseline conditions

### Current baseline

12.6.1 This section assesses the baseline conditions for the proposed scheme at the time of this PEI Report, reporting on the following elements:

- Land use and accessibility, including:
  - private property and housing
  - community land and assets
  - development land and businesses
  - agricultural land holdings
  - WCH (including all groups of non-motorised travellers)
- Human health, including:
  - health profiles of affected communities
  - health determinant status (e.g. noise or air pollution)

### Land use and accessibility

#### Private property and housing

12.6.2 In determining the sensitivity of private property and housing, DMRB LA 112 *Population and human health* utilises household projections as a key dataset, as well as considering existing housing/land allocated for housing.

12.6.3 The 2018-based household projects to 2041 for the local authority areas of Taunton Deane and South Somerset. In 2019, Taunton Deane local authority merged to become SWTC; however, the latest data for ONS household projections is from 2018 [19] (as presented in Table 12-9).

**Table 12-9 ONS Household Projections 2018-based to 2041**

Geography	2018	2041	Total Change	% Change
Taunton Deane	51,083	55,727	4,644	9.1
South Somerset	73,191	83,279	10,088	13.8
<b>Total</b>	<b>124,274</b>	<b>139,006</b>	<b>14,732</b>	<b>11.9</b>

12.6.4 This data shows a total percentage change in household growth in the region of 11.9%, which when considered against DMRB LA 112 *Population and human health* would get a medium sensitivity for private property and housing.

12.6.5 However, DMRB LA 112 *Population and human health* also includes consideration of existing housing and land allocated for housing. Given the largely rural nature of the study area and the communities within it, there are no allocated housing sites and therefore the growth identified above would occur in the wider local authority area, outside of the study area. This means that any housing growth within the study area would come forward on unallocated sites or via windfall sites through the planning process. This characteristic would lead to a low sensitivity. Despite this, it is considered that on balance a medium sensitivity should be applied to the private property and housing receptor group to account for the highest possible outcome that could occur, given the expected increase in household growth is at the higher end of the criteria bracket.

- 12.6.6 Outside the study area, there is a commitment to deliver Garden Town communities at Monkton Heathfield, Comeytrowe and Staplegrove and associated infrastructure at Taunton. Taunton would continue to be the focus of development as it has a comprehensive bus network and a rail station, and is home to major employers, education and health facilities and services. Wellington is also a sub-strategic town, expected to receive a share of new houses delivered over the next Local Plan period.
- 12.6.7 Data on private properties has been sourced from the Ordnance Survey Address Base Plus database. Those private properties and their land situated within the DCO boundary and most likely to experience 'direct' effects are listed in Appendix 12.2 Population and health preliminary impact assessment, Table 1-1. These are also shown on Figure 12.2 Private property within the study area. The properties within the DCO boundary are located between Henlade and Rapps.
- 12.6.8 Within the wider study area, there are further residential properties which may experience indirect or amenity effects due to their proximity. These have also been mapped on Figure 12.3 Community facilities within the study area and show that in general, properties are dispersed throughout the study area with concentrations in hamlets and villages including Henlade, Thornfalcon and West Hatch.
- 12.6.9 There are a total of 10 residential properties within the DCO boundary which are therefore more likely to experience direct effects from the proposed scheme. Properties within the wider study area, outside of the DCO boundary and as shown in Figure 12.3 Community Facilities within the study area are less likely to experience direct effects and more likely to experience indirect or amenity effects as a consequence of the construction and/or operation of the proposed scheme.

#### Community land and assets

#### **Communities**

- 12.6.10 When considering key communities, it is important to consider the region as well as the local area given the important connectivity function of the A358. The road forms part of highway connections to the larger settlements of Taunton to the north and Ilminster to the south.
- 12.6.11 Within SWTC and SSSDC local authority areas, the key trends are relevant:
- ONS Population estimates in 2019 state that Somerset West and Taunton had a population of 155,100, and South Somerset had a population of 168,300.
  - There is a significantly higher proportion of over 65s (37%) in Somerset West and Taunton compared to the UK (22.2%) and Somerset (31.9%) averages and a noticeable difference across the district with 29.3% of the former Taunton Dean population over 65, whilst 50.8% of the former West Somerset over 65.
  - In 2011, there were 353,000 cars or vans belonging to the county's population, up 44,300 (14.3%) from 2001.
  - The proportion of people reliant on a car to access work increased between 2001 and 2011.
  - Economic activity rates showed 88,500 usual residents aged between 16-64 in Somerset West and Taunton, of these 87.2% were economically active, and 95,700 usual residents aged between 16-64 in South Somerset, of these, 78.8% were economically active.

- The county's economic base revolved around human health and social work activities in Somerset West and Taunton and manufacturing in South Somerset.

12.6.12 The A358 serves low numbers of residential properties and businesses in a predominantly rural location. Relevant settlements in the local area include:

- Ilton
- Ashill
- Hatch Beauchamp
- Bickenhall
- Thornfalcon
- Ruishton
- Henlade

12.6.13 Settlements and facilities in the study area and area surrounding the proposed scheme are shown on Figure 12.3 Community facilities within the study area.

12.6.14 Taunton is the largest of the settlements in the area, situated at the north of the A358. This is the key settlement for the local area in terms of the services and facilities it provides. These include a nursery, primary school, and sports facilities.

### **Community land and assets**

12.6.15 Figure 12.3 Community facilities within the study area shows the community assets located within 500m of the proposed scheme and these are summarised in Appendix 12.2 Population and health preliminary impact assessment, Table 1-2. This also includes recreational assets. An appropriate allocation of sensitivity is provided.

12.6.16 Community land is shown on Figure 12.4 Community land within the study area. As shown in the figure, there is no Country Rights of Way (CRoW) Access Land or CRoW Common Land within the study area. Children's Wood/Riverside Park Local Nature Reserve (LNR) is partly within the study area at Taunton and Bickenhall Orchard LNR is partly within the study area at Bickenhall. Part of the treelined area of Hatch Beauchamp Registered Park and Garden is within the study area.

### **Development land and businesses**

12.6.17 Figure 12.3 Community facilities within the study area shows the development land and businesses located along the A358. These have been identified through desk-based work and are summarised in Appendix 12.2 Population and health preliminary impact assessment, Table 1-3.

12.6.18 This includes business and commercial premises, agricultural related businesses and tourism related businesses, such as holiday lets. Wider consideration of the effect on agricultural land holdings is presented separately in the following sections of the baseline.

12.6.19 Data has been presented where possible from publicly available sources or stakeholder engagement to help inform the sensitivity values, taking into account DMRB LA 112 *Population and human health*. Stakeholder engagement is ongoing, and this assessment would be updated and reported in the ES supporting the DCO application.

12.6.20 DMRB LA 112 *Population and human health* relates to employment sites and site area. In the majority of cases for this scheme, receptors and parts thereof which relate to the business/production of goods or services identified are less than 1 hectare (ha) in size. As such, they have been applied medium sensitivities as per DMRB LA 112 *Population and human health*. However, there are a number of receptors greater than 1ha and three receptors greater than 5ha, with an applied sensitivity of high and very high, respectively.

#### Agricultural land holdings

12.6.21 Effects on agricultural land and soils are presented within Chapter 9 Geology and soils, which presents Agricultural Land Classification (ALC) information and considers the effect of the proposed scheme on agricultural land and the soil resource. This chapter identifies known agricultural land holdings and outlines the use of these holdings within the study area.

12.6.22 Appendix 12.2 Population and health preliminary impact assessment, Table 1-4 and Figure 12.6 Agricultural land holdings within the study area outline the current understanding of main agricultural holdings within this study area.

12.6.23 Appendix 12.2 Population and health preliminary impact assessment Table 1-4 provides agricultural land holding reference numbers which should be used to identify the extent of farm holding boundaries when cross-referring to Figure 12.6 Agricultural land holdings within the study area. Where possible, the details of holdings have been obtained through Farm Impact Assessment meetings. At those holdings where it has not yet been possible to arrange interviews, information about agricultural holdings has been obtained through publicly available sources.

12.6.24 In order to inform the assessment of effects on agricultural holdings in accordance with DMRB LA 112 *Population and human health*, information in relation to the known use of the holding and the frequency of access to that use is provided in Appendix 12.2 Population and health preliminary impact assessment, Table 1-9. This includes information such as the need to access between parcels of land (e.g. pasture and grazing fields) and key agricultural infrastructure (e.g. milking parlour and sheering shed).

#### Walkers, cyclists and horse riders (WCH)

12.6.25 This section of the baseline considers all routes in the area surrounding the proposed scheme which have a legal status (e.g. PRow), are promoted for use by non-motorised travellers, or have been identified as such through consultation with stakeholder and local user groups. This section considers all groups of non-motorised users and is not restricted to walkers, cyclists and horse riders (e.g. also considers wheelchair users, and small wheeled transport such as scooters and skateboards).

12.6.26 PRow mapping data has been provided by SCC and has been taken to represent the definitive record of PRow in the study area. This reflects the definitive maps, which are a legal record of the public's rights of way in one of four categories (footpath, bridleway, restricted byway or byway open to all traffic).

12.6.27 The majority of PRow in the study area involve footpaths. The PRow that are potentially directly affected by the proposed scheme have been identified through examination of the definitive maps and site walkover work, complemented by stakeholder engagement. The proposed scheme would affect 24 footpaths.

- 12.6.28 Routes have been identified or checked through workshops and consultation events that have highlighted a number of routes used and valued by local people and user groups. The WCH stakeholder and local user groups has helped to collect and check evidence and discuss options.
- 12.6.29 A site walkover visit was undertaken to review each of the PRow identified as being potentially impacted by the proposed scheme. The results of the site walkover have helped complement stakeholder consultation work to inform an appraisal of the value of PRow and local routes and the proposed approach to assessment of those routes during construction and operation.
- 12.6.30 There are also other highways that WCH can use but that are not shown specifically on the definitive maps as PRow. DfT guidance identifies these as unclassified roads, which are local roads intended for local traffic. The vast majority (60%) of roads in the UK fall within this category. These roads are often shown and referred to as an 'other route with public access' (ORPA) on Ordnance Survey maps, indicating routes which carry public rights of some sort, but which are not recorded as PRow.
- 12.6.31 Figure 12.2 Private property within the study area shows PRow and local routes, and is summarised in Appendix 12.2 Population and health preliminary impact assessment, Table 1-5.

### **Human health – baseline**

- 12.6.32 The health baseline considers data on health indicators such as age, pre-existing health issues (including respiratory disease and COPD, deaths from respiratory diseases, percentage of the community with long-term illness or disability, general health, life expectancy and income deprivation. The baseline also sets out data related to relevant health determinants such as air quality and noise within the study area. Information relating to community, health and educational facilities is taken from the baseline developed for the land use and accessibility section of this chapter.
- 12.6.33 Data for each ward is presented in tables specific to each health parameter and health determinant and is summarised in text.
- 12.6.34 Certain health data are not available at ward level and yet are relevant in helping to inform a broad understanding of health which can be influenced by transport schemes; therefore, local authority level data is presented in these instances.
- 12.6.35 It should be noted that the health of individuals within the study area would vary considerably and cannot be inferred from the data presented in the baseline.

### Age

- 12.6.36 The age profile of the relevant areas, according to ONS mid-year population estimates, for mid-2017 [23] is shown in Table 12-10. When compared to the age profile of England, the wards included within the study area have a higher percentage of older individuals (65 years of age and older) and a lower percentage of the working age population (16-64 years of age). West Monkton had the highest percentage of individuals aged 0-15 years at 24.8%, whereas Neroche, South Somerset and Neroche, Taunton Deane had the highest percentage of individuals 65 years of age and older at 32.2% and 33.0%, respectively.

**Table 12-10 Age profiles for the total resident population (%), ONS for mid-2017**

Wards within the study area	Years of age			
	0-15	16-24	25-64	65 and older
West Monkton	24.8	7.7	52.9	15.3
Taunton Halcon	22.5	9.2	53.0	15.3
Taunton and Blackbrook and Holway	18.4	9.4	54.7	17.5
Ruishton and Creech	18.0	6.9	46.0	29.1
Neroche, Taunton Deane	13.5	6.1	47.4	33.0
North Curry and Stoke St Gregory	16.4	7.3	47.2	29.1
Neroche, South Somerset	14.4	6.6	46.8	32.2
Isle Moor	17.1	7.6	48.5	26.8
Ilminster	18.1	8.7	46.7	26.5
<b>Average of Wards</b>	<b>18.1</b>	<b>7.7</b>	<b>49.2</b>	<b>25.0</b>
<b>Average England</b>	<b>19.1</b>	<b>10.9</b>	<b>51.9</b>	<b>18.0</b>

### Deprivation

- 12.6.37 The English Index of Multiple Deprivation (IMD) 2015<sup>1</sup> measures relative levels of deprivation and is made up of seven 'domains' of deprivation (employment, health and disability, education, skills and training, crime, barriers to housing and services, and living environment). Table 12-11 sets out the average IMD score for each ward within the study area based on aggregated, population-weighted scores of lower super output areas (LSOA). The scores are used to rank areas according to their level of deprivation, with a larger score indicating a more deprived ward.
- 12.6.38 The study area (average of wards: 17.0) has a lower IMD score when compared to the score of England (21.8), suggesting it is less deprived. The IMD score is lowest in West Monkton (9.9) and Ruishton and Creech (9.9) suggesting that these wards are the least deprived. The IMD score is highest in Taunton Halcon (35.9) suggesting that this ward is the most deprived in the study area.
- 12.6.39 The Income deprivation domain measures the proportion of the population in an area experiencing deprivation relating to low income. The definition of low income includes both those that are out-of-work and those that have low earnings. Table 12-11 sets out the proportion of people experiencing income deprivation in the wards within the study area based on aggregated, population-weighted scores of Lower Super Output Areas (LSOA).
- 12.6.40 The study area (average: 10.7%) has a lower proportion of people experiencing income deprivation when compared to the proportion in England (14.6%), suggesting it is less income deprived. The proportion of people experiencing income deprivation is lowest in Neroche, Taunton Deane (6.2%) and Neroche, South Somerset (6.7%) and highest is in Taunton Halcon (24.5%) suggesting there is some variation in income deprivation across the study area wards.

<sup>1</sup> As aggregate data for wards was not available for the 2019 IMD, the 2015 IMD was used.

**Table 12-11 IMD score and income deprivation percentage (2015)**

Wards within the study area	IMD score	Income deprivation %
West Monkton	9.9	7.4
Taunton Halcon	35.6	24.5
Taunton and Blackbrook and Holway	19.9	15.0
Neroche, Taunton Deane	13.8	6.2
North Curry and Stoke St Gregory	15.0	7.3
Ruishton and Creech	10.2	6.9
Ilminster	14.2	11.2
Islemoor	21.8	10.8
Neroche, South Somerset	12.4	6.7
<i>Average of Wards</i>	17.0	10.7
<i>Average England</i>	21.8	14.6

#### Economic activity, inactivity and unemployment

12.6.41 The 2011 Census data shows that the percentage of economically active people (employed, self-employed, unemployed but actively seeking work, and full-time students) in the study area was 80.7% which is higher than the England and Wales level (76.8%) (Table 12-12 ). Unemployment and economic inactivity (retired, student, looking after home or family, long-term sick or disabled, other) in the study area was 3.9% and 19.3%, which is lower than the England and Wales level at 7.6% and 23.2%, respectively (see Table 12-12). Taunton Halcon had a highest level of unemployment at 8.2% which is higher than the level for England and Wales (7.6%).

**Table 12-12 Economic activity, inactivity and unemployment (%) (Census 2011)**

Wards within the study area	Economically active	Unemployed	Economically inactive
West Monkton	83.9	2.0	16.1
Taunton Halcon	77.1	8.2	22.9
Taunton and Blackbrook and Holway	81.2	4.5	18.8
Ruishton and Creech	80.6	3.2	19.4
Neroche, Taunton Deane	81.0	3.2	19.0
North Curry and Stoke St Gregory	81.3	3.5	18.7
Neroche, South Somerset	79.5	2.5	20.5
Islemoor	79.9	3.3	20.1
Ilminster	81.9	4.7	18.1
<i>Average of Wards</i>	80.7	3.9	19.3
<i>Average England and Wales</i>	76.8	7.6	23.2

#### General health - self reported

12.6.42 The 2011 Census [24] measured self-perceived general health of residents based on a five-point scale. The results specific to the wards included in the study area are portrayed in Table Table 12-13. The self-perceived general health of wards included within the study area have less people rating their health as bad or very bad (average: 3.1%) than the percentage in England (5.4%). Most residents

within the study area rated their health as good or very good however, this was highest in West Monkton and Neroche, Taunton Deane where 84.8% and 83.4% of residents rated their health as good or very good, respectively. Ruishton and Creech had the highest percentage of individuals rating their health as bad or very bad at 5.2% however, this is not significantly different from England (5.4%).

**Table 12-13 Self rated general health (%) (Census 2011)**

Wards within the study area	Very good	Good	Fair	Bad	Very bad
West Monkton	54.7	30.1	10.5	0.3	0.0
Taunton Halcon	43.4	36.5	14.3	0.5	0.0
Taunton Blackbrook and Holway	45.6	34.5	13.8	0.5	0.1
Neroche, Taunton Deane	49.6	33.8	12.1	3.7	0.8
North Curry and Stoke St Gregory	49.0	33.7	13.1	3.5	0.8
Ruishton and Creech	45.0	35.4	14.4	3.9	1.3
Ilminster	44.4	36.4	14.8	3.6	0.8
Islemoor	47.0	34.2	14.7	3.0	1.0
Neroche, South Somerset	45.1	35.8	14.8	3.7	0.6
<i>Average of Wards</i>	<i>47.1</i>	<i>34.5</i>	<i>13.6</i>	<i>2.5</i>	<i>0.6</i>
<i>Average England</i>	<i>47.2</i>	<i>34.2</i>	<i>13.1</i>	<i>4.2</i>	<i>1.2</i>

### Life expectancy

12.6.43 Public Health England data shows that the 2013-2017 average life expectancy at birth<sup>2</sup> is comparable across the wards included within the study area (average: males – 80.1 years, females – 84.0 years) and is slightly higher than the average life expectancy at birth for England (males – 79.5 years, females – 83.1 years) (as shown in Table 12-14). North Curry and Stroke St Gregory had the highest male average life expectancy at birth of all wards included in the study area at 83.3 years whereas Taunton Halcon had the lowest at 76.0 years. The highest female average life expectancy at birth was observed for Ruishton and Creech at 86.7 years, whereas Taunton Halcon had the lowest at 80.1 years.

**Table 12-14 Average life expectancy at birth (Public Health England 2013-2017)**

Wards within the study area	Males	Females
West Monkton	80.9	82.0
Taunton Halcon	76.0	80.1
Taunton and Blackbrook and Holway	81.5	84.7
Neroche, Taunton Deane	79.1	82.4
North Curry and Stoke St Gregory	83.3	85.7
Ruishton and Creech	81.6	86.7
Ilminster	81.5	86.2
Islemoor	83.1	83.6

<sup>2</sup> Public Health England. Fingertips – Average Life Expectancy at Birth. Available online at: [https://fingertips.phe.org.uk/profile/local-health/data#page/3/gid/1938133185/pat/201/par/E07000246/ati/8/are/E05008916/iid/93283/age/1/sex/2/cid/4/page-options/ovw-do-0\\_car-do-0](https://fingertips.phe.org.uk/profile/local-health/data#page/3/gid/1938133185/pat/201/par/E07000246/ati/8/are/E05008916/iid/93283/age/1/sex/2/cid/4/page-options/ovw-do-0_car-do-0)

Neroche, South Somerset	80.8	85.1
<i>Average of Wards</i>	<i>80.9</i>	<i>84.1</i>
<i>Average all England</i>	<i>79.5</i>	<i>83.1</i>

#### Long-term illness or disability

12.6.44 Data from the 2011 Census shows that the percentage of people who reported having a limiting long-term illness or disability in the study area (17.9%) was broadly in line with the percentage in England (17.6%) (as shown in Table 12-15). Of all the wards, Ruishton and Creech had the highest proportion of people reporting limiting long-term illness or disability at 20.3%, while West Monkton had the lowest at 14.4%.

**Table 12-15 Percentage of people who reported having a limiting long-term illness or disability (Census 2011)**

Wards within the study area	Percentage (%) of people who reported having a limiting long-term illness or disability
West Monkton	14.4
Taunton Halcon	18.4
Taunton and Blackbrook and Holway	17.9
Neroche, Taunton Deane	18.2
North Curry and Stoke St Gregory	17.1
Ruishton and Creech	20.3
Ilminster	18.2
Islemoor	18.1
Neroche, South Somerset	18.8
<i>Average of Wards</i>	<i>17.9</i>
<i>Average all England</i>	<i>17.6</i>

#### Respiratory disease and chronic obstructive pulmonary disease

12.6.45 Public Health England data from 2013-2017 shows that the standard mortality ratio (SMR) for deaths from respiratory diseases (for all ages) and standard admission ratio (SAR) for emergency hospital admissions for COPD is higher in wards located closer to the city of Taunton (Table 12-16). The SMR for deaths from respiratory diseases (all ages) was 121.1 per 100 and 100.7 per 100 in Taunton Halcon and Taunton Blackbrook and Holway, respectively. The SAR for emergency hospital admissions for COPD was 121.3 per 100 and 162.7 per 100 for Taunton Halcon and Taunton Blackbrook and Holway, respectively. These two wards had the highest standardised ratio of all wards included within the study area for these indicators.

**Table 12-16 SMR (per 100 people) for deaths from respiratory diseases (all ages) and SAR (per 100 people) for emergency hospital admissions for COPD (Public Health England 2013-2017)**

Wards within the study area	Deaths from respiratory diseases, all ages, SMR	Emergency hospital admissions for COPD, SAR
West Monkton	95.3	65.7
Taunton Halcon	121.1	121.3

Wards within the study area	Deaths from respiratory diseases, all ages, SMR	Emergency hospital admissions for COPD, SAR
Taunton and Blackbrook and Holway	100.7	162.7
Neroche, Taunton Deane	90.8	51.3
North Curry and Stoke St Gregory	59.9	61.9
Ruishton and Creech	60.7	61.9
Ilminster	60.8	83.5
Islemoor	90.1	59.2
Neroche, South Somerset	66.0	83.5
<i>Average of wards</i>	82.8	83.4
<i>England (SMR)</i>	100	100

### Vulnerable groups

12.6.46 The baseline profile suggests that there are numerous vulnerable groups within the study area which are considered to have high relevance to the proposed scheme. The vulnerable groups identified include, but are not limited to:

- age related groups (children/young people and older individuals)
- income related groups (people on low income/unemployed)
- people with poor health

12.6.47 Table 12-17 identifies the vulnerability of these groups as defined in Table 12-2 and would therefore be given close consideration within the assessment.

**Table 12-17 Population vulnerability within the study areas**

Wards within the study area	Children and young people	Older people (65+)	People on low incomes/unemployed	People with poor health
West Monkton	High	Medium	Low	Low
Taunton Halcon	High	Medium	High	Medium
Taunton and Blackbrook and Holway	Medium	Medium	Medium	Medium
Neroche, Taunton Deane	Low	High	Low	Medium
North Curry and Stoke St Gregory	Medium	High	Low	Medium
Ruishton and Creech	Medium	High	Low	High
Ilminster	Medium	High	Medium	Medium
Islemoor	Medium	High	Medium	Medium
Neroche, South Somerset	Low	High	Low	Medium

### Recreational and education facilities

12.6.48 Refer to the land use and accessibility baseline of this chapter for details.

### Green/open space

12.6.49 Refer to the land use and accessibility baseline of this chapter for details.

### Healthcare facilities

12.6.50 Refer to the land use and accessibility baseline of this chapter for details.

Public Rights of Way (including bridleways), cycle ways, non-designated public routes

12.6.51 Refer to the land use and accessibility baseline of this chapter for details.

Public transport routes

12.6.52 Data on public transport routes is being collected and would be included in the ES supporting the DCO application.

Air quality

12.6.53 Full baseline conditions related to air quality are found in Chapter 5 Air quality. There are currently three Air Quality Management Areas (AQMAs) within 200m of the ARN (study area for air quality assessment). These are:

- East Reach AQMA declared by SWTC
- Henlade AQMA declared by SWTC
- Yeovil AQMA declared by SSDC

12.6.54 East Reach AQMA and Henlade AQMA were both declared in 2003 for exceedances of the annual mean nitrogen dioxide (NO<sub>2</sub>). The East Reach AQMA is located approximately 2km west of the proposed scheme and the Henlade AQMA is located approximately 300m north.

12.6.55 The Yeovil AQMA was declared in 2002 for exceedances of the annual mean NO<sub>2</sub>. It is located approximately 17km east of the proposed scheme.

12.6.56 Public Health England data for 2018 shows that the fraction of mortality attributable to air pollution in Somerset was 4.2% in 2019 which is lower than the average fraction for England (5.2%) [6]. No data for SWTC was available.

Noise

12.6.57 Full baseline conditions related to noise are found in Chapter 11 Noise and vibration. Ambient noise environment conditions would be observed using baseline noise surveys when traffic flows are considered representative of the baseline conditions in the area.

12.6.58 There are eight Noise Important Areas (NIA) along the A358 as listed below:

- NIA Number 3497, Taunton, Somerset
- NIA Number 3498, Taunton, Somerset
- NIA Number 3499, Taunton, Somerset
- NIA Number 3500, Taunton, Somerset
- NIA Number 3501, Taunton, Somerset
- NIA Number 3502, Taunton, Somerset
- NIA Number 12939, Taunton, Somerset
- NIA Number 12940, Taunton, Somerset

12.6.59 Public Health England [7] data for 2018/19 shows that the rate of complaints (per 1,000 population) about noise is 2.1 in South Somerset and 2.2 in Somerset West and Taunton, both of which are lower than the rate in England (6.8).

Sources of potential pollution/contamination (based on historical and current land use)

12.6.60 As stated in Chapter 9 Geology and soils, the study area is a predominately rural setting; however, a number of potentially contaminative land uses have been identified including historical landfills, sewage works, commercial activities and fuel storage sites and evidence of made ground of unknown quality. If disturbed,

these could pose a threat to human health. The following potentially contaminated land sites have been identified:

- On-site (direct interaction with proposed alignment):
  - Former Thornfalcon Refuse Tip/Thornfalcon Tip - the proposed slip embankment to Ashe Farm Road passes through the landfill and a proposed farm access track.
  - GWR infilled cutting at Home Farm and West Hatch intersected by both the existing and proposed route.
  - Former inert Ashill bypass Site A Landfill, located directly on the proposed alignment and new link road.
- Off-site (within 250m of proposed centreline)
  - Near Dairy Farm landfill.
  - Texaco service station and motorhome dealer at Mattock's Tree Hill.
  - Foresters Garden Buildings north-west of West Hatch Lane, manufacturers of timber products.
  - Hatch Green Garage and PFS at Hatch Green.
  - Former Ashill petrol filling station, (Stewley Cross).
  - Former Butlers Fuel Depot, Kenny Lane, Ashill.
  - Ashill Sewage Treatment Works.
  - Land east of Bow Bridge and Saw Mills.
  - Shell petrol filling station, (Horton Cross).

12.6.61 Other areas of potentially contaminated land have also been identified within 250m from centre of the proposed scheme:

- depot at Greenway Lane
- farmyards (potential contamination sources include fuel tanks and slurry pits)
- builders' yard at Hatch Beauchamp
- former Horlick's site former dairy and cattle breeding centre
- presence of made ground associated with existing road construction and the immediate environment of the route corridor, infilled disused quarries and former gravel pits

12.6.62 Priority sites of potential land contamination which meet the Homes and Communities Agency (HCA) criteria of 'moderate' risk [23] are shown on Figure 9.7 Public Rights of Way Within the Study Area. These have been subject to a Tier 1 preliminary (qualitative) risk assessment (PRA) and are to be further investigated as part of the proposed ground investigation for the proposed scheme (refer to Chapter 9 Geology and soils).

#### Landscape amenity

12.6.63 Full baseline information relating to the landscape are set out in Chapter 7 Landscape. In summary, the proposed scheme passes through three National Character Areas (NCAs):

- NCA 140, Yeovil Scarplands [25], for approximately 1.8km at the southern end of the proposed scheme.
- NCA 143, Mid Somerset Hills [26], for the majority of the proposed scheme length.
- NCA 146, Vale of Taunton and Quantock Fringes [27], for approximately 1.6km at the northern end of the proposed scheme.

- 12.6.64 NCA 147, Blackdowns [28], is located outside of the proposed scheme's footprint, but lies within the study area, situated approximately 1.5km to the south-west at its nearest point.
- 12.6.65 Blackdown Hills Area of Outstanding Natural Beauty (AONB) lies predominantly within the Blackdowns NCA.
- 12.6.66 The landscape through which the proposed scheme passes is rural in nature with open views across the landscape and access into the landscape via numerous PRow.

#### Road safety

- 12.6.67 Road safety data was obtained from the Combined Modelling and Appraisal (ComMA) Report [29] published as part of the options selection stage, which is the most recent data available for the proposed scheme. An updated accident analysis based on 2015 to 2019 data would be undertaken shortly and would be reported in the preliminary design stage ComMA [29].
- 12.6.68 Personal Injury Accident (PIA) data for the 5-year period available (January 2010 to December 2014) showed that there was a total of 63 accidents on the A358 between M5 junction 25 and the A303 at Southfields roundabout, of which one was fatal and 20 were serious.
- 12.6.69 The A358 accident rate per billion vehicle-kilometres travelled for this period was 110, which compares to a national accident rate of 171, suggesting that the frequency of accidents is lower within this area.
- 12.6.70 Public Health England [8] data for 2016-2018 for the number of people reported killed or seriously injured (KSI) on roads (per 100,000 population) in South Somerset and Somerset West and Taunton was 33.3 and 32.8 (crude rate per 100,000), respectively, which is lower than the KSI in England on average (42.6).

## **12.7 Potential impacts**

- 12.7.1 This section provides an overview of potential impacts from the proposed scheme on the broad receptor groups identified within the methodology above and on human health outcomes, before any mitigation or enhancement has been incorporated.

### **Land use and accessibility**

#### Private property and housing

- 12.7.2 This includes potential impacts on residential property and land receptors as follows:
- Demolition of residential property
  - Loss of land associated with residential property
  - Loss of or impacts on land allocated for housing growth
  - Change in attribute such as noise environment or sense of tranquillity

#### Community land and assets

- 12.7.3 This includes potential impact on community assets, facilities and land which could include:
- Construction and operational effects on community facilities such as village halls, schools and religious premises.

- Construction and operational effects on tourism and recreational facilities within the vicinity of the proposed scheme, including direct effects on the receptor as well as indirect effects associated with any impacts on users of the receptors (e.g. amenity/perceived effects).
- Potential effects on other land (e.g. open space land) during construction and operation.

#### Development land and businesses

12.7.4 This includes potential impacts on commercial property and businesses, and land allocated for employment growth as follows:

- Construction and operational effects on commercial property and business receptors (including tourism businesses).
- Change in attributes of business receptors (e.g. accessibility).
- Loss of or impacts on land allocated or identified for employment/business growth.

#### Agricultural land holdings

12.7.5 The potential effects of the proposed scheme on agricultural land holdings all occur during the construction phase, and include the following:

- Temporary and permanent loss of agricultural land.
- Severance of land from agricultural infrastructure including increased accessibility issues resulting from the restructured local highway network.
- Demolition of agricultural infrastructure including buildings, tracks, irrigation mains.
- Disturbance of agricultural operations including noise, dust and increased difficulty accessing farmland due to construction traffic.

#### Walkers, cyclists and horse riders

12.7.6 This includes an assessment of potential impacts arising from the proposed scheme on WCHs as follows:

- Potential effects on WCHs during construction including severance of key routes, any diversions required and associated impacts in relation to journey length and amenity.
- Potential effects on WCHs during operation including any severance or diversions to key routes and the potential for enhancements to the WCH network due to new overbridges and underbridges. Consideration has also been given to journey length effects and amenity impacts.

### **Human health**

12.7.7 The assessment of human health considers how changes that result from the proposed scheme would affect health determinants during both construction and operation. Health determinants considered include:

- Healthcare services and other community facilities
- Transport and connectivity
- Access to open space and nature
- Air quality
- Noise environment
- Landscape and visual amenity

- Sources of pollution (pollution pathways)
- Access to employment and training

12.7.8 Changes to the health determinants and the likely health outcomes resulting from this are considered in more detail in the assessment section of this chapter.

12.7.9 Based on a consideration of the population vulnerabilities identified for each of the study wards, alongside an understanding of the likely population exposure (number of people affected) to each of the changes in health determinants, population sensitivity within each of the wards is assigned as set out in Table 12-18.

**Table 12-18 Population sensitivity within each ward per health determinant**

Health determinant	West Monkton	Taunton Halcon	Taunton and Blackbrook and	Neroche, Taunton Deane	North Curry and Stoke St Gregory	Ruishton and Creech	Ilminster	Isle Moor	Neroche, South Somerset
Healthcare services and other community facilities	Low	Low	Low	Medium	Low	Medium	Low	Low	Medium
Transport and connectivity	Low	Low	Low	Medium	Low	Medium	Low	Low	Medium
Access to open space and nature	Low	Low	Low	Low	Low	Low	Low	Low	Low
Air quality	Low	Low	Low	Medium	Low	Medium	Low	Low	Medium
Noise environment	Low	Low	Low	Medium	Low	Medium	Low	Low	Medium
Landscape and visual amenity	Low	Low	Low	Low	Low	Low	Low	Low	Low
Sources of pollution (pollution pathways)	Low	Low	Low	Medium	Low	Medium	Low	Low	Medium
Access to employment and training	Low	Low	Low	Low	Low	Low	Low	Low	Low

## 12.8 Design, mitigation and enhancement measures

### Construction mitigation

12.8.1 This section outlines the design and enhancement measures implemented during construction and operation, as well as any planned enhancements. Mitigation measures incorporated in the design and construction of the proposed scheme are reported as embedded mitigation in Chapter 2 The Project. Prior to the implementation of mitigation, the proposed scheme has the potential to affect population and health during construction and operation, both beneficially and adversely.

12.8.2 An Environmental Management Plan (EMP) that would be submitted as part of the ES and in support of the DCO application would provide a list of outline mitigation measures to be implemented during the construction stage.

- 12.8.3 Where access is affected to private properties and businesses, temporary alternative access will be provided safely and as appropriate.
- 12.8.4 Where the construction works would affect access to existing tourism receptors, temporary alternative access arrangements would be provided in agreement with the receptor.
- 12.8.5 Necessary access arrangements during construction will be detailed in a Construction Traffic Management Plan (CTMP), in addition to details of stopped up road and new access provided.
- 12.8.6 Agricultural land required temporarily during construction would be returned to its original use and condition. Further details on the restoration of agricultural land are provided in Chapter 9 Geology and soils. The use of agricultural land would be minimised through the rationalisation of construction sites, including the use of balancing ponds and mitigation planting and to place construction works/compounds in the least sensitive locations.
- 12.8.7 Severance during construction would be reduced through the appropriate construction of agricultural crossings, access tracks and replacement field entrances, where needed. The siting of such mitigation measures would be informed through consultation with affected landowners where possible.
- 12.8.8 Potential indirect amenity and agricultural holding impacts relating to noise, dust, the movement of construction vehicles and general construction works would be mitigated through considerate construction management including the use of screening (temporary or permanent), which would be outlined in further detail in the EMP. The EMP preparation and delivery during construction would involve the local community through the appointed Public or Agricultural Liaison Officer.
- 12.8.9 Once finalised the EMP would include the details provided in the PRoW Management Plan would to be submitted with the ES which presents the approach to managing the interactions of the proposed scheme with the PRoWs during both the construction and operational phases of the proposed scheme.
- 12.8.10 A planned approach would be taken to the management of PRoW during the construction and operation of the proposed scheme, ensuring public safety while reducing disruption to users. This includes managing closures where possible (e.g. managed crossing and/or early re-provision) retaining rights of way as per current routes and seeking to reduce the effects on users. This would include:
- Use of signage where PRoW can remain open, but users need to be warned of the presence of construction vehicles (local management).
  - Implementation of short, temporary closures where local works might affect safety of users (local closures).
  - Closure of/extinguishment of a PRoW following the early implementation of an alternative/new route (e.g. via a new overbridge/underbridge) (early re-provision).
  - Avoid closure of/extinguishment of a PRoW without re-provision (e.g. where works sequencing would not provide a new crossing in advance on the carriageway works) and/or permanent extinguishment of a PRoW (full closure).
  - Provision of new crossings/routes as part of the proposed scheme (new routes).

- 12.8.11 It is also assumed that during construction, Highways England or its contractor would provide a Public Liaison Officer and/or operate a Community Relations team with contact details to be provided on relevant signage located along the PRow network (for example, giving notice of temporary closures/diversions). Concerns around condition can therefore be flagged through this procedure and Highways England would explore any short-term reinstatement work where necessary. Any concerns raised would be shared with the relevant Council PRow Officers for discussion when appropriate.
- 12.8.12 Best practice construction methods would also seek to reduce if not avoid indirect temporary effects on users of WCH routes, for example with dust suppression methods of construction.
- 12.8.13 Given that many of the effects on the PRow network relate to the proposed scheme severing sections of the network, Highways England propose to implement early re-provision of PRow as part of the early construction phase of the project, or diverted along new Private Means of Access as a temporary alternative.

### **Operational mitigation**

- 12.8.14 Landscape mitigation measures are detailed within the landscape and visual effects chapter of the Chapter 7 Landscape. Such measures consist of landscape planting, principally designed with the intention of mitigating negative effects and benefiting nature conservation and biodiversity, landscape integration and visual amenity.
- 12.8.15 The need for additional signage beyond typical highway signage, for example to tourism assets, would be discussed with Highways England and the relevant local authority as the design process continues.
- 12.8.16 Once finalised, the EMP would incorporate the Public Rights of Way Management Plan (submitted as part of the ES) which sets out the operation mitigation for walkers, cyclists and horse riders and other users of PRow/highway with public access. The PRow Management Plan supports the potential health benefits related to improved air quality and the potential for enhanced active travel and recreational opportunities. Once operational, the proposed scheme would also offer improved highway safety.

### **Enhancement**

- 12.8.17 There are opportunities to enhance the options for local communities to access open spaces and to utilise well designed and integrated active travel options such as providing cycle paths that connect existing residential areas to each other.

## **12.9 Assessment of likely significant effects**

- 12.9.1 This section presents the assessment of likely significant effects on population and health resulting from the construction and operation of the proposed scheme. The assessment of effects takes into account the potential impacts to each receptor following the implementation of embedded and essential mitigation measures to determine the significance of the residual effects.

## Effects on private property and housing during construction

- 12.9.2 The assessment of effects on private property and housing considers the potential effects on residential properties within the vicinity of the proposed scheme, as well potential effects on residential development land. As described in the baseline, 10 residential properties are located within the DCO boundary of the proposed scheme.
- 12.9.3 The potential direct effects on residential properties during construction are shown in Table 12-19 which considers the potential effects, magnitude of this effect and subsequent significance.

**Table 12-19 Effects on residential properties – construction**

Receptor	Sensitivity	Potential effect(s)	Magnitude	Significance
Henlade Farm House, Stoke Road, Henlade	Medium	Direct acquisition and demolition	Major	Large adverse (not considered to be moderate because of total demolition)
Meadow View, Stoke Road, Henlade	Medium	Direct acquisition and demolition	Major	Large adverse (not considered to be moderate because of total demolition)
Bath Cottage, West Hatch, Taunton, TA3 5RH	Medium	Direct acquisition and demolition	Major	Large adverse (not considered to be moderate because of total demolition)
Keirles, Thornfalcon, TA3 5NG	Medium	Partial removal of land as a result of the construction of the proposed scheme compromising the viability of the property and introducing severance.	Moderate	Moderate adverse
Ash Cross Cottage, Ash Road, Thornfalcon, TA3 5NW	Medium	Introduction of severe severance with limited accessibility provision.	Moderate	Moderate adverse
Little Ashe, Ash Road, Thornfalcon, TA3 5NW	Medium	Introduction of severe severance with limited accessibility provision.	Moderate	Moderate adverse
Chase Cottage, West Hatch, TA3 5RG	Medium	Introduction of severance with limited accessibility provision.	Moderate	Moderate adverse
Land Plat, Stewley, Ashill, TA19 9NJ	Medium	A discernible change in environmental attributes and quality.	Minor	Slight adverse
April Cottage, Rapps, Ilminster, TA19 9LQ	Medium	A discernible change in environmental attributes and quality and introduction of severance with limited accessibility provision during construction.	Moderate	Moderate adverse

12.9.4 There are three demolitions required to private property, which are considered to be permanent effects. Where no demolition or land take is proposed, effects on private property and housing during construction would be temporary for the duration of the construction phase, with appropriate mitigation and management to be put in place through the CTMP and EMP.

### Effects on private property during operation

12.9.5 The potential effects on private property and housing during operation are shown in Table 12-20 which considers the potential effects, magnitude of this effect and subsequent significance.

**Table 12-20 Effects on residential properties – operation**

Receptor	Sensitivity	Potential effects(s)	Magnitude	Significance
Keirles, Thornfalcon, TA3 5NG	Medium	Introduction of severe severance which compromises overall viability of property.	Moderate	Moderate adverse
Ash Cross Cottage, Ash Road, Thornfalcon, TA3 5NW	Medium	Introduction of severe severance which compromises overall viability of property.	Moderate	Moderate adverse
Little Ashe, Ash Road, Thornfalcon, TA3 5NW	Medium	Introduction of severe severance which compromises overall viability of property.	Moderate	Moderate adverse
Chase Cottage, West Hatch, TA3 5RG	Medium	A discernible change in environmental attributes and quality but does not compromise overall viability of property.	Minor	Slight adverse
Land Plat, Stewley, Ashill, TA19 9NJ	Medium	A discernible change in attributes and environmental quality but does not compromise overall viability of property.	Minor	Slight adverse
April Cottage, Rapps, Ilminster, TA19 9LQ	Medium	Partial damage to the property's features including substantial amendment to access.	Moderate	Moderate adverse

### Community land and assets

12.9.6 This section of the assessment considers effects on the communities in the study area with a focus on assets, facilities and land.

12.9.7 For the purpose of this assessment, this section considers communities in relation to community land and assets rather than private property and housing, which is considered above. As such, likely effects on communities as a whole (local population) and then community assets/facilities and land are considered

12.9.8 Tourism and recreational facilities are also considered within this section of the assessment, recognising their multi functioning role in serving the local community as well as visitors to the area.

## Communities

- 12.9.9 There are a number of settlements on and along the proposed scheme, which rely on the A358 for direct access. Planned works are to be undertaken both on-line on the existing A358 route and off-line within the wider area. It is recognised that on-line planned works may result in direct demolition or land acquisition, while off-line may result in a combination of construction effects which could lead to potential effects on access to facilities or services (e.g. footpath closures, increased construction traffic on the road network).
- 12.9.10 During construction, it is acknowledged that some individual properties could be adversely affected by noise and vibration (see Chapter 11 Noise and vibration). In addition, the character of the main settlements located along/adjacent to the A358 such as Henlade and West Hatch could be affected by construction activities including the presence of compounds, earthworks and machinery. Noise effects would be temporary and at their worst in close proximity to the proposed scheme.
- 12.9.11 Traffic management would help to prevent impacts on these communities by restricting construction traffic to certain routes and nuisance can generally be limited through considerate construction management including the use of screening (temporary or permanent), which would be outlined in further detail in the EMP.
- 12.9.12 Mitigation has been put in place but given the location of the communities near to the construction of the proposed scheme, it is assessed that the proposed scheme would lead to six significant effects on communities during construction, largely as a result of the introduction of severance as summarised in Appendix 12.2 Population and health preliminary impact assessment, Table 1-6.
- 12.9.13 Given the geographic location of the proposed scheme and the type/volume of construction skills required, it is anticipated that a proportion of the construction workforce would be brought into the area and therefore made up of workers travelling from outside the area and staying locally. This brings both potential beneficial and negative impacts for the local economy and the accommodation sector with the presence of non-local staff within the workforce leading to demand for accommodation within the study area. The settlements near to the proposed scheme have a good supply of serviced and non-serviced accommodation and would likely be able to accommodate the workforce demand. This could bring beneficial effects to the local accommodation sector during the construction programme, bringing additional trade at their quietest times of the year.
- 12.9.14 During the peak tourist season, when occupancy rates are generally higher, the additional requirements for long-term accommodation could place increased pressure on providers. This may require workers to access accommodation in the wider region and travel to site. However, this is not expected to result in any significant effect on communities and could lead to minor beneficial effects in terms of accommodation/occupancy and associated spend in local communities for goods and services.

## Community land and assets during construction

- 12.9.15 Highways England has sought to avoid direct effects on communities, community land and assets through scheme design and no direct effects are anticipated in terms of demolition in relation to community assets.

- 12.9.16 Potential effects on community assets during construction of the proposed scheme are explored further in Appendix 12.2 Population and health preliminary impact assessment, Table 1-6.
- 12.9.17 In attributing a magnitude value to receptors, the assessment has drawn on proximity to the proposed scheme and therefore the potential effects of construction in terms of general accessibility (e.g. effects of traffic management) and wider potential indirect effects from construction activities.
- 12.9.18 The proposed scheme includes changes to access provision at Ivy House Social Club, Somerset Progressive School, Huish Woods Scout Campsite, Ashill Village Hall, Ashill Primary School and West Hatch Village Hall. Whilst it is not considered that these requirements would compromise overall viability or use of the facilities, it is considered that the proposed scheme would lead to a discernible change in attributes of moderate magnitude. When considered against the receptors' medium and high sensitivity, the moderate magnitude leads to potential moderate and large adverse effect, which would be significant, although temporary for the duration of the works, as set out in Appendix 12.2 Population and health preliminary impact assessment, Table 1-6. The CTMP would ensure access is available to the facility during construction of the proposed scheme.
- 12.9.19 The remainder of effects on all other community receptors are indirect and relate to potential effects associated with more general construction effects. This include noise and dust effects of the construction works, noise and vibration effects for HGV movements, and visual impacts. A CTMP would identify the key areas where the works impact on the existing A358 traffic flow and key receptors, with solutions to phase the construction works in such a way as to reduce the disruption and impact on the travelling public, as well as access to key services and facilities. With good design which ensures ongoing access to facilities, and with mitigation measures defined within the EMP and CTMP, it is not anticipated that construction would lead to any significant effects on the identified community assets.

#### Community land and assets during operation

- 12.9.20 During operation of the proposed scheme, it is anticipated that there would be an overall reduction in the number of vehicles passing through communities within the areas surrounding the A358. Improved alignment is also likely to reduce the number of accidents. This primarily relates to the proposed scheme addressing the mixed road typology and the high traffic flows on many sections of the route which experience traffic demand above that for which it was designed. As such, reduced delays, fewer accidents and improved journey time reliability as a result of the proposed scheme are likely to contribute positively to the safety of communities, and their accessibility to facilities and services during operation, with overbridges provided as part of the proposed A358 in order to facilitate greater connectivity across the proposed scheme. This is considered to lead to a slight beneficial effect in terms of accessibility for local communities along the proposed scheme.
- 12.9.21 There would be limited employment benefit as result of the proposed scheme during its operation, beyond typical maintenance arrangements. However, benefits of the proposed scheme could continue to be experienced by the local labour force as result of skills and training learned from working on or as part of the supply chain servicing the proposed scheme's construction.

- 12.9.22 Highways England and its contractor would discuss initiatives where legacy benefits could be realised and achieved, for example with targeted recruitment and training as well as apprenticeships utilising partnership arrangements with local educational institutions. As a result, assuming that there would be local construction worker and training benefits, as well as supply chain service benefits (with associated multiplier effects) there could be slight beneficial impacts within the local and regional economy during operation of the proposed scheme.
- 12.9.23 None of the identified community assets would be directly affected during operation of the proposed scheme with impacts associated with demolition or land take having occurred during the construction stage.
- 12.9.24 During operation, the proposed scheme is anticipated to lead to improvements in travel conditions. This would be particularly beneficial at peak times during summer months when there is typically 30% growth in additional traffic along the A303 corridor, which could help remove a perceived barrier to accessibility, with associated benefits in terms of access to community facilities in the study area. Overall, the proposed scheme could therefore lead to slight beneficial effects on the identified receptors in terms of accessibility.

### **Open space – construction**

- 12.9.25 The three open spaces within the study area have a high sensitivity given their frequent use and access to majority of the community. However, given the substantial distance between the DCO boundary and the open spaces, which are all only partially within the 500m buffer, the magnitude of impact is considered to be negligible as a result of a very minor detrimental alteration to the characteristics of the open space. It is therefore assessed that there is a neutral/slight adverse construction significance given the discernible change in environmental quality expected in close proximity to the open spaces.

### **Open space – operation**

- 12.9.26 None of the open space assets would be directly affected during operation of the proposed scheme with impacts associated with the changes to environmental quality having occurred during the construction stage.

### **Development land and businesses**

- 12.9.27 The consideration of effects on development land and businesses focusses on businesses at risk (including severance) or from which land would be required to facilitate construction and/or operation of the proposed scheme. It also considers potential effects (e.g. sterilisation) of land allocated for development or subject to a planning application, within the study area.

#### Development land and businesses during construction

- 12.9.28 The design of the proposed scheme has, where possible, avoided direct impacts on development land and businesses and appropriate embedded mitigation has been developed in order to mitigate potential effects where possible (e.g. early reprovision of access to ensure accessibility during construction).
- 12.9.29 Access arrangements would be maintained during construction to all identified commercial property and businesses. Through scheme design, appropriate access would continue to be provided. Where concerns have been raised by landowners and tenants about the proposed scheme and its potential effects on

business viability, landowner engagement has helped inform design with appropriate mitigation measures agreed and incorporated as part of the proposed scheme. Where such mitigation has been provided, a summary is given in Appendix 12.2 Population and health preliminary impact assessment, Table 1-8.

- 12.9.30 The proposed scheme therefore only has the potential to lead to significant effects on those businesses that are lost (in part or in full). For other businesses and commercial property during construction there could be short-term impacts as a result of disruption and diversions for access.
- 12.9.31 Best practice construction techniques would be used to help reduce and avoid where practicable any likely adverse impacts. Details would be provided within the EMP and CTMP when submitted as part of the DCO application.
- 12.9.32 As part of the proposed scheme's construction, there would no direct effects association with demolition to development land and businesses.
- 12.9.33 There is some partial removal to access and acquisition of land at the Nags Head Tavern, likely to compromise the viability of the business giving it a moderate magnitude of impact. Combined with its medium sensitivity, this leads to moderate adverse construction effects.
- 12.9.34 Severance and disruption to access due to local roads being stopped up is likely to affect Orchard Poultry (Livestock breeder), Jordan's Estate Glamping (camp site), Blackdown Shepherds Huts (manufacturing), JM Glass Ltd (Glass Studio) and the Ginger Bread House (B&B), resulting in a moderate magnitude of impact. When combined with their medium sensitivity, this would also lead to moderate adverse construction effects.
- 12.9.35 Despite only a discernible change in attributes and environmental quality during construction activities resulting in a minor magnitude of impact, the very high sensitivity of strategic employment land allocations at Southfield roundabout (allocations ME/ILM/3, ME/ILM/4, and ME/ILMI/5 for mixed business uses) and Nexus 25 roundabout at Junction 25 of the M5 motorway (mixed employment uses including research and development and creating more than 3,500 jobs), result in moderate adverse construction effects.
- 12.9.36 With appropriate mitigation, the construction of the proposed scheme is not anticipated to bring any further significant adverse effects on business receptors. It would be important for the CTMP when developed to ensure that access is maintained.

#### Development land and businesses during operation

- 12.9.37 During the operation of the proposed scheme and its access arrangements, it is not considered that development land and businesses identified within the study area would experience significant adverse effects, given that access would be maintained to all receptors.
- 12.9.38 Overall, the proposed scheme is envisaged to improve journey time reliability and safety, which would serve to improve traffic conditions in the local area. These improvements would not only overcome current problems experienced along the A358, but would also help to accommodate a forecast growth in traffic. The proposed scheme corridor is subject to the pressures brought about through traffic growth, something which is forecast to increase as local authorities along the length of the proposed scheme seek to deliver on their employment allocation,

especially as the economic outlook improves. The proposed scheme seeks to support economic growth, particularly by facilitating growth in employment and key locations and centres along the A303, A358 and A30 corridor and to the South-West region. The Nexus 25 development has stated that a high-quality route on the SRN, providing smooth flows of traffic, efficiency and connections to London and the South-East is a key factor in contributing to the success of the business. As such, some beneficial effects are likely to be experienced by businesses that rely upon access to the highway network and/or benefit from people travelling through the area. The operation of the proposed scheme is therefore considered to lead to a minor beneficial change for business receptors, which are of medium sensitivity. This would lead to a slight beneficial effect, which would not be significant.

### **Agricultural land holdings**

#### Agricultural land holdings during construction

- 12.9.39 This section of the assessment considers the potential effects of the proposed scheme on agricultural holdings through land take, demolition or severance/accessibility restrictions. In line with DMRB LA 112 *Population and human health* the assessment is focused on the loss of or damage to key characteristics, features or elements of the agricultural holding and potential effect of this change on viability.
- 12.9.40 In terms of the area of land required from each holding, assessment of temporary effects assumes that all agricultural land within the study area would be unavailable to agricultural land holdings during the construction period. The assessment of permanent construction effects has been based on the footprint of the highway, junctions, embankments and cuttings only.
- 12.9.41 The proposed scheme would affect 37 agricultural land holdings temporarily during construction. Following the restoration of agricultural land, 31 holdings would continue to be affected permanently.
- 12.9.42 In terms of temporary construction effects, 23 agricultural land holdings would experience very large, large or moderate temporary adverse effects which are considered significant. The majority of these are related to the proportion of agricultural land required.
- 12.9.43 17 agricultural land holdings would experience a large or moderate permanent adverse effects which are considered significant. The majority of these are related to the proportion of agricultural land required, although severance effects are also relevant.
- 12.9.44 Further detail on the assessment of temporary and permanent construction effects is presented in Table 1-9 of Appendix 12.2 Population and health preliminary impact assessment.

#### Agricultural land holdings during operation

- 12.9.45 As the permanent removal of land from agricultural use and severance would occur during the construction phase of the proposed scheme, it is not considered that any further effects would occur during operation of the proposed scheme.

## Walkers, cyclists and horse riders

### General approach to assessment of WCH

- 12.9.46 The assessment of effects on WCH considers direct effects on the routes where they are crossed by the proposed scheme and/or affected during construction (e.g. used in full or in part as construction accesses or crossed by construction routes).
- 12.9.47 The assessment also considers indirect amenity effects on users of routes within an area up to 500m from the DCO boundary, but with a focus on routes where they run parallel to the proposed scheme or construction works. When considering indirect amenity effects, the assessment has been completed in the context of the current baseline.
- 12.9.48 As explained as part of the baseline, the proposed scheme also has the potential to affect unclassified roads or ORPAs that interface with the proposed scheme. Those that are affected by works are also shown on Figure 12.2 Private property within the study area.
- 12.9.49 Figure 12-7 Public Rights of Way within the study area shows proposed stopping up, diversions and new routes for WCH and other users of highways and local routes with public access rights.
- 12.9.50 The proposed scheme includes a number of elements that either ensure continued access for WCH or bring improvements in terms of current accessibility and severance as follows:
- Approximately 1.5km of new footpath linking T26/4 at Nexus 25 roundabout to T22/5 to the west of the proposed scheme. The new stretch of pathway provides walkers with enhanced visitor experience by providing long distance views south onto Blackdown Hills.
  - Stoke Road (Henlade) overbridge would significantly reduce severance between communities in Henlade. It also provides safe and direct access for the existing popular cycling route between Haydon and Stoke St Mary to the south of the proposed scheme to Ruishton to the north.
  - Approximately 5km of proposed cycle route linking into the traffic-free cycle route on the existing A358 to the north of the proposed scheme, south of Nexus 25 roundabout and connecting to the existing signed cycle route at West Hatch Lane.
  - Proposed bridleway to connect Greenway Lane and Ash Road, and through Mattock's Tree Green junction roundabout. The access tracks would include provision for WCHs, helping connect into existing sections of footpaths and cycleways to improve connectivity for WCH.
  - New Griffin Lane underbridge providing a route across the proposed scheme for the East Dean Way and Taunton Cycle Trail. This would enhance the visitor experience of this important long-distance route, bringing a significant improvement on the existing situation.
  - Approximately 7km of proposed cycle route originating in Hatch Beauchamp and ending at Lower Horton. The cycle route would cross over the proposed scheme at Capland, then continue south along the west side of the proposed scheme. The proposal would also link popular cycle routes on Wood Road in Wood and Broadway Road leading to Broadway Pound. The cycle route would travel through Ashill, and eventually end in Lower Horton where it connects

with existing cycle routes. The route provides safe routes for both recreational and commuter journeys.

- New sections of bridleways and footways would connect into existing routes to help enhance connectivity east-west and north-south.

12.9.51 Permanent closures without substitute are only proposed in the following circumstances:

- Where the value of the route is not sufficient to justify the re-provision or diversion as part of the proposed scheme (for example a short length of PRow at its terminus).
- Where the proposed scheme and the mitigation proposals divert a route, rendering part of the current route no longer accessible.

12.9.52 All potential diversions and proposed new routes would also be shown on the ProW plans supporting the DCO application, when submitted. That would provide the necessary powers to stop up PRowS and implement diversions and new routes as necessary.

12.9.53 In order to provide mitigation and enhancement as part of the proposed scheme, a number of new routes, reclassification of PRow or new access rights are proposed. These new proposals are detailed in Table 12-21.

12.9.54 Further detail on the assessment of potential effects on WCH is provided in Appendix 12.2 Population and health preliminary impact assessment, Table 1-9. This identified one large adverse effect where a bridleway is to be stopped up and where the user would be subject to longer journey times, and seven moderate adverse effects where footpaths are stopped up and the user is subject to longer journeys, but where journey safety and quality is improved as the user no longer have to cross the A358. The assessment also identifies moderate benefits effects where, although journeys are subject to a diversion, the new journey provides a safer and better quality environment for users.

**Table 12-21 Changes to PRow as a result of the proposed scheme**

Proposal	Description
Proposed new footpath	New footpath between Nexus 25 roundabout and Henlade with views south to Blackdown Hills.
Proposed new cycle way	New cycleway between Nexus 25 roundabout to West Hatch Lane.
Proposed new footpath	New footpath between existing PRow T 26/4 at Nexus 25 roundabout and existing PRow T22/5.
Proposed new footpath	New section of footway to connect Gravelands Lane to Thorn Lane
Proposed shared use bridleway	New shared use path through Mattock's Tree Green junction and connecting to existing walking and cycling routes.
Proposed new bridleway	Existing A358 road proposed to be retained as a bridleway at Mattock's Tree Green junction.
Proposed new bridleway	New bridleway to provide connection between Greenway Lane to Ash Road.
Proposed new bridleway	Existing road at Ash Cross proposed to be retained as a bridleway.
Enhancement to route	Griffin Lane underbridge providing signed cycle route on the East Deane Way.
Proposed new footpath	New Fivehead River underbridge to accommodate walkers and diversion of footpath through new underbridge.

Proposal	Description
Proposed new bridleway	Proposed new bridleway to connect Village Road and Capland Lane, and existing A358 road to be retained as bridleway.
Proposed new footpath	Footpath diversion through grade separated junction at Ashill.
Proposed new bridleway	New bridleway through the proposed Ding Bridge underpass.
Proposed new footpath	Footpath diversion through new Sunnyside underpass.
Proposed new footway	New footway over Bickenhall overbridge

#### Walkers, cyclists and horse riders during construction

12.9.55 The following routes would experience effects during construction as they interact with the proposed works:

- East Deane Way (promoted long distance footpath)
- 30 footpaths across the proposed scheme
- nine bridleways across the proposed scheme

12.9.56 Construction effects are likely given the linear nature of the proposed scheme and the construction activities required. For example, noise, dust and temporary diversions could have an impact on users of the existing routes. It is intended to keep the majority of the PRowWs open via local management, early re-provision and/or use of short-term and temporary closures.

12.9.57 It has been assumed that pre-commencement condition surveys/inspections would be undertaken on any PRowW to be used by construction vehicles. Regular inspections on any installed temporary diversions or alternative routes would also be undertaken with any short-term damage repaired where necessary.

12.9.58 It is therefore anticipated that with the implementation of management and appropriate mitigation there would be slight adverse effects on the majority of WCHs during construction of the proposed scheme, which would not be significant.

12.9.59 For those PRowW in the wider study area that do not directly interact with the proposed scheme, there would typically be no or negligible change during construction, leading to neutral effects, which would not be significant.

#### Walkers, cyclists and horse riders during operation

12.9.60 The proposed scheme includes numerous proposals that seek to improve accessibility and connectivity across the PRowW network within the study area. In summary this includes:

- five sections of proposed new footpath
- six sections of proposed new bridleway
- instances of repurposing existing road for walkers and cyclists
- instances where access rights are proposed to provide greater connectivity between the existing PRowW

12.9.61 All new structures proposed, as described in detail in Chapter 2 The Project would carry public access rights and/or PRowW, providing a key element of mitigation in order to reduce severance for WCH across the study area.

12.9.62 For the purposes of this assessment, the following assumptions have been made in relation to mitigation, management and re-provision:

- Surfaces would be restored/be as per existing post construction. Suitable surfaces for different types and classification of routes would be provided, taking into account relevant guidance, for example from the British Horse Society. For multipurpose routes (e.g. routes providing private means of access and a footpath, bridleway or restricted byway), details of surfaces and access restrictions features (e.g. demountable bollards) would be agreed with the landowner and/or third party responsible for maintenance and/or use of that surface and/or route at the detailed design stage. Such details and specifications for substituted and new PRow, including scale, surface materials, access features and signage would be agreed at detailed design stage between Highways England, its contractor and SWTC.
- Highways England and its contractor would provide appropriate signage for re-provided and new PRow in agreement with SWTC.
- Where the proposed scheme severs local routes, the provision of alternative routes/diversions would ensure that access across the A358 scheme is maintained at key points during operation.

- 12.9.63 New crossing points and new routes are proposed, as well as the repurposing of existing roads for bridleways, both facilitating and allowing improved conditions for WCH.
- 12.9.64 The new underpass at Griffin Lane would provide a safe and connected route for users on the East Deane Way Long Distance Path, including on the Taunton Cycle Trail. The proposed scheme also proposes a new footpath between Nexus 25 roundabout to Henlade to the west of the A358, which would provide a landscaped environment through which walkers would travel with long views south to Blackdown Hills.
- 12.9.65 The proposed scheme proposes to divert several bridleways and PRows across both new grade separated junctions and new underpasses, providing safe and attractive routes. These include at the proposed Stoke Road overbridge, Fivehead River underbridge, High Bridge underbridge, Sunnyside underpass, and the through grade separated junction at Ashill, which would be considered a major magnitude of impact. These diversions would potentially add journey length and time to some users. However, given the improved environment of the route, on balance it is considered that the proposal would bring some benefits to the users, which would be less the significance of the effect.
- 12.9.66 Some PRow routes are to be stopped up including at West Hatch, Bickenhall Lane, Radigan Lane, Venners Water and Thickthorne. However, additional crossings or diversions have been planned which would mitigate the severance of existing footpaths and bridleways. This would provide favourable WCH routes between key residential and employment areas, and between features and facilities within the study area, offering opportunities for recreational and commuter routes.
- 12.9.67 Where routes have to be stopped up, alternative routes to mitigate severance have been planned for. The re-provision is also likely to provide safer routes with a better environmental quality. However, at several points along the proposed scheme, the diversions to existing routes have led to journey time increases of over 500m, which would be considered a major magnitude of impact. When combined with the medium sensitivity, the significance of impact is considered to be a moderate adverse effect, reduced from a large adverse effect as a result of

the betterment and improved safety. This would be significant to users and the local community.

### **Assessment of effects on human health**

- 12.9.68 The assessment of human health considers each of the determinants of human health identified, comprising:
- healthcare services and other community facilities
  - transport and connectivity
  - access to open space and nature
  - air quality
  - noise environment
  - landscape and visual amenity
  - access to employment and training
- 12.9.69 Focusing on each of the determinants in turn, an assessment is made of how, as a result of the proposed scheme, each of these health determinants may be affected and how these may result in changes in health outcomes of the population within the study area. Where relevant, assessment outcomes from other PEI assessments have been used as a basis for the assessment on health.
- 12.9.70 Consideration is given to the sensitivities of the populations within the study area (i.e. for each of the wards). As described in the methodology section, sensitivity is derived from a consideration of population exposure to the impact (how many people are affected) together with the population vulnerability to changes (refer to Table 12-6). Different groups of people within the population would have different vulnerabilities depending on their characteristics (refer to Table 12-17 which sets out the different vulnerabilities of the different groups within the study areas).
- 12.9.71 Health assessments consider how health outcomes of populations within the study area are likely to be affected by a development proposal. Focus is therefore made on local communities rather than visitors to the area, although visitors are considered where appropriate.

### **Healthcare services and other community facilities**

#### Access to healthcare services and other community facilities during construction

- 12.9.72 Physical access to healthcare services and other community facilities such as schools, nurseries, leisure facilities and community halls, is unlikely to be restricted during construction, although there is likely to be disruption and delays to access caused by construction activities. It is not considered that this disruption would result in any discernible health impacts, although more vulnerable people such as children, older people and those in poor health would be more sensitive to any changes.
- 12.9.73 The existing A358 dual carriageway to the north of the proposed scheme would be retained as it provides access to multiple properties, businesses and the park and ride facility. Access to these facilities therefore would be unaffected.
- 12.9.74 There are likely to be short-term and temporary increased journey times when traffic management measures are required during construction. This could increase driver stress, albeit the health effects are likely to be neutral.

12.9.75 Overall, it is considered that the construction phase of the proposed scheme would result in a neutral health outcome for those within the study area as result of any impacts on health care or other community facilities.

Access to healthcare services and other community facilities during operation

12.9.76 Once the proposed scheme has been completed it is likely that ease of access to healthcare services and other community facilities would be improved due to the reduced amount of travel time/reduced congestion that the A358 would offer. This, therefore, would result in minor positive health effects, particularly for those whose access to such services is more geographically limited to the study area, e.g. children/young people, older people and those in poor health. However, this is unlikely to make a large difference to the local communities which are relatively sparse and not likely to be directly affected by the proposed scheme.

12.9.77 Overall, it is considered that there would be a neutral health outcome within the study area with regards to access to healthcare and other social infrastructure during the operation phase of the proposed scheme.

**Transport and connectivity**

Transport and connectivity during construction

12.9.78 During the construction phase accessibility to the existing road network and public transport would not be affected significantly. It is not yet known whether any diversions to public transport routes are required, but it is not anticipated that any diversions would affect the overall provision of the service and would not result in any health impacts.

12.9.79 In total the proposed scheme has the potential to affect 39 PRow which are shown on Figure 12.7 Public rights of way within the study area. During construction there would be a number of impacts on these PRow, such as diversions and disruption which would affect options available for leisure activities and, to a certain extent, active travel options.

12.9.80 Highways England intends to keep the majority of PRow open via local management, early re-provision and/or use of short-term, temporary closures. In addition, the draft PRow Management Plan would be prepared detailing how impacts on PRow would be managed during construction.

12.9.81 In all cases, it is likely that realignment or diversion of local routes is proposed, utilising new local roads, overbridges and junctions where possible to maintain access for users. This would enable local communities to maintain access to leisure and active travel options during the construction phase, albeit if inconvenienced for a short period.

12.9.82 Population sensitivity to changes in this health determinant is considered to be low to medium across all wards. Based on the changes to this health determinant, a neutral health outcome is likely to result.

Transport and connectivity during operation

12.9.83 Once the proposed scheme is fully operational, existing routes would remain accessible where possible for the local community and visitors to the area. The proposed scheme would improve journey times thereby improving the perception of connectivity between places.

- 12.9.84 New and safe PRow crossings of the proposed route would be provided through the construction of overbridges and underpasses. Details of these would be explored and presented in the ES.
- 12.9.85 It is considered that the proposed scheme would not increase or decrease the number of active travel journeys, which are for the purpose of commuting. This is because whilst the proposed scheme would improve journey times / experience for motor vehicles, no specific provision is being made for walking or cycling along the proposed A358, therefore not improving the experience and/or safety of cyclist and walkers. There could be a slight increase in people travelling by walking or cycling between places given the improved connections and environment for those trips as a result of the proposed scheme (particularly along the existing northern part of the A358). However, it is not thought that this would result any noticeable health impact.
- 12.9.86 As a result of the proposed scheme, it is not considered that active travel would increase. However, improved connectivity would result from the proposed scheme, as congestion decreases and journey experience improves. It is also likely that local communities would utilise the improved PRow crossings, thereby increasing active travel uptake. For children and young people in particular, this would be beneficial.
- 12.9.87 Population sensitivity to these changes is considered to be low to medium across all wards and based on the predicted change to this health determinant, a beneficial health outcome is likely to result for each of the study wards.

### **Open space and nature**

#### Open space and nature during construction

- 12.9.88 Access to open space would be maintained throughout construction where possible. However, the quality of that access is likely to be adversely affected due to the proximity of the construction activities (and associated noise and general disturbance). Due to the rural nature of the local area, there are other options for accessing open space in close proximity which could be used during construction and therefore it is considered these changes in access do not represent a large change, particularly as none of the areas under consideration are designated open spaces.
- 12.9.89 Population sensitivity to these changes in access to open space and nature during construction is considered to be low and a neutral health outcome predicted for each of the study wards.

#### Open space and nature during operation

- 12.9.90 No new areas of open space are being provided. Whilst the proposed scheme does go off-line into a rural area, this is not identified as being open access land or common land.
- 12.9.91 Table 12-21 identifies the PRow that would be affected by the proposed scheme which includes numerous proposals that seek to improve accessibility and connectivity across the PRow network within the study area. In summary this includes:
- five sections of proposed new footpath
  - six sections of proposed new bridleway
  - instances of repurposing existing road for walkers and cyclists

- instances where access rights are proposed to provide greater connectivity between the existing PRow

12.9.92 These works would maintain and enhance access to open spaces and nature, particularly for the communities which live close to these routes and who may use them frequently for local walking. This would be explored more in the ES that would be submitted in support of the DCO application.

12.9.93 Population sensitivity to these changes in access to open space and nature during operation is considered to be low across all wards and based on the predicted change to this health determinant, a neutral health outcome is likely for each of the study wards.

## **Air quality**

### Air quality during construction

12.9.94 Chapter 5 Air quality considers effects related to construction dust and construction traffic. During construction, potential air quality effects arise from fugitive dust emissions due to earthworks, track out and general construction activity associated with the proposed scheme. During these activities the contractor would be following the EMP, which when prepared and submitted as part of the DCO application, would set out how environmental impacts should be mitigated during construction.

12.9.95 Whilst the proposed scheme is considered to have high potential for generation of construction dust, with the implementation of these mitigation measures, the air quality assessment (Chapter 5 Air quality) considers impacts on human health to be not significant (negligible). That assessment however does not consider the potential vulnerabilities within a population that may make them more susceptible to changes in air quality. Ruishton and Creech ward has a high vulnerability with regards to people in poor health, whilst West Monkton and Taunton Halcon have high vulnerability with regards to children and young people. All other wards have either a high or medium vulnerability with regards to older people. All wards are therefore considered to be of high sensitivity to changes in this health determinant and there is potential for a negative health outcome in the absence of mitigation. Because mitigation would be in place, there would be a neutral health outcome in relation to air quality during construction.

12.9.96 Construction traffic is not considered to pose a risk to human health in any of the study wards.

### Air quality during operation

12.9.97 Chapter 5 Air quality has predicted no exceedances of the Air Quality Objectives (AQOs) at human receptors for the proposed scheme. All concentrations of annual mean NO<sub>2</sub> are predicted to remain below the AQOs.

12.9.98 At the Henlade AQMA, the concentrations of annual mean NO<sub>2</sub> reduce from 33.1 µg/m<sup>3</sup> (micrograms per cubic metre) to 12.4 µg/m<sup>3</sup> in 2023. This is due to the proposed scheme moving traffic away from receptor locations in the AQMA and a reduction in congestion.

12.9.99 With no exceedances of the AQOs at human receptor locations and improvements in the Henlade AQMA, it is considered the proposed scheme would have no significant effects on air quality. Overall, the proposed scheme is

considered to have a beneficial impact on local air quality due to the reductions in NO<sub>2</sub> concentrations within the AQMA.

12.9.100 The population is considered to have high to medium vulnerability to air quality across all wards as a result of the proportion of children, young people, older people and people with poor health who are more vulnerable to changes in air quality. Population sensitivity is therefore medium to high. Combined with the air quality assessment outcome, this is likely to result in health outcomes that are positive.

## Noise

### Noise during construction

12.9.101 Chapter 11 Noise and vibration assesses the construction noise levels. The results of the noise impact assessment are shown in Table 12-22 showing impacts related to individual locations (including structures, earthworks and cuttings associated with individual proposed scheme elements) and the total combined impacts including other linear works away from specific structures (note some properties would be impacted by multiple activities).

**Table 12-22 Construction noise impacts at all receptors (residential and non-residential)**

Location	Properties predicted to experience a major noise impact	Properties predicted to experience a moderate noise impact	Total
Ashill junction	3	3	6
Griffin Lane underbridge	1	1	2
Stewley Link Road	2	2	4
Mattock's Tree Green junction	18	6	24
New Cad Brook underbridge	0	4	4
Stoke Road overbridge	131	82	213
Hatch Beauchamp junction overbridge	1	0	1
New High bridge underbridge	3	0	3
Venner's bridge (watercourse)	5	0	5
Total impacts for all works*	199	146	345

\* Includes earthworks, cuttings and sub-base activities not specific to a particular junction or structure.

12.9.102 In summary, based on the preliminary assessment, a total of 199 properties are predicted to experience major adverse impacts during one or more construction activities and 146 properties are predicted to experience moderate adverse impacts. It is likely that durations of these works would exceed ten days in 15 consecutive days or 40 days in a consecutive six months and therefore temporary direct significant adverse effects are predicted at these receptors.

12.9.103 The above impacts all relate to noise levels predicted to exceed the Significant Observed Adverse Effect Level (SOAEL) threshold. There may be further negligible or minor impacts affecting properties between the Lower Observed Adverse Effect Level (LOAEL) and SOAEL.

12.9.104 Within each of the study wards the population is considered to be between low and medium sensitivity to changes in noise levels. This is based on consideration

of the population vulnerability within the wards, particularly in relation to children, older people and people with poor health who are more sensitive to noise. As it is not possible to know who lives within the residential properties affected, or indeed whether these residents are particularly vulnerable to changes in noise, a general assumption is made based on the average within the wards. Assuming that the 345 properties have residents who are particularly sensitive to changes in noise levels (as a worst case), this represents an adverse health outcome at these locations. However, at a population level, construction noise is unlikely to result in adverse health outcomes in each of the wards.

#### Noise during operation

12.9.105 Chapter 11 Noise and vibration assesses the operational noise levels at residential receptors along the proposed scheme.

12.9.106 The noise assessment summarises the overall noise impacts separately for settlements around the proposed scheme, north to south. These are listed below in Table 12-23 along with an overview of which ward these fall within and what the outcomes of the noise assessment are in terms of the number of residential properties affected either positively or negatively.

**Table 12-23 Noise effects (as reported in Chapter 11 Noise and vibration)**

Section as identified in noise assessment	Ward	Significant Adverse above the SOAEL	Significant Beneficial above the SOAEL	Number of dwellings			
				Significant Adverse (between LOAEL and SOAEL)	Significant Beneficial (between LOAEL and SOAEL)	Not Significant	Negligible effects above SOAEL
Taunton	West Monkton Taunton Halcon Taunton and Blackbrook and Holway	-	-	-	-	1,007	17
Ruishton	Ruishton and Creech	-	-	-	1	405	-
Henlade	North Curry and Stoke St Gregory	2	55	108	37	47	-
Thornfalcon and Mattock's Tree Green Junction	Ruishton Neroche, Taunton Deane	5	7	42	5	57	-
West Hatch and Meare Green	Neroche, Taunton Deane	-	-	22	-	13	-
Hatch Beauchamp	Neroche, Taunton Deane	-	-	55	-	171	-

Section as identified in noise assessment	Ward	Significant Adverse above the SOAEL	Significant Beneficial above the SOAEL	Significant Adverse (between LOAEL and SOAEL)	Significant Beneficial (between LOAEL and SOAEL)	Not Significant	Negligible effects above SOAEL
		Number of dwellings					
Hatch Green	Neroche, Taunton Deane	2	1	21	3	6	-
Ashill	Neroche, South Somerset	11	1	115	2	14	-
Rapps	Neroche, South Somerset Islemoor	-	-	32	-	40	-
Horton Cross	Neroch, South Somerset Ilminster Islemoor	5	-	14	-	137	1

12.9.107 In the wider area where the current traffic patterns would be influenced indirectly due to the opening of the proposed scheme, dwellings located within 50m from the road edges would be subject to a reduction in noise levels on following roads:

- Shoreditch Road, B3170, and Chestnut Drive in Taunton
- Thurlbear Road in Orchard Portman
- Staple Hill and New Road in Staple Fitzpaine
- Unnamed roads between Staple Fitzpaine and Buckland St Mary
- Pound Road in Horton

12.9.108 Dwellings located on the following road would be subject to an increase in noise levels:

- Windmill Hill and Stoke Road in North Curry
- Meare Green in Mare Green
- Curload Road in Curload
- Stanmoor Road in Burrow Bridge
- Headwell and Higher Street in Curry Mallet
- Broadway Road in Broadway
- Hanning Road in Horton

12.9.109 Within each of the study wards the population is considered to be between low and medium sensitivity to changes in noise levels. This is based on consideration of the population vulnerability within the wards, particularly in relation to children, older people and people with poor health who are more sensitive to noise. As it is not possible to know who lives within the residential properties affected, or indeed whether these residents are particularly vulnerable to changes in noise, a general assumption is made based on the average within the wards.

12.9.110 Overall, there are relatively few residential properties that would experience a significant beneficial noise effect as a result of the proposed scheme. The highest number of residential properties to benefit are within North Curry and Stoke St Gregory ward. Due to the relatively low number of properties likely to experience this (in terms of population exposure), the population sensitivity is considered to be low with a positive health outcome.

12.9.111 With regards to the significant adverse effects identified by the noise assessment, more properties are affected (compared to experiencing beneficial effects), although the total number still remains relatively small compared to all properties within the wards. There are groups within each of the wards that are particularly sensitive to noise increases, including children, older people and people with poor health and the population sensitivity within each of the wards is, as described above, between low and medium. The health outcome would be negative for those residents affected. At a population level, the health outcome is likely to be neutral across all wards except for North Curry and Stoke St Gregory, which is positive.

### **Landscape and visual amenity**

#### Landscape and visual amenity during construction

12.9.112 Chapter 7 Landscape identifies the sources of effects on landscape and visual receptors during construction as:

- Temporary construction compounds with associated lighting and fencing
- Temporary haul roads
- Stockpiling and storage of materials
- Excavation and handling of materials
- On- and off-site construction traffic
- On-site plant, such as:
  - Demolition plant and excavators for site clearance.
  - Articulated dump trucks, excavators up to 35 tonne capacity, dozers and rollers for bulk earthworks.
  - Cranes, telescopic boom lifts, piling rigs and telescopic forklifts for construction of structures.
- Night-time security lighting year-round such as:
  - Isolated task lighting, which would be provided intermittently where required during the winter months only.
  - Lighting of construction site compounds.

12.9.113 The majority of construction activities would take place between 2024 and 2028 and is considered to be temporary. The construction period is likely to impact on the sense of tranquillity and calm in the existing landscape and the construction activities themselves would result in changes to the existing landscape.

12.9.114 The following landscape construction impacts are identified in Chapter 7 Landscape for each of the local landscape character areas (LLCA) within the study area:

- Vale of Taunton Deane LLCA (assessed as being of medium sensitivity for the purpose of the LVIA) – major adverse magnitude of change due to large-scale impact to existing landscape character including fields, the village of Henlade

and settlements between the existing A358 and new offline section, caused by construction works and associated vehicles and deliveries. This is assessed to result in a large adverse effect, which is significant.

- North Curry Sandstone Ridge LLCA (assessed as being of medium sensitivity for the purpose of the LVIA) – This is assessed to be a major adverse magnitude of change, based on the loss and extensive damage to existing landscape character of Mattock’s Tree Hill, an asset of local cultural value, and nearby settlements, caused by construction works and associated vehicles and deliveries. This is assessed to result in a large adverse effect, which is significant.
- Fivehead Vale LLCA (assessed as being of medium sensitivity for the purpose of the LVIA) – This is assessed to result in a moderate adverse magnitude of change due to works associated with the construction of new uncharacteristic road infrastructure. The magnitude of impact is considerable on the character of connectivity within the landscape, stopping up local lanes, and shifting movement from lanes and footpaths to overbridges and footbridges. This is assessed to result in a moderate adverse effect, which is significant.
- Lower Lias Foothills and Lowland LLCA (assessed as being of medium sensitivity for the purpose of the LVIA) – This is assessed to result in a moderate adverse magnitude of change due to the impact of constructing two areas of new uncharacteristic road infrastructure, as well as on the character of connectivity within the landscape, stopping up local lanes and diverting footpaths. This is assessed to result in a moderate adverse effect, which is significant.

12.9.115 Chapter 7 Landscape and Figure 7.4 Zone of Theoretical Visibility (ZTV) and Proposed Viewpoints identifies a number of viewpoint locations which have been assessed for construction impacts. Out of the 48 viewpoints (VP) assessed, 25 are identified as being significantly affected (i.e. of moderate significance and above):

- Major adverse significant effect: VP27: Hedgerow and woodland removal adjacent to both sides of existing A358 would create exposed views of the road construction and associated Ashill overbridge and new link to Rapps.
- Very large adverse significant effect: VPs 1 and 4: Effect would result from changes in view from rural fields to close proximity views of construction machinery.
- Large adverse significant effect: VPs 2, 5, 7, 10, 13, 18, 22, 24, 26, 32: generally relates to loss of hedgerow and trees making construction works visible.
- Moderate adverse significant effect: VPs 6, 9, 14, 16, 19, 20, 21, 23, 25, 30, 31, 46: generally related to removal of hedgerow and trees in the distance, exposing more construction activity from viewpoints.

12.9.116 From a health perspective, changes to the landscape and visual amenity during construction are considered to result in neutral health outcomes due to the temporary nature of loss of amenity and the low sensitivity of the communities to changes in landscape and visual determinants of health.

#### Landscape and visual amenity during operation

12.9.117 Chapter 7 Landscape identifies the sources of effects on landscape during operation as:

- Tree and vegetation loss when compared to baseline (particularly at year 1, as any mitigation planting would be immature).
- Additional woodland planting incorporated into the proposed scheme to reduce visual impacts and improve landscape integration of the proposed scheme.
- Presence of the widened A358 corridor and increased prominence in the landscape along the on-line section of the proposed scheme.
- The presence of the A358 corridor in new landscapes that did not previously have road infrastructure along the off-line section of the proposed scheme.
- The extent, scale, and design of earthworks.
- The materials and appearance of proposed structures for the works (e.g. junctions, bridges, and retaining walls).
- Addition or removal of lighting along the A358 corridor.
- Addition of road signage along the A358 corridor.
- Any changes to the existing strategic green infrastructure network.

12.9.118 Impacts on visual amenity are identified as:

- Tree and vegetation loss when compared to baseline increasing visibility of the A358 (particularly at year 1, as any mitigation planting would be immature).
- Presence of widened A358 corridor and increased prominence of traffic in views.
- Presence of the A358 corridor and associated traffic in some views that did not previously have road infrastructure along the on-line section, causing dust and visual intrusion.
- The extent, scale, and design of earthworks.
- The materials and appearance of proposed structures for the works (e.g. junctions, bridges, and retaining walls).
- Addition or removal of lighting along the A358 corridor.
- Addition of road signage along the A358 corridor.
- Engineering or environmental features enclosing or changing views towards the Blackdown Hills AONB or other landscape features.
- Establishment of visual mitigation (particularly at year 15).
- Establishment of landscape mitigation (particularly at year 15).

12.9.119 The following landscape operational impacts are identified in Chapter 7

Landscape for each of the local landscape character areas (LLCA) within the study area. Only year 15 is considered for the purpose of the health assessment because it is considered unlikely that health outcomes would be affected 1 year post construction:

- Vale of Taunton Deane LLCA – A moderate adverse magnitude of change due to mitigation treatments helping to reinstate some lost features and partially embed new infrastructure into local landscape character. Damage to existing landscape character and the increase in aural and visual influence of transport features on the landscape would therefore be lessened. This is assessed to result in a moderate adverse effect, which is significant.
- North Curry Sandstone Ridge LLCA – At year 15 this is assessed to be a major adverse magnitude of change, based on the loss of the existing landscape character of Mattock's Tree Hill, an asset of local cultural value. The impact on settlements may be reduced by the establishment of mitigation

planting to help re-establish the character in these areas of notable change. This is assessed to result in a moderate adverse effect, which is significant.

- Fivehead Vale LLCA – At year 15 the magnitude of change is assessed to reduce to minor adverse with mitigation treatments helping to reinstate some lost features and partially embed new infrastructure into local landscape character and reducing the overall increase in influence of transport features on the landscape. This is assessed to result in a slight adverse effect, which is not significant.
- Lower Lias Foothills and Lowland LLCA – At year 15 the magnitude of change is assessed to be minor adverse. Although landscape mitigation measures would reinstate many of the baseline characteristics of the landscape, the widened corridor and addition of two areas of new uncharacteristic road infrastructure for proposed overbridges would continue to increase the influence of transport infrastructure on landscape character in this area, as well as the character of connectivity within the landscape, stopping up local lanes and shifting movement from lanes and footpaths, to overbridges. This is assessed to result in a slight adverse effect, which is not significant.

12.9.120 Chapter 7 Landscape and Figure 7.4 ZTV and Proposed Viewpoints identifies a number of viewpoint locations which have been assessed for operational impacts. For the same reasons as given for landscape, out of the 48 viewpoints assessed, only 4 are identified as being significant (i.e. of moderate significance and above)

- Large adverse significant effect: VPs 1, 4: due to a change in views from rural fields to close proximity views of major highway corridor. Established mitigation would soften appearance of the proposed scheme.
- Moderate adverse significant effect: VPs 18, 32: at VP18 the highway corridor and access road to Stewley Link Road would be a more prominent feature of the view than the baseline condition. At VP32 the loss of mature trees would not be fully mitigated and the prominence of the highway corridor would be increased due to the closer proximity and presence of planted earthworks for Stewley Link Road.

12.9.121 From a health perspective, changes to the landscape and visual amenity during operation are considered to result in neutral health outcomes at a population level within each of the study wards due to the low sensitivity of the communities to changes in landscape and visual determinants of health.

### **Sources of pollution**

#### Pollution during construction

12.9.122 Chapter 9 Geology and soils identifies localised significant effects in relation to exposure to contaminated soil, groundwater, leachate, ground gas and vapours, which but concludes that with appropriate and standard mitigation in place, there would not be any significant risk. From a health perspective there would also therefore be a neutral health outcome from sources of pollution which would be controlled during this time.

#### Pollution during operation

12.9.123 Provided that the mitigation measures set out in Chapter 9 Geology and soils are followed, population health outcomes are unlikely to be affected as a result during the operational phase, i.e. a neutral health outcome is predicted.

## **Employment and training**

### Access to employment and training during construction

- 12.9.124 During construction it is anticipated that employment would be generated that would remain fairly constant over the construction programme. Given the location of the proposed scheme, it is anticipated that a proportion of the construction workforce would be brought into the area and therefore made up of workers travelling from outside the area and staying locally.
- 12.9.125 Given that the majority of the workforce would be from outside of the local area, the health benefits associated with employment would be dissipated beyond the local communities. However, in addition to the direct employment there would also likely be some induced employment within the tourism sector which is likely to provide some of the accommodation needed to house the workforce which would be travelling into the area for the work.
- 12.9.126 New spend within the local economy by these workers is also likely to benefit local businesses. This is likely to be relatively small when compared to the overall tourism spend in Somerset, but nonetheless is not an insignificant level of spend in the local area, with an increased boost to the local economy.
- 12.9.127 For those who are unemployed or economically inactive, there may be opportunities for accessing training related to construction employment. At this stage it is not known how many people would benefit and therefore it is not possible to quantify the magnitude of this effect.
- 12.9.128 Whilst there would be some employment benefits in the local area as a result of induced spend, it is considered that the overall construction phase health outcomes within a community of low sensitivity to this change, would be short-term and neutral. This is based on the wide area across which direct employment benefits are likely to be felt and the relatively low levels of induced employment likely to result from the proposed scheme's construction phase.

### Access to employment and training during operation

- 12.9.129 During operation the proposed scheme would not result in any direct employment benefits beyond typical maintenance arrangements. However, as identified in PEI Report Chapter 2: The Project (Table 2-1), one of the proposed scheme objectives is to facilitate growth in employment at key locations and centres along the A303/A358/A30 corridor and to the South-West Region'.
- 12.9.130 Whilst it is difficult to measure the success of these objectives, if (when) met, they would all contribute to a stronger employment market that would benefit the health of the whole community. As such, it is predicted that the proposed scheme would result in long-term, positive health outcomes, even within a study population of low sensitivity to economic change.

## **12.10 Monitoring**

- 12.10.1 Beyond the recommendations for monitoring made in other relevant assessments, there are no significant adverse effects related to this assessment identified either during the construction or operational stages of the proposed scheme that would require monitoring.

## 12.11 Summary

12.11.1 The summary is split between the community lands and assets assessment and the human health assessment.

### Community lands and assets

#### Preliminary construction assessment

12.11.2 There are three private properties that experience permanent large adverse effects during construction due to demolition.

12.11.3 There are no demolitions resulting in large adverse effects for either community assets or businesses. There are moderate adverse effects to 20 businesses as a result of access changes or discernible changes in environmental quality.

12.11.4 37 agricultural land holdings would be affected temporarily during construction, of which 23 would experience very large, large or moderate temporary adverse effects, which are significant.

12.11.5 Once the construction is complete and agricultural land required temporarily has been restored, 31 agricultural land holdings would be affected permanently from construction, of which 16 would experience large or moderate permanent adverse effects, which are significant.

12.11.6 Slight adverse effects would be experienced by all walker, cyclists, and horse riders as a result of construction activities, which are not considered significant.

#### Preliminary operational assessment

12.11.7 Table 12-24 summarises the overall assessment of significance of identified effects for the topics discussed in this section.

12.11.8 Four private properties are anticipated to experience permanent moderate adverse effects during operation where severance has been created or there are substantial environmental changes. There are no demolitions resulting in permanent large adverse effects for either community assets or businesses. There is one very large adverse effect, one large adverse effect and four moderate adverse effects however because of stopped up road or discernible changes in the attributes of the environmental quality. Both community assets and business however would experience slight beneficial effects once the proposed scheme is operational.

**Table 12-24 Summary of significance during construction and operation – land use and accessibility**

Land use and accessibility category	Significance of effect during construction	Significance of effect during operation
Private property and housing	<p><b>Permanent large adverse</b></p> <ul style="list-style-type: none"> <li>Henlade Farm</li> <li>Bath Cottage, West Hatch</li> </ul> <p><b>Permanent large adverse</b></p> <ul style="list-style-type: none"> <li>Meadow View</li> </ul> <p><b>Temporary moderate adverse</b></p> <ul style="list-style-type: none"> <li>Keirles, Thornfalcon</li> <li>Ash Cross Cottage</li> </ul>	<p><b>Permanent moderate adverse</b></p> <ul style="list-style-type: none"> <li>Kierles, Thornfalcon</li> </ul> <p><b>Permanent moderate adverse</b></p> <ul style="list-style-type: none"> <li>Ash Cross Cottage, Ash Road</li> </ul> <p><b>Permanent moderate adverse</b></p> <ul style="list-style-type: none"> <li>Little Ashe</li> </ul> <p><b>Permanent moderate adverse</b></p> <ul style="list-style-type: none"> <li>April Cottage</li> </ul>

Land use and accessibility category	Significance of effect during construction	Significance of effect during operation
	<ul style="list-style-type: none"> <li>• Little Ashe, Ash Road</li> <li>• Chase Cottage, West Hatch</li> <li>• April Cottage Rapps</li> </ul> <b>Temporary slight adverse</b> <ul style="list-style-type: none"> <li>• Land Plat, Stewley</li> </ul>	<b>Permanent slight adverse</b> <ul style="list-style-type: none"> <li>• Chase Cottage</li> </ul> <b>Permanent slight adverse</b> <ul style="list-style-type: none"> <li>• Land Plat, Stewley</li> </ul>
Community land and assets	<b>Permanent very large adverse</b> <ul style="list-style-type: none"> <li>• Somerset Progressive School</li> </ul> <b>Temporary large adverse</b> <ul style="list-style-type: none"> <li>• Huish Woods Scout Campsite</li> </ul> <b>Temporary moderate adverse</b> <ul style="list-style-type: none"> <li>• Ivy House Social Club</li> </ul> <b>Temporary moderate adverse</b> <ul style="list-style-type: none"> <li>• West Hatch Village Hall</li> </ul> <b>Temporary moderate adverse</b> <ul style="list-style-type: none"> <li>• Ashill Village Hall</li> </ul> <b>Temporary moderate adverse</b> <ul style="list-style-type: none"> <li>• Ashill Primary School</li> </ul> <b>Temporary slight adverse</b> <ul style="list-style-type: none"> <li>• all other receptors</li> </ul>	Permanent Slight Beneficial – <ul style="list-style-type: none"> <li>• all receptors</li> </ul>
Development land and businesses	<b>Permanent moderate adverse</b> <ul style="list-style-type: none"> <li>• Nags Head Tavern.</li> </ul> <b>Temporary moderate adverse</b> <ul style="list-style-type: none"> <li>• Nexus 25 roundabout</li> <li>• Ivy House Park</li> <li>• The Mount Somerset</li> <li>• Thornfalcon Classic Car Storage</li> <li>• Desert to Jungle Gardening</li> <li>• Somerset Motorhome</li> <li>• SPAR Thornfalcon</li> <li>• KNR Scaffolding</li> <li>• Posh Wash Showers Ltd</li> <li>• Thornfalcon Storage</li> <li>• Baxters Rescue</li> <li>• AVS Furniture Outlet</li> <li>• Ashe Farm Camping and Caravan Site</li> <li>• Foresters Garden Buildings, Vape it UK, Oatmans</li> <li>• TM Safety Signs Ltd, West Hatch Lane Equestrian</li> <li>• Orchard Poultry</li> <li>• Jordan's Estate Glamping</li> <li>• Blackdown Shepherds Huts</li> <li>• JM Glass Ltd</li> <li>• Ginger Bread House</li> <li>• Southfields roundabout employment allocation</li> </ul>	Permanent Slight Beneficial – <ul style="list-style-type: none"> <li>• all receptors</li> </ul>

Land use and accessibility category	Significance of effect during construction	Significance of effect during operation
	<ul style="list-style-type: none"> <li>• Stoneleigh Beauty</li> </ul> <b>Temporary slight adverse</b> <ul style="list-style-type: none"> <li>• All other receptors</li> </ul>	
Agricultural land holdings	<b>Temporary very large adverse</b> <ul style="list-style-type: none"> <li>• Ashe Farm</li> </ul> <b>Temporary large adverse</b> <ul style="list-style-type: none"> <li>• Land north of Haydon Lane</li> <li>• Haydon House Farm</li> <li>• The Conifers</li> <li>• Rose Farm</li> <li>• West Hatch Farm/Meare Court Farm</li> <li>• Broughton Farm</li> <li>• Broadlands Farm</li> <li>• Bickenhall Farm/Higher Wrantage Farm (including Gore Langton Estate)</li> <li>• Capland Orchard</li> <li>• Westview Farm</li> <li>• Sunnyside Farm</li> <li>• Ashill Farm</li> <li>• Southtown Farm House</li> </ul> <b>Temporary moderate adverse</b> <ul style="list-style-type: none"> <li>• Thornwater Farm</li> <li>• The Clock House (Land at Home Farm)</li> <li>• Ash Lodge</li> <li>• Land North of West Hatch Lane</li> <li>• Forest Farm</li> <li>• Meadows</li> <li>• New Rydon Farm</li> <li>• Land north of Ashill</li> <li>• Shrubbery Farm</li> </ul> <b>Temporary slight and neutral adverse</b> <ul style="list-style-type: none"> <li>• All other receptors</li> </ul> <b>Permanent large adverse</b> <ul style="list-style-type: none"> <li>• Land north of Haydon Lane</li> <li>• Haydon House Farm</li> <li>• The Conifers</li> <li>• Rose Farm</li> <li>• Ashe Farm</li> <li>• West Hatch Farm/Meare Court Farm</li> <li>• Broughton Farm</li> <li>• Sunnyside Farm</li> </ul> <b>Permanent moderate adverse</b> <ul style="list-style-type: none"> <li>• Thornwater Farm</li> </ul>	N/A - All effects experienced during construction phase.

Land use and accessibility category	Significance of effect during construction	Significance of effect during operation
	<ul style="list-style-type: none"> <li>• Ash Lodge</li> <li>• Land North of West Hatch Lane</li> <li>• Bickenhall Farm/Higher Wrantage Farm (including Gore Langton Estate)</li> <li>• Forest Farm</li> <li>• Meadows</li> <li>• Ashill Farm</li> <li>• Shrubbery Farm</li> <li>• Southtown Farm House</li> </ul> <p><b>Permanent slight and neutral adverse</b></p> <ul style="list-style-type: none"> <li>• All other receptors</li> </ul>	
WCH	<p><b>Slight adverse</b></p> <ul style="list-style-type: none"> <li>• All WCH routes</li> </ul>	<p><b>Large adverse</b></p> <ul style="list-style-type: none"> <li>• T31/36 Bridleway</li> </ul> <p><b>Moderate adverse</b></p> <ul style="list-style-type: none"> <li>• T22/6 Footpath linking Taunton and Henlade</li> <li>• T22/7 Footpath linking Ruishton to Henlade, north-south</li> <li>• T22/5 Footpath linking Henlade towards Ruishton, south-north</li> <li>• T22/1 Footpath links Henlade and Thornfalcon</li> <li>• T31 /37 Footpath Mattock Tree</li> <li>• T2/5 Footpath</li> <li>• T14.8 Bridleway</li> <li>• CH 1/1 Footpath linking Radigan Lan to Ashill</li> <li>• CH 1 / 2 Footpath links Radigan Lane to Ashill</li> <li>• CH 1 /3 Footpath linking Venner's Water</li> <li>• CH 1/5 Links Park Barn Lane to the A358</li> <li>• CH 1/6 Footpath Ashill</li> <li>• CH1 /21 Footpath links to Thickthorne across the A358</li> <li>• CH 1/ 6 Footpath crosses the A358 and links to Suggs Lane</li> <li>• Ch 2/15 Footpath Ding Bridge</li> </ul> <p><b>Slight adverse</b></p> <ul style="list-style-type: none"> <li>• T27/3 links the railway cutting to the A358, south-north</li> </ul>

Land use and accessibility category	Significance of effect during construction	Significance of effect during operation
		<ul style="list-style-type: none"> <li>T14/15 Footpath crossing the A358 at Capland, east-west</li> <li>T14/4 footpath links the A358 with Forest Drove, east-west</li> </ul>

### Human health assessment

12.11.9 Table 12-25 below set out a summary of health outcomes for each of the wards within the study area, taking each health determinant in turn for the construction and operation stages of the proposed scheme.

**Table 12-25 Summary assessment of human health outcomes**

Ward	Sensitivity	Health outcome: Construction	Health outcome: Operation
<b>Transport and connectivity</b>			
West Monkton	Low	Neutral	Positive
Taunton Halcon	Low	Neutral	Positive
Taunton and Blackbrook and Holway	Low	Neutral	Positive
Neroche, Taunton Deane	Medium	Neutral	Positive
North Curry and Stoke St Gregory	Low	Neutral	Positive
Ruishton and Creech	Medium	Neutral	Positive
Ilminster	Low	Neutral	Positive
Islemoor	Low	Neutral	Positive
Neroche, South Somerset	Medium	Neutral	Positive
<b>Open space and nature</b>			
West Monkton	Low	Neutral	Neutral
Taunton Halcon	Low	Neutral	Neutral
Taunton and Blackbrook and Holway	Low	Neutral	Neutral
Neroche, Taunton Deane	Low	Neutral	Neutral
North Curry and Stoke St Gregory	Low	Neutral	Neutral
Ruishton and Creech	Low	Neutral	Neutral
Ilminster	Low	Neutral	Neutral
Islemoor	Low	Neutral	Neutral
Neroche, South Somerset	Low	Neutral	Neutral
<b>Air quality</b>			
West Monkton	Low	Negative	Positive
Taunton Halcon	Low	Negative	Positive
Taunton and Blackbrook and Holway	Low	Negative	Positive
Neroche, Taunton Deane	Medium	Negative	Positive
North Curry and Stoke St Gregory	Low	Negative	Positive
Ruishton and Creech	Medium	Negative	Positive
Ilminster	Low	Negative	Positive

Islemoor	Low	Negative	Positive
Neroche, South Somerset	Medium	Negative	Positive
<b>Noise and vibration</b>			
West Monkton	Low	Neutral	Neutral
Taunton Halcon	Low	Neutral	Neutral
Taunton and Blackbrook and Holway	Low	Neutral	Neutral
Neroche, Taunton Deane	Medium	Neutral	Neutral
North Curry and Stoke St Gregory	Low	Neutral	Positive
Ruishton and Creech	Medium	Neutral	Neutral
Ilminster	Low	Neutral	Neutral
Islemoor	Low	Neutral	Neutral
Neroche, South Somerset	Medium	Neutral	Neutral
<b>Landscape</b>			
West Monkton	Low	Neutral	Neutral
Taunton Halcon	Low	Neutral	Neutral
Taunton and Blackbrook and Holway	Low	Neutral	Neutral
Neroche, Taunton Deane	Low	Neutral	Neutral
North Curry and Stoke St Gregory	Low	Neutral	Neutral
Ruishton and Creech	Low	Neutral	Neutral
Ilminster	Low	Neutral	Neutral
Islemoor	Low	Neutral	Neutral
Neroche, South Somerset	Low	Neutral	Neutral
<b>Sources of pollution</b>			
West Monkton	Low	Neutral	Neutral
Taunton Halcon	Low	Neutral	Neutral
Taunton and Blackbrook and Holway	Low	Neutral	Neutral
Neroche, Taunton Deane	Low	Neutral	Neutral
North Curry and Stoke St Gregory	Low	Neutral	Neutral
Ruishton and Creech	Low	Neutral	Neutral
Ilminster	Low	Neutral	Neutral
Islemoor	Low	Neutral	Neutral
Neroche, South Somerset	Low	Neutral	Neutral
<b>Employment and training</b>			
West Monkton	Low	Neutral	Positive
Taunton Halcon	Low	Neutral	Positive
Taunton and Blackbrook and Holway	Low	Neutral	Positive
Neroche, Taunton Deane	Low	Neutral	Positive
North Curry and Stoke St Gregory	Low	Neutral	Positive
Ruishton and Creech	Low	Neutral	Positive
Ilminster	Low	Neutral	Positive
Islemoor	Low	Neutral	Positive
Neroche, South Somerset	Low	Neutral	Positive

**Further work**

- 12.11.10 Quantified effects on agricultural land would be updated and provided to reflect any changes made to the DCO boundary.
- 12.11.11 Lengths of stopping up, diversions and new sections of PRow would be calculated and provided in the ES once the PRow Management Plan is available.
- 12.11.12 The impacts on health determinants would be updated and provided to reflect any changes to the results reported in other relevant assessments.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 13  
Road Drainage and the Water Environment

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## 13 Road drainage and the water environment

### 13.1 Introduction

- 13.1.1 This chapter assesses the potential road drainage and water environment impacts from the construction and operation of the A358 Taunton and Southfields Dualling Scheme (the 'proposed scheme'), following the methodology set out in *Design Manual for Roads and Bridges* (DMRB) LA 113 *Road drainage and the water environment* [1].
- 13.1.2 In this chapter the road drainage and water environment is considered to comprise:
- surface water features within the study area
  - groundwater contained within aquifer units that underlie the study area
  - other water bodies or water dependent features that may potentially be affected
  - the aspects of potable water supply that directly depend on water resources (for example private wells)
  - existing road drainage assets
- 13.1.3 This chapter describes the baseline conditions of the existing road drainage water environment in the study area and the methodology used to assess potential impacts during the construction and operational phases of the proposed scheme, before presenting the preliminary results of these assessments and any further mitigation measures or monitoring deemed necessary.
- 13.1.4 The assessment considers the potential effects on the quality and quantity of surface and ground waters, hydrogeomorphology and flood risk that may result from construction activities, operational road drainage and accidental spillages.
- 13.1.5 The Water Framework Directive (WFD) compliance assessment and Flood Risk Assessment (FRA) will be reported within the Environmental Statement (ES) and presented as appendices, which will accompany the Development Consent Order (DCO) application. A WFD screening assessment and a preliminary FRA has been undertaken to accompany the Preliminary Environmental Information (PEI) Report and are provided as appendices.
- 13.1.6 The proposed scheme does not include any sizeable cuttings and there are no groundwater Source Protection Zones within the study area. As such, at this time no potentially significant hydrogeological risks have been identified and it is not proposed to undertake a formal Hydrogeological Impact Assessment (HIA) of the proposed scheme as a whole. However, where the need for hydrogeological calculation is identified at individual cutting and dewatering locations, these will be undertaken in order to inform the assessment process going forward and reported in the ES.
- 13.1.7 Associated effects on ecology (including aquatic ecology) are considered in Chapter 8 Biodiversity, although ecological proxy indicators of water quality may be considered in assessment of effects in the Road Drainage and the Water Environment ES Chapter. This will be dependent on the findings of the detailed assessment reported in the ES.
- 13.1.8 Effects on ground conditions and water quality arising from existing land contamination are considered in Chapter 9 Geology and Soils.

## 13.2 Legislative and policy framework

### Legislation

- 13.2.1 As documented in Chapter 1 Introduction, the primary basis for deciding whether or not to grant a DCO is the *National Policy Statement for National Networks* (NPSNN) [2], which sets out policies to guide how DCO applications will be decided and how the effects of national networks infrastructure should be considered. Table 13-1 identifies the NPSNN policies relevant to the water environment and specifies where in this chapter information is provided to address the policy.

**Table 13-1 Relevant NPSNN policies for road drainage and water environment assessment**

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in this PEI Report chapter is information provided to address this policy
5.92	States that applications for projects (Such as this project) in Flood Zones 2 and 3 should be accompanied by a flood risk assessment (FRA) that <i>“...should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account”</i> .	A Preliminary FRA is provided in Appendix 13.1 PEIR Flood Risk Assessment to this PEI Report. This will be updated and finalised and provided with the ES.
5.96	States that applicants for projects that have the potential to be affected by, or increase, flood risk are advised to seek appropriate early stakeholder engagement with the Environment Agency and other relevant flood risk management bodies such as lead local flood authorities (LLFA), Internal Drainage Boards (IDB) and sewerage undertakers among others.	The Environment Agency comments on the Scoping Report have informed the PEI Report. Early engagement has been undertaken with the LLFA to inform the PEI Report and drainage design. Ongoing engagement will be undertaken to inform the ES.
5.97	States that local flood risk management strategies and surface water management plans provided by LLFAs should be used to inform the assessment of the project on flood risk and the FRA. This should include consideration of surface water flood risk in addition to fluvial flood risk	A list of relevant local flood risk documentation is provided in section 13.2 Legislative and policy framework. This documentation has directly informed the baseline provided in section 13.6 Baseline conditions. A Preliminary FRA is provided in Appendix 13.1 PEIR Flood Risk Assessment to this PEI Report. A summary of the Preliminary FRA is provided in section 13.9 Assessment of likely significant effects.
5.98 and 5.99, 5.105, 5.106 and 5.109	States the requirement of the project to apply <i>“...the Sequential Test...and, if required, the Exception Test”</i> to demonstrate that the project will not increase flood risk elsewhere and is only located in an area at risk of flooding if appropriate. The requirements relevant to the Sequential Test are	A Preliminary FRA is provided in Appendix 13.1 PEIR Flood Risk Assessment to this PEI Report which outlines the application of the Sequential

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in this PEI Report chapter is information provided to address this policy
	outlined in paragraph 5.105 and those relevant to the Exception Test are outlined in paragraphs 5.106-5.109.	Test and Exception Test to the proposed scheme.
5.100	States that <i>“For construction work which has drainage implications”</i> , the project will need to demonstrate that the proposed drainage system complies with the standards outlined in the Flood and Water Management Act 2010 and should include the provision for the adoption and maintenance of any Sustainable Drainage Systems (SuDs) and any necessary access requirements.	A description of the preliminary drainage design for the preliminary scheme design is provided in section 13.8 Design, mitigation and enhancement measures.
5.102	States that the project must take reasonable steps <i>“...to avoid, limit and reduce the risk of flooding to the proposed infrastructure and others”</i> .	A Preliminary FRA is provided in Appendix 13.1 PEIR Flood Risk Assessment to this PEI Report.
5.104	States that where linear infrastructure has been proposed in a flood risk area, reasonable mitigation measures should be made to <i>“...ensure that the infrastructure remains functional in the event of predicted flooding”</i> .	A Preliminary FRA is provided in Appendix 13.1 PEIR Flood Risk Assessment to this PEI Report.
5.112	States that the layout of the site should be designed to cope with events that exceed the design capacity of the system to appropriately manage excess water during flood events.	A Preliminary FRA is provided in Appendix 13.1 PEIR Flood Risk Assessment to this PEI Report. A description of the drainage design for the proposed scheme is provided in section 13.8 Design, mitigation and enhancement measures.
5.113 and 5.114	States that the <i>“...surface water drainage arrangements for any project should be such that the volumes and peak flow rates of surface water leaving the sites are no greater than the rates prior to the proposed project unless specific off-site arrangements are made and result in the same net effect”</i> . To fulfil this requirement, it may be necessary to provide infiltration and surface water storage to limit and reduce the peak rate of discharge from the site and total volume discharged from the site as outlined in paragraph 5.114 of the NPSNN.	A description of the preliminary drainage design for the preliminary scheme design is provided in section 13.8 Design, mitigation and enhancement measures.
5.221	States that <i>“Applicants should make early contact with the relevant regulators...”</i> for water quality and water supply to determine the existing status of, and complete an assessment of, the impacts of the <i>“...project on water quality, water resources and physical characteristics”</i> of the water environment as part of the ES.	Early engagement has been undertaken with the LLFA regarding water quality and water supply. Environment Agency comments on the Scoping Report have informed the PEI Report. Ongoing engagement will inform and be reported in the ES.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in this PEI Report chapter is information provided to address this policy
5.222	States that, where appropriate, opportunities should be taken to improve upon the quality of existing discharges where these are identified to contribute towards WFD commitments.	A WFD Screening assessment is provided in Appendix 13.2 Water Framework Directive Screening to this PEI Report. This identifies the surface and groundwater bodies screened in for detailed assessment in the WFD Compliance Assessment to be appended to the ES.
5.223	Outlines that the environmental statement should describe existing water quality, water resources and physical characteristics of the water environment and any impacts of the project on water bodies of protected areas under the WFD and source protection zones (SPZ) as well as any cumulative effects.	A comprehensive description of existing surface water and groundwater features in the study area is provided in section 13.6 Baseline conditions. This includes a list of WFD waterbodies in the study area and consideration of SPZs. A cumulative assessment will be completed as part of the ES.
5.225	States the requirement for all activities that discharge to the water environment to be subject to pollution control and to include consideration of paragraphs 4.48-4.56 of the NPSNN.	A description of the measures to be implemented during construction to manage pollution and the preliminary operational drainage design for the preliminary scheme design is provided in section 13.8 Design, mitigation and enhancement measures.
5.226	States that the assessment of the impacts of the project on the water environment must consider 'River Basin Management Plans' and the requirements of the WFD and its daughter directives, including those on priority substances and groundwater' and that 'The overall aim of the project should be no deterioration of ecological of status in watercourses, ensuring that Article 4.7 of the WFD does not need to be applied'	A WFD Screening assessment is provided in Appendix 13.2 Water Framework Directive Screening to this PEI Report. This identifies the surface and groundwater bodies screened in for detailed assessment in the WFD Compliance Assessment to be appended to the ES.
5.228, 5.230 and 5.231	Outline how the project can minimise impacts on the water environment by planning and designing for the efficient use of water, introduction of SuDs and adherence to good pollution control practice.	A description of the measures to be implemented during construction to minimise impacts on the water environment and the preliminary operational drainage design for the preliminary scheme design is provided in section 13.8 Design, mitigation and enhancement measures.

- 13.2.2 A list of the relevant legislation and policy considered in this PEI Report is provided in the following sections.
- 13.2.3 Full details of relevant national and local legislation, policy and strategy is provided in Appendix 13.3 Water legislative and policy framework, of this PEI Report.

#### National legislation

- Environmental Protection Act 1990
- Land Drainage Act 1991 (as amended)
- Water Resources Act (England and Wales) 1991 (as amended in 2009);
- Environment Act 1995
- Water Act 2003
- The Water Resources (Abstraction and Impounding) Regulations 2006 and Water Resources (Abstractions and Impounding (Exemptions) Regulations 2017
- The Flood Risk Regulations 2009
- Flood and Water Management Act 2010
- The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
- The Groundwater (Water Framework Directive) England Direction 2016
- The Environmental Permitting (England and Wales) Regulations 2016 (SI 2010/675) (as amended in 2018 and 2019)
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
- The Water Supply (Water Quality) Regulations 2018
- Urban Waste Water Treatment (England and Wales) Regulations 1994
- The Conservation of Habitats and Species Regulations 2017

#### **National planning policy**

- NPSNN
- The National Planning Policy Framework (NPPF) is noted as being ‘important and relevant’ and is to be considered, however, if there is a conflict between the NPSNN and NPPF, the NPSNN takes precedence.

#### **Regional planning policy**

- South west river basin district River Basin Management Plan (RBMP) (Updated: 2015) [3]
- South west Flood Risk Management Plan (FRMP) 2015-2021

#### **Local planning policy, strategy and evidence**

- Taunton Deane Borough Council Adopted Core Strategy 2011-2028 (in the process of replacement by the Somerset West and Taunton Local Plan 2040 [4])
- Taunton Deane Strategic Flood Risk Assessment (SFRA) (2011) [5]
- South Somerset Local Plan 2006-2028 [6]
- Somerset West & Taunton and South Somerset Councils Joint level 1 SFRA [7]
- Somerset County Council Preliminary Flood Risk Assessment (PFRA)
- Somerset County Council Local Flood Strategy

- Somerset Local Flood Risk Management Strategy Summary

### 13.3 Assessment methodology

13.3.1 The assessment methodology followed in this chapter conforms to DMRB LA 104 *Environmental assessment and monitoring* and DMRB LA 113 *Road drainage and the water environment*. DMRB LA 104 *Environmental assessment and monitoring* and LA 113 provide a methodology and criteria for assessing the impact of a proposed road scheme on the water environment. This methodology comprises the following steps:

- Identification of potential water receptors within the study area (as defined in section 13.5 Study area), based on the features outlined in Table 13-2 Attributes and indicators of quality for water features (adapted from Table 3.69 in DMRB LA 113 *Road drainage and the water environment*).
- Assessment of the potential importance, value and sensitivity of each of these receptors, shown in Table 13-3, as per Table 3.70 of DMRB LA 113 *Road drainage and the water environment*.
- Assessment of the potential magnitude of any construction or operation impact on the receptor, shown in Table 13-4, as per Table 3.71 of LA 113 *Road drainage and the water environment*.
- Assessment of the overall significance of any effects on receptors due to impacts, shown in Table 13-5, as per Table 3.8.1 of DMRB LA 104 *Environmental assessment and monitoring*. The significance of effect is determined by a combination of the identified importance/sensitivity of the receptor with the estimated magnitude of the impact.

13.3.2 For the purpose of this assessment, values of moderate adverse and above have been defined as significant potential effects.

**Table 13-2 Attributes and indicators of quality for water features (adapted from Table 3.69 in DMRB LA 113 *Road drainage and the water environment*)<sup>1</sup>**

Feature	Attribute	Indicator of quality	Possible Measure
Surface Water body	Water supply/ quality	Amount used for water supply (potable). Amount used for water supply (industrial/agricultural). Chemical water quality.	Location and number of abstraction points. Volume abstracted daily. WFD chemical status.
	Dilution and removal of waste products	Presence of surface water discharges. Effluent discharges.	Daily volume of discharge (treated/ untreated).
	Recreation	Access to river. Use of river for recreation.	Length of river used for recreation (fishing, water sports). Number of clubs.

<sup>1</sup> Please note that estuaries, canals and coastal waters have been excluded from this table as there are none located in the road drainage and water environment study area.

Feature	Attribute	Indicator of quality	Possible Measure
	Value to economy	Value of use of river.	Length of river used for recreation commercially. Number of people employed Length of riverbank developed. Length of river fished commercially.
	Conveyance of flow	Presence of watercourses.	Number and size of watercourses, natural, artificial or heavily modified water body. Number of watercourses artificially managed to control flow/levels.
	Biodiversity	Biological water quality.	Fisheries quality.
Fisheries quality.		Fish status, as defined under the WFD.	
Floodplain	Conveyance of flow	Presence of floodplain Flood flows.	Developed area within extent of floodplain affected, as determined from hydraulic modelling. Flood risk. Mean annual flood.
Groundwater	Water supply/ quality	Amount used for water supply. Amount used for water supply (industrial/ agricultural).	WFD groundwater quantitative and chemical status. Catchment abstraction management Strategy (CAMS) status. Location and number of abstraction points. Volume abstracted daily and use (potable most important). Location and grade of SPZ.
	Soakaway	Presence of soakaways or other discharges to the ground.	Location, type and number of discharge points. Daily volume discharged.
	Vulnerability	Groundwater vulnerability.	Classification of aquifer vulnerability.
	Economic value	Extent of use for abstractions.	Number of people employed, cost of alternatives.
	Conveyance of flow	Presence of groundwater supported water bodies. Potential for groundwater flooding. Groundwater interception by road structures or drainage.	Changes to groundwater recharge, levels or flows. Number and size of watercourses fed by baseflow.
	Biodiversity	Presence of Groundwater-dependent terrestrial ecosystems (GWDTE).	Changes to groundwater recharge, levels or flows. Status or classification of wetland including GWDTE under WFD.
Lakes, ponds and reservoirs	Recreation Access	Use for recreation.	Area used for recreation.
	Water supply/ quality	Amount used for water supply (potable). Amount used for water supply	Volume abstracted daily. WFD chemical status.

Feature	Attribute	Indicator of quality	Possible Measure
		(industrial/agricultural). Chemical water quality.	
	Dilution and removal of waste products	Presence of surface water discharges. Effluent discharges.	Daily volume of discharge (treated/untreated).
	Value to economy	Extent of employment.	Number of people employed.
	Biodiversity	Biological water quality.	WFD ecological status.
		Fisheries quality. Populations of birds.	Fish status, as defined in WFD 2000/60/EC. Assemblages or number of species of UK biodiversity. Action plan or birds of conservation concern.

**Table 13-3 Estimating the importance of water environment attributes (taken from Table 3.70 in DMRB LA 113 *Road drainage and the water environment*)**

Importance	Aspect	Description	Examples within the study area
Very High (Nationally significant attribute of high importance)	Surface water	Watercourse having a WFD classification shown in a RBMP and $Q_{95}^2 \geq 1.0 \text{ m}^3/\text{s}$ . Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by EC legislation.	None identified within the study area.
	Groundwater	Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK legislation. Groundwater locally supports GWDTE SPZ1.	None identified within the study area.
	Flood risk	Essential infrastructure or highly vulnerable development.	Existing A358.
High (Locally significant attribute of high importance)	Surface water	Watercourse having a WFD classification shown in a RBMP and $Q_{95} < 1.0 \text{ m}^3/\text{s}$ . Species protected under EC or UK legislation.	Broughton Brook, River Tone, Meare Stream, Fivehead River Main Channel 1, Fivehead River Main Channel 2, River Ding, River Isle.
	Groundwater	Principal aquifer providing locally important resource or supporting a river ecosystem Groundwater supports GWDTE SPZ2.	None identified within the study area.

<sup>2</sup>  $Q_{95}$  is the flow equalled or exceeded in a watercourse 95% of the time.

Importance	Aspect	Description	Examples within the study area
	Flood risk	More vulnerable development.	Residential properties along Stoke Road.
Medium (Moderate quality and rarity)	Surface water	Watercourses not having a WFD classification shown in a RBMP and $Q_{95} > 0.001 \text{m}^3/\text{s}$ .	Black Brook and its tributaries, Thornwater Stream, Meare Stream Tributary 1, Venner's Water, Cad Brook drainage network, Cad Brook, River Ding Tributaries 1 and 2, Back Stream.
	Groundwater	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3.	Quaternary deposits of Secondary aquifers, Triassic/Jurassic sequence of Secondary aquifers No groundwater SPZs identified within study area.
	Flood risk	Less vulnerable development.	Agricultural land.
Low (Lower quality)	Surface water	Watercourses not having a WFD classification shown in a RBMP and $Q_{95} \leq 0.001 \text{m}^3/\text{s}$ .	River Tone Tributaries 2 to 6, Fivehead River Tributaries 1 to 5, River Isle drainage network and tributary 1.
	Groundwater	Unproductive strata.	None identified within the study area.
	Flood risk	Water compatible development.	None identified within the study area.

**Table 13-4 Estimating the magnitude of an impact on an attribute (taken from Table 3.71 of DMRB LA 113 Road drainage and the water environment)**

Magnitude	Criteria	Attribute	
Major adverse	Results in loss of attribute and/or quality and integrity of the attribute	Surface water	Failure of both acute-soluble and chronic-sediment related pollutants in Highways England's Water Risk Assessment Tool (HEWRAT) and compliance failure with Environmental Quality Standards (EQS) values.
			Calculated risk of pollution from a spillage $\geq 2\%$ annually (spillage assessment).
			Loss or extensive change to a fishery.
			Loss of regionally important public water supply.
			Loss or extensive change to a designated nature conservation site.
			Reduction in water body WFD classification.
		Groundwater	Loss of, or extensive change to, an aquifer.
			Loss of regionally important water supply.
			Potential high risk of pollution to groundwater from routine runoff – risk score $>250$ (Groundwater quality and runoff assessment).
			Calculated risk of pollution from spillages $\geq 2\%$ annually (spillage assessment).
			Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies.
			Reduction in water body WFD classification.
		Flood risk	Increase in peak flood level ( $>100\text{mm}$ ).
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute	Surface water	Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT but compliance with EQS values.
			Calculated risk of pollution from spillages $\geq 1\%$ annually and $< 2\%$ annually.
			Partial loss in productivity of a fishery.
			Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies.
			Contribution to reduction in water body WFD classification.
			Groundwater
		Degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies.	
		Potential medium risk of pollution to groundwater from routine runoff – risk score 150-250.	
		Calculated risk of pollution from spillages $\geq 1\%$ annually and $< 2\%$ annually.	
		Partial loss of the integrity of GWDTE.	
		Contribution to reduction in water body. WFD classification.	

Magnitude	Criteria	Attribute	
			Damage to major structures through subsidence or similar effects or loss of minor structures.
		Flood risk	Increase in peak flood level (>50mm).
Minor adverse	Results in some measurable change in attributes, quality or vulnerability	Surface water	Failure of either acute soluble or chronic sediment related pollutants in HEWRAT.
			Calculated risk of pollution from spillages $\geq 0.5\%$ annually and < 1% annually.
			Minor effects on water supplies.
		Groundwater	Potential low risk of pollution to groundwater from routine runoff – risk score <150.
			Calculated risk of pollution from spillages $\geq 0.5\%$ annually and <1% annually.
			Minor effects on an aquifer, GWDTEs, abstractions and structures.
Flood risk	Increase in peak flood level (>10mm).		
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	Surface water	No risk identified by HEWRAT (pass both acute-soluble and chronic-sediment related pollutants).
			Risk of pollution from spillages <0.5%.
		Groundwater	No measurable impact upon an aquifer and/or groundwater receptors and risk of pollution from spillages <0.5%.
		Flood risk	Negligible change to peak flood level ( $\leq \pm 10$ mm).
Minor beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	Surface water	HEWRAT assessment of either acute soluble or chronic-sediment related pollutants becomes pass from an existing site where the baseline was of 'fail' condition.
			Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually).
		Groundwater	Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually).
			Reduction of groundwater hazards to existing structures.
			Reductions in waterlogging and groundwater flooding.
		Flood risk	Creation of flood storage and decrease in peak flood level (>10mm).
Moderate beneficial	Results in moderate improvement of attribute quality	Surface water	HEWRAT assessment of both acute-soluble and chronic-sediment related pollutants becomes pass from an existing site where the baseline was of 'fail' condition.
			Calculated reduction in existing spillage by 50% or more (when existing spillage risk >1% annually).
			Contribution to improvement in water body WFD classification.
		Groundwater	Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually).

Magnitude	Criteria	Attribute	
			Contribution to improvement in water body WFD classification. Improvement in water body Catchment Abstraction Management Strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE.
		Flood risk	Creation of flood storage and decrease in peak flood level1 (>50mm).
Major beneficial	Results in major improvement of attribute quality	Surface water	Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Improvement in water body WFD classification.
		Groundwater	Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer. Improvement in water body WFD classification.
		Flood risk	Creation of flood storage and decrease in peak flood level (>100mm).
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.	

**Table 13-5 Significance matrix (taken from Table 3.8.1 of DMRB LA 104 Environmental assessment and monitoring )**

		Magnitude of impact (degree of change)				
		No change	Negligible	Minor	Moderate	Major
Environmental value (sensitivity)	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

### Construction

- 13.3.3 DMRB LA 113 *Road drainage and the water environment* recommends that an assessment of construction impacts should use the advice given in Construction Industry Research and Information Association (CIRIA) Report C648 *Control of Water Pollution from Linear Construction Projects* [8] on potential impacts arising during the construction phase and the assessment and mitigation of these risks.
- 13.3.4 The potential impacts of construction on surface water or sediment runoff, water quality, flood risk and groundwater quality or level have been assessed based on the proposed construction methods and sequencing. Where details on construction methods have not been available, the use of standard construction practices have been assumed.

- 13.3.5 The impact and effect of physical works to watercourses is not assessed in the construction stage assessment but is instead examined as part of the operational assessment. This is because the hydromorphological and hydrological changes will be permanent.
- 13.3.6 The construction stage will only be assessed using hydraulic modelling (fluvial and/or surface water) if a specific activity at a specific location is identified to be at high risk of changing local flood risk characteristics increasing flood risk of local communities or endangering construction works. Hydraulic modelling may also be employed to assess the flood risk considerations of construction activities with a long duration. This will be determined through consultation with the Highways England and the LLFA.
- 13.3.7 Cumulative impacts on the water environment as a result of construction phasing have also been assessed in this PEI Report.
- 13.3.8 Outline measures to reduce construction impacts will be included in an Environmental Management Plan (EMP). These measures will be secured by the DCO application through the imposition of a requirement and these measures are therefore relied on for the purposes of this assessment. For the purposes of the impact assessment it is assumed that they will be implemented correctly. These measures will also be reported in the Register of Environmental Actions and Commitments in the EMP, to be submitted with the ES as part of the DCO application.
- 13.3.9 The potential impacts of construction on hydrogeology and surface hydrology will be evaluated by consideration of the proposed construction activities in the context of the baseline hydrogeological and surface water regime.

### **Operation**

- 13.3.10 The assessment of potential impacts during operation includes the following key aspects of the water environment for the purpose of the PEI Report:
- WFD compliance
  - flood risk
  - routine highway runoff, surface water flow paths and surface water quality
  - hydromorphological assessment
  - spillage and water quality
  - groundwater level and flow
  - groundwater quality and routine runoff
  - groundwater-dependent terrestrial ecosystems (GWDTEs)

#### WFD compliance assessment

- 13.3.11 A WFD compliance assessment for the proposed scheme will be undertaken and provided as part of the ES, with reference to the Planning Inspectorate (PINS) *Advice Note 18 The Water Framework Directive* [9].
- 13.3.12 The WFD quality and quantity elements identified through scoping and the WFD Screening assessment (Appendix 13.2 Water Framework Directive Screening) as being at potential risk of impact from the proposed scheme will be assessed in the WFD compliance assessment.
- 13.3.13 The WFD compliance assessment will identify how the proposed scheme has the potential to affect each of the water bodies' quality/quantity elements and whether this results in non-compliance with the WFD. The results of the other

assessments in ES Chapter 13 Road drainage and the water environment will be used to inform the WFD compliance assessment, where considered applicable.

- 13.3.14 For water bodies that have the potential to be impacted by the proposed scheme, the effect of the proposed scheme on any mitigation measures identified within the relevant RBMP will be assessed.

#### Flood risk

- 13.3.15 A preliminary FRA has been prepared to support the PEI Report and a standalone FRA will be prepared and provided as an appendix to ES.
- 13.3.16 The preliminary FRA outlines the baseline conditions in terms of flood risk from fluvial, groundwater, surface water and infrastructure failure (including existing drainage systems) both to and as a result of the proposed scheme and identifies the key flood risk receptors. It provides a commentary on how the proposed scheme has taken the sequential and exception tests into account during the route selection process and document the approach to assessment.
- 13.3.17 A standalone FRA will be produced to accompany the ES. This document will present an updated baseline, based on any additional data received, site observations and analytical work undertaken (including hydraulic modelling). It will also provide an assessment of flood risk from all the sources of flooding outlined.
- 13.3.18 A key component of the FRA supporting the ES will be an assessment of the watercourses crossed by the proposed scheme or in close proximity to the proposed scheme. This element of the assessment will be informed by fluvial hydraulic modelling at bridge and culvert crossings, watercourse realignments or diversions as necessary.
- 13.3.19 The assessment of the proposed scheme in the FRA will be based on application of the latest published climate change allowances where required.

#### Routine highway runoff, surface water flow paths and surface water quality

- 13.3.20 At this preliminary stage of assessment, the proposed scheme has been assessed based on a drainage strategy that implements sustainable methods of surface water management. This will consist of natural vegetated features which are recognised to capture and treat potentially polluting matter, such as hydrocarbons and heavy metals. Therefore, it assumed the implementation of the drainage strategy will mitigate the potential impact of routine runoff from highways.
- 13.3.21 A detailed assessment of the potential impacts of routine runoff on surface water quality will be undertaken using the Highways England Water Risk Assessment Tool (HEWRAT), to determine whether the risk is acceptable, and be included as an appendix to ES.
- 13.3.22 For the purpose of the HEWRAT assessment to be undertaken as part of the ES, baseline surface water quality will be determined based on the Environment Agency's online Water Quality Archive and water quality surveys undertaken along the extent of the proposed scheme.
- 13.3.23 The assessment will be conducted at proposed outfall locations. This assessment tool takes account of the release of materials with known toxicity to aquatic organisms (the heavy metals Copper (Cu) and Zinc (Zn)) and also accounts for locations where there could be accumulations of sediments.

- 13.3.24 The assessment of surface water quantity will be based on results from hydrodynamic modelling of the proposed conveyance and attenuation features. This will likely be undertaken in MicroDrainage. This will be informed by hydrological inputs based on the Flood Estimation Handbook (FEH) suite of data sources and the associated flood flow calculation methods that are routinely employed to determine appropriate rates of discharge from developed areas.
- 13.3.25 This information will be complimented by an assessment of existing surface water flow paths using analysis of topographical survey data and the impact that the proposed scheme may have on these. This will take account of overland flow, watercourses and land drainage features. Localised surface water models may be created where required. This will be undertaken using Tuflow or the FloodFlow module in MicroDrainage.
- 13.3.26 The assessment will also be used to inform the design of suitable drainage systems and ensure that an appropriate train of treatment is provided in the preliminary scheme design. In addition, the assessment process will ensure mitigation measures such as proprietary treatment devices are implemented where required.

#### Groundwater quality and routine runoff

- 13.3.27 An assessment of groundwater quality and routine runoff will be undertaken as an appendix to the ES. This will use DMRB LA 113 *Road drainage and the water environment* Appendix C Groundwater quality and run off, which provides a methodology to determine the risk of impact on groundwater quality from routine runoff. The method is based on the 'source-pathway-receptor' pollutant linkage principle.
- 13.3.28 For there to be a risk of impact to groundwater quality, a source, pathway and receptor all must be present to create a pollutant linkage or create a linkage based on natural processes. In the context of road drainage, the source is the road runoff with any pollutants it contains. The pathways are the processes which may modify the pollutants during transmission through the discharge system and unsaturated zone. The receptor is the groundwater resources.

#### Hydromorphological assessment

- 13.3.29 At this preliminary stage of assessment, the impact of the proposed scheme on hydromorphology has been limited to examining the length of culverting and the length and form of watercourse diversions. This information has then been compared to the overall length of the existing river channel and the existing hydromorphological condition of the watercourse, based on preliminary observations collected during a water features walk-over survey undertaken in June 2021, to enable a preliminary assessment to be undertaken.
- 13.3.30 A detailed hydromorphological assessment will be undertaken to determine whether the degree of hydromorphological change is acceptable and will be presented as an appendix to the ES.
- 13.3.31 The appropriate, methods of assessment to measure hydromorphological change will be determined by a competent expert on a site-specific basis. Appendix E Hydromorphological assessment of DMRB LA 113 *Road drainage and the water environment* will be followed.
- 13.3.32 The assessment will be made using professional judgement and experience of working within similar watercourses and will be focussed on locations where the

route of the proposed scheme physically interacts with water bodies for example proposed bridges, culverts, realignments and where development is taking place directly adjacent to a watercourse. The assessment will also take account of locations where sediment accumulation may occur as a result of the proposed drainage system or changes to the hydrodynamic characteristics of the channel.

#### Accidental spillage

- 13.3.33 An accidental spillage assessment will be undertaken using Appendix D Spillage assessment from DMRB LA 113 *Road drainage and the water environment* and presented as an appendix to the ES. Using the spillage assessment method, for the risk of a serious pollution incident to be acceptable the calculated annual probability of such an incident shall not be greater than 1%. Where spillage has the potential to affect a Site of Special Scientific Interest (SSSI), SPZ, protected area, drinking water supply or commercial activity abstracting from the watercourse, for the risk of a serious pollution incident to be acceptable the calculated annual probability shall not be greater than 0.5%.
- 13.3.34 The risk is assessed initially without any mitigation measures. Where mitigation measures are needed to reduce the probability, a reduction factor is applied, depending on the type of mitigation used.

#### Groundwater

- 13.3.35 An assessment will be undertaken following the procedures set out in Appendix A Groundwater levels and flow of DMRB LA 113 *Road drainage and the water environment*, which follows a stepped approach as follows:
- Step 1 – Establish regional groundwater body status.
  - Step 2 – Develop a conceptual model for the surrounding area.
  - Step 3 – Based on the conceptual model, identify all potential features which are susceptible to groundwater level and flow impacts.
- 13.3.36 The assessment of potential effects resulting from the operation of the proposed scheme will consider the interaction of the elements of the proposed scheme that are identified as interacting with the groundwater environment and the baseline conditions presented in the hydrogeological conceptual model created in Step 2. Ground investigation works, including a programme of groundwater level monitoring, will inform the assessment, which will be reported within an appendix to the ES.
- 13.3.37 For there to be a risk of impact to groundwater quality, a source, pathway and receptor all have to be present to create a pollutant linkage or create a linkage based on natural processes. In the context of the road drainage and water environment chapter, pollutant sources comprise the drainage water that would be discharged at the outfalls of the proposed drainage system, and the receptors are defined as controlled water bodies, including the groundwater that underlie the proposed scheme. In the case of natural processes, sources include recharge, pathways include flow paths through the aquifer and residence times, and receptors are defined as the aquifer or surface expressions of groundwater such as springs.
- 13.3.38 The source-pathway-receptor model can also be applied to water resources and water features that are sensitive to groundwater levels and flow. In this context sources include abstraction and recharge points, which may be for dewatering or drainage purposes that are artificially altering groundwater level and flows. The

pathway is the hydraulic connection between the water resource that is being changed and features up or down gradient, so this could include the aquifer that connects the two. The receptors are groundwater bodies and groundwater-dependent features.

- 13.3.39 Assessment of the impacts of the proposed scheme on groundwater abstractions will be carried out in accordance with DMRB LA 113 *Road drainage and the water environment* and Environment Agency guidance for dewatering abstractions (SC040020/SR1 [10]) and groundwater abstractions (SC040020/SR2 [11]), as needed within the ES.
- 13.3.40 At the preliminary scheme design stage, a qualitative assessment has been undertaken and this has informed the PEI Report, as reflected in Table 13-16. Detailed assessment will be undertaken, as necessary to inform the ES.

#### Groundwater-dependent terrestrial ecosystems

- 13.3.41 An assessment will be undertaken in the ES following the procedures set out in Appendix B Groundwater-dependent terrestrial ecosystems of DMRB LA 113 *Road drainage and the water environment*, which follows a stepped, risk-based approach which depends upon establishing linkages between potential impacts from the proposed scheme on the hydrological and hydrogeological regime and the GWDTEs.
- 13.3.42 The understanding of the baseline regime and the location of the GWDTE in comparison to the proposed scheme will enable an assessment of the potential impact of the proposed scheme on GWDTE to be undertaken as part of the ES. This will be undertaken at a Simple level, as per the requirements of DMRB LA 113 *Road drainage and the water environment*, and where a likely significant effect is identified, be further investigated by a Detailed assessment.

### **13.4 Assessment assumptions and limitations**

- 13.4.1 Assessment of the road drainage and the water environment aspects of the proposed scheme has been carried out in accordance with DMRB LA 113 *Road drainage and the water environment*, and supplementary methods for potential impacts not covered in DMRB LA 113 *Road drainage and the water environment*.
- 13.4.2 For the assessment of construction impacts, where details on construction methods and sequencing are not available, current standard construction practices are assumed.
- 13.4.3 The preliminary drainage design will be finalised later in the design process. However, it is assumed that the drainage strategy will implement sustainable methods of surface water management and that this will consist of natural vegetated features that are known to capture and treat potentially polluting matter, such as hydrocarbons and heavy metals.
- 13.4.4 The impact and effect of physical works to watercourses is not assessed in the construction stage assessment but is instead examined as part of the operational assessment. This is because the hydromorphological and hydrological changes will be permanent.
- 13.4.5 At this stage no ground investigations or environmental monitoring have been completed to inform this assessment. Conceptual models and assessments discussed within this PEI Report will therefore be developed within the ES,

utilising ground investigation and monitoring information procured following completion of the PEI Report.

- 13.4.6 A water features walk-over survey was undertaken in June 2021 to help gain an understanding of the existing conditions of surface water features that may be affected by the proposed scheme. It was not possible to gain access to all areas potentially relevant and ongoing data collection in the form of further surveys of surface water features will be required to enhance the understanding of current conditions to inform the ES. The ongoing data collection will aim to include the areas that could not be accessed during the surveys undertaken in June 2021 where access restrictions allow.
- 13.4.7 The surveys were affected by access limitations and therefore it is recognised that ongoing data collection will be required to enhance the understanding of current conditions to inform the ES.
- 13.4.8 Surface water quality surveys are in the process of being undertaken along the proposed scheme and will be undertaken across a total of six months. The results of the surface water quality surveys will be reported in the ES and used to inform the assessment undertaken in the ES.
- 13.4.9 It is acknowledged that uncertainty is inherent to this type of assessment, in particular with respect to the assessment of interaction between surface water and groundwater. Every effort has been made to ensure that the information used is as accurate as possible.
- 13.4.10 The final environmental design may be amended during detailed design prior to construction. However, the assessment of potential effects has taken account of the 'reasonable worst case' scenarios and mitigation measures are included within the preliminary scheme design accordingly.
- 13.4.11 This chapter includes the information reasonably required to assess the likely significant environmental effects. A precautionary valuation of the baseline that represents a 'reasonable worst-case' is provided, i.e. one that is precautionary, but it is reasonable to assume could occur, rather than an extreme scenario that is unlikely. Precautionary valuations have been assigned to surface water and groundwater receptors based on the best available information including consideration of any available field or desk study data and published research literature relevant to the study area. The degree of precaution built into the assessment is linked to the level of confidence in the existing data upon which the assessment is based.
- 13.4.12 The findings presented in this chapter represent those available at the time writing and data collected to end of June 2021.
- 13.4.13 Further topic-specific limitations and assumptions associated with the proposed scheme are discussed in the following sections.

#### Surface water

- 13.4.14 The baseline conditions have primarily been derived from desk-based sources. Baseline water quality data collection and monitoring will be completed prior to commencement of the ES, the findings of which will be incorporated into the assessment at that time.

#### Groundwater

- 13.4.15 The understanding of the hydrogeological regime of the proposed scheme and its study area is currently limited to published reports and available mapping.
- 13.4.16 If the DMRB LA 113 *Road drainage and the water environment* Appendix C Groundwater quality and run off assessment identifies an effect of a significance that is relevant to the specific locale of the point of discharge, which is not relevant to the wider groundwater body due to dilution effects, a supplementary risk assessment will be undertaken as part of the ES.

## 13.5 Study area

- 13.5.1 The study area for the road drainage and the water environment assessment has been defined as encompassing all surface water, groundwater, flood risk and human health receptors (taken to be drinking water abstractions in the context of the road drainage and water environment chapter) located within 1 kilometre (km) of the proposed scheme.
- 13.5.2 The 1km radius is based on the Highways England Water Resources Assessment Tool methodology and Help Guide which considers any protected areas for conservation located within 1km to be at higher risk than sites at a greater distance and applies stricter thresholds of compliance to protect against pollution incidents.
- 13.5.3 The 1km study area has been extended for features that have been determined as being in hydraulic connectivity with the proposed scheme and, therefore, have the potential to be affected by pollutants transported downstream of the works. These features include the underlying aquifer and associated WFD groundwater bodies and habitats identified as groundwater dependent.
- 13.5.4 Receptors within the study area (including those outside the 1km boundary, where relevant) are described in the baseline section of this chapter.

## 13.6 Baseline conditions

### Data sources

- 13.6.1 The baseline conditions have been derived from a number of sources, including the following:
- Environment Agency long term flood risk map and flood map for planning [12]
  - Environment Agency Catchment Data Explorer [13]
  - Environment Agency Groundwater Vulnerability Map [14]
  - British Geological Society (BGS) mapping [15]
  - Environment Agency groundwater SPZs [14]
  - Somerset West & Taunton and South Somerset Councils Joint Level 1 Strategic Flood Risk Assessment (SFRA) [7]
  - Somerset County Council Preliminary Flood Risk Assessment (PFRA) [16]
  - Somerset County Council Local Flood Strategy [17]
  - Somerset Local Flood Risk Management Strategy Summary [18]
  - River Basin Management Plan (RBMP) South West River Basin District [19]
  - Natural England, MAGIC [14]
  - Ordnance Survey (OS) mapping (including topography)
- 13.6.2 A water features walk-over survey was undertaken in June 2021 which has informed the baseline for the PEI Report. The water features walk-over survey

was conducted on upstream and downstream extents (dependent on access availability) of the following watercourses:

- Black Brook and tributaries
- Broughton Brook
- Thornwater Stream
- Meare Stream
- Fivehead Main River Channels 1 and 2
- Fivehead River Tributaries 3 and 5
- Venner's Water
- Cad Brook and Cad Brook drainage network
- River Ding
- Back Stream

13.6.3 The water features walk-over survey involved collecting high-level observational data and photographs along the extents of the watercourses available to access. Ongoing data collection (including surface water quality surveys as identified in 13.3.22) will be undertaken prior to the preparation of the ES to refine and enhance understanding of existing conditions of the water environment.

13.6.4 Details regarding historical ground investigations are referenced in Chapter 9 Geology and soils. Very limited information is available but will be supplemented by additional ground investigation as noted above.

#### **Surface water features**

13.6.5 The surface watercourses located in the study area are described in Table 13-6 and shown on Figure 13.1 Surface watercourses and flood risk. Unique names have been allocated to each of the watercourses for the purposes of the assessment set out in this chapter, utilising existing names where applicable, or allocating project-specific ones where not. The study area sits within a catchment that slopes gently to the north-east, with watercourses flowing generally in a north easterly direction, joining the River Parrett before discharging into the Bristol Channel at Burnham-on-Sea. The watercourses at the northern end of the study area flow into the River Parrett via the River Tone, a major tributary of the Parrett, while the watercourses to the south of the study area flow into the River Parrett via the River Isle, another major tributary of the Parrett. A detailed description of the individual watercourses is provided in the Preliminary FRA.

13.6.6 The whole River Parrett catchment has been subject to extensive flow and water level management, which is evidenced by networks of drains, ditches, rhynes (drainage ditches, or canals used to turn areas of wetland at around sea level into useful pasture) and canals.

13.6.7 The main rivers and ordinary watercourses that are located within the study area have been considered as part of the baseline for this assessment and are listed in Table 13-6. Individual drain features will only be assessed in the PEI Report and the ES where changes to their characteristics as a result of the proposed scheme affects the local land drainage regime.

#### **Table 13-6 Surface water features in the study area**

Surface water feature	Main river or Ordinary watercourse	WFD waterbody	Crossed by proposed scheme (Y/N)
Broughton Brook	Ordinary watercourse	Broughton Brook (South and West Somerset)	Y
Black Brook	Main river		Y
Black Brook Tributary 1	Ordinary watercourse		Y
Black Brook Tributary 2	Ordinary watercourse		Y
Black Brook Tributary 3	Ordinary watercourse		Y
Black Brook Tributary 4	Ordinary watercourse		N
Black Brook Tributary 5	Ordinary watercourse		N
Black Brook Tributary 6	Ordinary watercourse	N	
River Tone	Main river	Tone Ds Taunton	N
Thornwater Stream	Ordinary watercourse		Y
River Tone Tributary 2	Ordinary watercourse		N
River Tone Tributary 3	Ordinary watercourse		N
River Tone Tributary 4	Ordinary watercourse		N
River Tone Tributary 5	Ordinary watercourse		N
River Tone Tributary 6	Ordinary watercourse		N
Meare Stream	Ordinary watercourse	West Sedgemoor Main Drain	Y
Meare Stream Tributary 1	Ordinary watercourse		Y
Fivehead River Main Channel 1	Ordinary watercourse	Fivehead River	Y
Fivehead River Tributary 1	Ordinary watercourse		N
Fivehead River Tributary 2	Ordinary watercourse		N
Fivehead River Tributary 3	Ordinary watercourse		N
Fivehead River Main Channel 2	Ordinary watercourse		Y
Fivehead River Tributary 4	Ordinary watercourse		N
Fivehead River Tributary 5	Ordinary watercourse		Y
Venner's Water	Ordinary watercourse		Y
Cad Brook drainage network	Ordinary watercourse	Ding	Y
Cad Brook	Ordinary watercourse		Y
River Isle drainage network	Ordinary watercourse	Isle – Cad Brook to Fivehead River	N
River Isle Tributary 1	Ordinary watercourse		N
River Ding	Ordinary watercourse	Ding	Y
River Ding Tributary 1	Ordinary watercourse		N
River Ding Tributary 2	Ordinary watercourse		N
Back Stream	Ordinary watercourse	Isle – upper to confluence with Cad Brook	Y
River Isle	Main river		N

### Surface water quality

13.6.8 The Environment Agency's online Water Quality Archive indicates that there are freshwater monitoring points within the study area associated with:

- Broughton Brook, approximately 2km upstream of the proposed scheme.

- Fivehead River Main Channel 1, approximately 300m downstream of the proposed scheme.
- Fivehead River Main Channel 2, approximately 2.5km downstream of the proposed scheme.
- River Isle, approximately 100m downstream of the proposed scheme.

13.6.9 The most recent data from Broughton Brook, Fivehead River Main Channel 2 and the River Isle is dated to 2017 and records neutral to slightly alkaline pH waters, well oxygenated and with low levels of biochemical oxygen demand (BOD), indicating good quality water.

13.6.10 The River Isle is recorded as consistently containing higher levels of nitrates and phosphates than the Broughton Brook or Fivehead River Main Channel 2.

13.6.11 The most recent data from Fivehead River Main Channel 1 dates to 2021 and records water that is slightly alkaline, with low BOD, good oxygen saturation and good quality with respect to ammonia.

### **Groundwater features**

13.6.12 The groundwater features located in the study area are described in Table 13-7.

13.6.13 The study area crosses a region that is gently rolling countryside, underlain by Lower Jurassic and Upper Triassic bedrock, mostly formed of mudstones but also containing beds of limestone and other more permeable strata. Strata generally dip to the east and southeast, with variations on a localised scale as a consequence of faulting. BGS hydrogeological mapping notes that Triassic strata underlying the northern end of the study area are of low productivity, yielding limited amounts of water (that can be highly mineralised) and that the strata act as a confining layer over the Sherwood Sandstone that lies at greater depth. The Jurassic strata that underlie the southern portion of the study area are classified by the BGS as being rocks with essentially no groundwater. The bedrock underlying the study area is thus likely to have a limited role in any groundwater movement and thus any hydrogeological interaction with the proposed scheme.

13.6.14 Overlaying the bedrock for approximately 50% of the route are superficial deposits of head, colluvium and alluvium, reflecting Quaternary remnant landscape, with higher topography (and no superficial deposits) to the southwest, with alluvium cropping out in sinuous patterns aligning with drainage from the higher land, down to the northeast and towards the River Parrett. Although such strata can contain permeable strata and have been classified as Secondary aquifers by the EA, review of BGS borehole logs within the study area records that very little if any groundwater has been encountered during investigation works. It is recognised, however, that a number of groundwater issues are located within the study area (see section 13.6.34).

13.6.15 Issues are points where water emerges at the surface. This can be water discharging from a culvert, a land drainage pipe or from a formal drainage system but in some instances is groundwater emergence. The issues identified predominantly occur in outcrops of head, colluvium and alluvium, indicating that there is water present within these strata, although likely to be geographically limited in extent. Issues are discussed further in section 13.6 Baseline conditions.

**Table 13-7 Groundwater features in the study area**

Age	Formation	Aquifer classification*	Description (generic)	WFD waterbody
Quaternary	Alluvium	Secondary (undifferentiated)	Clay, silt, sand and gravel	Tone and North Somerset Streams  (Between M5 junction and West Hatch)
	Colluvium	Secondary (undifferentiated)	Diamicton	
	Head	Secondary A	Gravel, sand and clay	
Jurassic	Charmouth Mudstone Formation	Secondary (undifferentiated)	Mudstone	Tone and North Somerset Streams  (Between M5 junction and West Hatch)
	Belemnite Marl Member	Unproductive strata	Calcareous mudstones with abundant belemnites	
Triassic/Jurassic	Blue Lias Formation	Secondary A	Mudstone and Limestone, interbedded	Tone and North Somerset Streams  (Between M5 junction and West Hatch)
Triassic	Westbury Formation and Cotham Member (undifferentiated)	Secondary (undifferentiated)	Mudstone and limestone, interbedded	
	Blue Anchor Formation	Secondary (undifferentiated)	Mudstone	
	Branscombe Mudstone Formation	Secondary B	Mudstone	
	Mercia Mudstone	Secondary B	Mudstone and Halite-Stone	
	Mercia Mudstone Group	Secondary A	Sandstone	

\* *Secondary A – containing permeable layers capable of supporting water supplies but at a local scale rather than a strategic scale, these deposits can form an important source of baseflow to local watercourses.*

*Secondary B – predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.*

*Secondary undifferentiated – strata of mixed characteristics that are a mix of unproductive strata and strata that may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.*

*Unproductive strata - low permeability and negligible significance for water supply or watercourse base flow.*

- 13.6.16 Groundwater vulnerability across the route of the proposed scheme predominantly varies between high and medium-high. Areas designated as high and medium-high can easily transmit pollution to groundwater and are characterised by high leaching soils and the absence of low permeability superficial deposits. The consequence of this is that operations and activities in these areas may (high areas) / are likely (medium-high areas) to require measures in addition to good practice pollution prevention in order to ensure that groundwater is not impacted.
- 13.6.17 In the vicinity of Ashill there is a small area of medium to low vulnerability aquifers, together with outcrops of unproductive strata. Areas designated as medium offer intermediate groundwater protection and areas identified as unproductive strata are associated with low permeability bedrock or superficial deposits that naturally offer protection to any underlying aquifers. Strata in this area have some to a high degree of natural protection from surface activities and therefore no additional measures would be required to ensure that groundwater is impacted.
- 13.6.18 SPZs are designated around groundwater abstraction points to protect the water quality of the abstraction from surface activities. There are no SPZs located within the study area.
- 13.6.19 The assessment of potential contamination risk to groundwater quality in the study area is provided in Chapter 9 Geology and Soils to this PEI Report.

#### Groundwater quality

- 13.6.20 The Environment Agency's online Water Quality Archive indicates that there are no groundwater monitoring points within the study area.
- 13.6.21 The Tone and North Somerset Streams WFD designated groundwater body underlies the north western end of the study area (from the M5 to West Hatch). It is currently classified as having poor water quality, this classification being associated with diffuse pollution from agricultural land use. The Dyrham Formation (North of Yeovil – Fragmented GWB) is not located within the 1km study area but lies directly to the south-east and is considered to potentially be in hydraulic connectivity with the proposed scheme. It currently is classified as having good water quality.
- 13.6.22 A significant proportion of the study area (from West Hatch to Illminster) is not designated as a WFD groundwater body and there is thus no groundwater quality data available.

#### Groundwater levels

- 13.6.23 There are no known groundwater level monitoring locations within the study area. Groundwater level monitoring will be undertaken as part of planned ground investigations in order to inform the assessments to be completed for the ES. The BGS have produced a groundwater flooding risk categorisation based on underlying geology and hydrogeological characteristics. The BGS classify the route of the proposed scheme as follows:
- The northernmost third – located in an area with the potential for groundwater flooding at the surface.
  - Central third – located in an area with limited potential for groundwater flooding to occur or not considered to be prone to groundwater flooding.

- Southern third – located in an area with a mixture of classifications from not prone to groundwater flooding, to potential for groundwater flooding at the surface.

#### WFD waterbodies

13.6.24 The statutory objective of the WFD is to prevent deterioration of all water bodies at good or high status and to prevent waterbodies at less than good status from deteriorating further.

13.6.25 The WFD waterbodies in the study area are located within the South West River Basin District and are described in Table 13-8 and shown on Figure 13.5 Surface water WFD waterbodies and Figure 13.6 Groundwater WFD waterbodies.

**Table 13-8 WFD waterbodies in the study area**

WFD waterbody	Operational catchment	Overall status (Cycle 2 - 2019)	Future objective
<b>Surface water</b>			
Broughton Brook (South and West Somerset) (GB108052015420)	Tone	Poor	Good by 2027
Tone Ds Taunton (GB108052015482)	Tone	Moderate	Good by 2021
West Sedgemoor Main Drain (GB108052015450)	Parrett	Moderate	Moderate by 2015 (Achieved)
Fivehead River (GB108052015241)	Parrett	Moderate	Moderate by 2027
Ding (GB108052015180)	Parrett	Poor	Poor by 2015 (Achieved)
Isle – Cad Bk to Fivehead River (GB108052015220)	Parrett	Moderate	Good by 2027
Isle – Upper to conf Cad Bk (GB108052015190)	Parrett	Moderate	Moderate by 2015 (Achieved)
<b>Groundwater</b>			
Tone and North Somerset Streams (GB40802G806400)	South West GW	Poor	Good by 2027
Dyrham Formation – North of Yeovil – Fragmented GWB (GB40802G803700)	South West GW	Good	Good by 2015 (Achieved)

#### **Designated sites with potential hydraulic connectivity to the proposed scheme**

13.6.26 Table 13-9 lists the national and international designated sites that have a potential hydraulic connection to the watercourses and underlying groundwater receptors (identified as GWDTEs in line with DMRB LA 113 *Road drainage and the water environment*) located within the study area of the proposed scheme. These sites will also be addressed as part of the Habitats Regulations Assessment, as outlined in Chapter 8 Biodiversity of this PEI Report.

- 13.6.27 In addition to the statutory designated sites listed in Table 13-9, there are a number of non-statutory wildlife sites such as Local Wildlife Sites (LWS) within and adjacent to the proposed scheme. Some of these are associated directly with watercourses. Details of these are provided in Chapter 8 Biodiversity of this PEI Report.
- 13.6.28 Ashill Wood and Every's Copse are two ancient woodlands that lie to the east north-east of Ashill. Whilst not directly associated with any of the watercourses listed in Table 13-6, they are bordered by ditches which have the potential to be affected by the proposed scheme.
- 13.6.29 The assessment of designated sites, in terms of the impact of changes to hydrological conditions and water quality will be undertaken in accordance with DMRB LA 113 *Road drainage and the water environment* and will include the assessment of GWDTE. It will involve collaboration with the biodiversity and ecology team and informed by consultation with the Environment Agency and Natural England. Impacts and effects will be reported in the ES and will also take account of WFD compliance.

**Table 13-9 Designated sites with potential hydraulic connectivity close to the proposed scheme**

Designated site name	Designation <sup>1</sup>	Location (relative to the proposed scheme)	Surface water dependent (Y/N)	Associated water body	If Yes, relevant species/habitats/vegetation	Ground-water dependent (Y/N)	If Yes, relevant species/habitats/vegetation
Curry and Hay Moors	SSSI	Approx. 3.5km north-east	Y	River Tone Broughton Brook Black Brook	Annually flooded grazing marshes and meadows which also support wintering birds. Important communities associated with ditches.	Y	Marsh and ditches
Somerset Levels and Moors	SPA & Ramsar	Approx. 3.5km north-east	Y	River Tone Broughton Brook Black Brook	Grassland, marshland, standing water and fen environments which supports diverse aquatic, flora and over-wintering bird populations	Y	Marshland and fen systems
Children's Wood/ Riverside Park	LNR	Approx. 500m west	Y	River Tone	Park with lake, open grassland and woodland habitats. Supports large numbers of bird and butterfly species as well as bats and otters	N	n/a
South Taunton Streams	LNR	Approx. 700m west	Y	Tributary of River Tone	Wetland habitats supporting wide range of flora and fauns including water voles, otters, bats and birds.	Y	n/a
North Moor	SSSI	Approx. 6.7km north-east	Y	River Tone	Nationally important grazing marsh and ditch system. Communities associated with peat, wet pastures and wet grasslands. Diverse aquatic communities and birdlife.	Y	Marshes, peat and wet grasslands
Somerset Levels	NNR	Approx. 10km northeast	Y	River Tone	Open water, lowland grassland habitats	N	n/a
Southlake Moor	SSSI	Approx. 10km north-east	Y	River Tone River Parrett	Nationally important grazing marsh and ditch system. Peaty soils with high water levels and winter flooding. Diverse aquatic communities. Also supports significant bird population and otters.	Y	Marsh and ditch system
West Sedgemoor	SSSI	Approx. 4.9km north-east	Y	West Sedgemoor Main Drain	Fields and meadows within complex of ditches and rhynes. Supports rich invertebrate populations and diverse flora as well as large numbers of wintering birds.	Y	Low-lying fields linked by ditch system

Designated site name	Designation <sup>1</sup>	Location (relative to the proposed scheme)	Surface water dependent (Y/N)	Associated water body	If Yes, relevant species/habitats/ vegetation	Ground-water dependent (Y/N)	If Yes, relevant species/habitats/ vegetation
Barrington Hill Meadows	NNR/SSSI	1.7km south	Y	Veneer's Water	Molinia meadows on calcareous, peaty or clayey-silt laden soils	Y	Molinia meadows on calcareous, peaty or clayey-silt laden soils
West Moor	SSSI	9.6km north-east	Y	River Isle	Grazing marsh grasslands, aquatic plant communities,	Y	Grazing marsh grasslands
Wet Moor	SSSI/SPA/Ramsar	13km north-east	Y	River Isle	Lowland wet grasslands and wetland habitats; wintering waterfowl, birds of international importance	Y	Lowland wet grasslands and wetland habitats
Ruttersleigh	SSSI	4.8km south-west	N	N/A	N/A	Y	Broadleaved woodland, scrub, bracken, mires and unimproved grass land
Prior's Park and Adcombe Wood	SSSI	7.8km west	N	N/A	N/A	Y	Marshy grassland
Deadman	SSSI	7.5km south-west	N	N/A	N/A	Y	Wet heath, bog pools, marshy grassland
Severn Estuary	SPA, Ramsar and SAC	Approx. 25km downstream along the Tone and the Parrett	Y	NA	Primarily designated for estuaries, mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadow habitats	Y	

<sup>1</sup> SSSI – Site of Special Scientific Interest, SAC – Special Area of Conservation SPA – Special Protection Area, NNR – national nature reserve, LNR – local nature reserve

## Abstractions and discharges

- 13.6.30 Abstractions and discharges located in the study are shown on Figure 13.3 Groundwater and surface water features.
- 13.6.31 There are two known groundwater abstraction points within the study area, both of which have two licences attributed to them. The first of the abstraction points on Henlade Estate Gardens has one licence for spray irrigation and another for potable use. The second abstraction point on Ashe Farm has two licences one for general farming and domestic and the other for general use. None of the abstractions fall within or adjacent to the red line boundary and therefore will not be assessed as there is no risk of potential impact.
- 13.6.32 There are 34 consented discharges within the study area, one of which has two licences associated with it. A total of 12 of the consented discharges fall within or adjacent to the red line boundary, as listed in Table 13-10, and will therefore be assessed in this report.
- 13.6.33 All identified features are assigned an importance value as outlined in Table 13-13.

**Table 13-10 Discharge consents and abstraction locations to be included in the assessment**

Receptor ID	Primary use of feature	Location (Grid reference)
<b>Discharge consents</b>		
DIS-001	Pumping Station on Sewerage Network (water company)	Stepley (ST266235)
DIS-002	Making of Glass/Ceramics/Cement/Cutting Stone	Thornfalcon (ST273239)
DIS-003	Holiday Accom/Camp Site/Caravan Site/Hotel/Hostel	Greenway Lane (ST270234)
DIS-004	Domestic property (single) (including farm house)	Mattock's Tree Hill (ST281232)
DIS-005	Holiday Accom/Camp Site/Caravan Site/Hotel/Hostel	West Hatch (ST286219)
DIS-006	WwTW/Sewage Treatment Works (water company)	Village Road (ST294218)
DIS-007	Domestic property (multiple) (including farm houses)	Capland Lane (ST305187)
DIS-008	Farms (not house)/ Crop + Animal Rearing/Plant Nursery	Neroche Farm (ST310182)
DIS-009	Domestic property (single) (including farm house)	Kenny (ST314178)
DIS-010	Making of Coke + Refined Petroleum Products	Ashill (ST317176)
DIS-011	WwTW/Sewage Treatment Works (water company)	Ashill A358 (ST322176)
DIS-012	Domestic property (multiple) (including farm houses)	Hastings Cross (ST329168)
<b>Abstractions</b>		
ABS-001	Spray irrigation – Direct	Henlade Estate Gardens (ST269244)
ABS-002	Drinking, cooking, sanitary, washing, (Small Garden) – Commercial/Industrial/Public Services	
ABS-003	General Farming and Domestic	Ashe Farm (ST279223)
ABS-004	General use for Industrial/Commercial/Energy/Public Services	

- 13.6.34 Details of private abstractions and potentially unlicensed abstractions are awaited and will be assessed in the ES.

### Springs, issues and sinks

- 13.6.35 Springs, issues and sinks have been identified within the study area from interrogation of Ordnance Survey mapping. Those located in the study area are shown on Figure 13.3 Groundwater and surface water features.
- 13.6.36 Sinks represent a location where surface water enters a subsurface feature such as a culvert or land drainage pipe. However, it can also represent a point where a pathway is introduced between surface water and groundwater, where water 'sinks' into groundwater.
- 13.6.37 Issues are points where water emerges at the surface. This can be water discharging from a culvert, a land drainage pipe or from a formal drainage system but in some instances is groundwater emergence. Springs are defined as a specific form of issue where groundwater emerges at the surface.
- 13.6.38 All identified features have been assigned an importance value, but only features that lie within the red line boundary will be assessed and their importance value outlined in Table 13-12.
- 13.6.39 Within the study area, three springs have been identified. These features all have a receptor importance value of high as they are assumed to be issuing from superficial deposits linked to the Quaternary period (assigned a high importance value as per Table 13-12). None of the three springs are within the red line boundary and therefore will not be assessed unless there is a potential release of existing contaminants. This will be assessed in conjunction with Chapter 9 Geology and soils of the PEI Report.
- 13.6.40 Within the study area, 14 sinks have been identified. All 14 of the sinks identified can be attributed to either land or road drainage and therefore have all been assigned an importance value of low. Three sinks lie within the red line boundary (Table 13-11) and will therefore be assessed in Table 13-16.

**Table 13-11 Sinks located within the study area**

Receptor ID	Location with respect to the proposed scheme	Grid Ref
SINK-001	160m, south	ST270235
SINK-002	115m, north east	ST275236
SINK-003	Adjacent to existing A358	ST321176

- 13.6.41 Within the study area, 47 issues have been identified. 39 of the issues identified can be attributed to either land or road drainage and therefore have all been assigned an importance value of low (see Table 13-12). Eight of the issues have a clear and direct link to a watercourse and will be assessed and their importance values determined based on the watercourses that they feed (see Table 13-12).

**Table 13-12 Issues located within the study area that directly feed watercourses**

Receptor ID	Location with respect to the proposed scheme	Grid Ref	Linked watercourse
ISS-001	110m, south-west	ST261238	Black Brook Tributary 4
ISS-002	180m, south-west	ST276232	Black Brook Tributary 6
ISS-003	180m, south-west	ST2763232	Thornwater Stream
ISS-004	140m, south-west	ST275233	Thornwater Stream

Receptor ID	Location with respect to the proposed scheme	Grid Ref	Linked watercourse
ISS-005	290m, north-east	ST275238	Thornwater Stream
ISS-006	360m, south-west	ST307179	Fivehead River Tributary 5
ISS-007	780m, south-west	ST288191	Fivehead River Main Channel 1
ISS-008	0m (Caplands Link)	ST321177	Venner's Water

13.6.42 One issue (ST269234) cannot be attributed to drainage or linked to a watercourse and could therefore be a groundwater-surface water interaction. However, this issue is not within the red line boundary and will not be assessed as there is no risk of a potential impact.

#### Flood risk

13.6.43 The baseline flood risk conditions are discussed within the Preliminary FRA provided as Appendix 13.1 PEIR Flood Risk Assessment to this PEI Report.

#### **Future baseline**

#### Water quality

13.6.44 The current water quality for road drainage and water environmental are not expected to undergo any notable changes in the foreseeable future. Therefore, the current conditions are considered to provide the most reasonable basis for assessment

#### Flood risk

13.6.45 The following developments have the potential to introduce new flood risk receptors into the study area and, in combination with the works required for the proposed scheme, exacerbate the impacts of the proposed scheme on local flood risk:

- Application 17/03800/OUT – Erection of 25 dwellings and formation of access (outline) – Located in close proximity to areas of fluvial and surface water flood risk in vicinity of Ashill.
- Application 19/03418/FUL – Erection of 10 No. dwellings with garages and ancillary parking. – Located in close proximity to area of fluvial flood zone and surface water flood risk in Kenny.
- Application 20/03697/REM – Landscaping, ecological mitigation, surface and foul water drainage and cycle/footpath links associated with residential development - Located in close proximity to areas of fluvial and surface water flood risk in vicinity of Ashill.
- Application 19/00012/OUT – Outline planning application for the erection of flexible class buildings, dwellings and access - Noted that application site comprises of large area located adjacent to fluvial flood zone associated with River Isle.
- Application 19/03070/FUL – Erection of 25 No. dwellings along with associated vehicular access and landscaping - Noted that application is located adjacent to fluvial flood zone associated with the River Ding.

#### **Importance of features**

13.6.46 Table 13-13 summarises the assessment of the importance of water environment attributes to be assessed as part of the PEI Report in line with Table 13-3, and as per the methodology outlined in Section 13.3. The classifications presented are

the basis for the assessment. Biodiversity classifications are based upon the watercourses being within or supporting designated sites or the watercourses supporting protected species. An assessment of potential effects on individual species is presented in Chapter 8 Biodiversity of the PEI Report.

**Table 13-13 Water environment receptors, attributes and importance**

Receptor	Attribute/features	Importance of receptor	Overall importance of receptor	Quality measure assigned to attribute
<b>Surface water</b>				
Broughton Brook	Water quality	High	High	Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m <sup>3</sup> /s
	Biodiversity	High		Supports water dependent nationally and internationally designated sites/habitats approximately 3.5 km downstream
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (M5) as per NPPF
Black Brook	Water quality	Medium	High	Watercourse not having a WFD classification and Q95 >0.001m <sup>3</sup> /s
	Biodiversity	High		Supports water dependent nationally and internationally designated sites/habitats approximately 3.5 km downstream
	Flood risk	Very High	More vulnerable	Maximum vulnerability of flood risk receptor is more vulnerable as per NPPF
Black Brook Tributaries 1 to 3	Water quality	Medium	Medium	Watercourse not having a WFD classification and Q95 > 0.001m <sup>3</sup> /s
	Biodiversity	Medium		Aquatic habitat supports protected species
Black Brook Tributary 1 to 2	Flood risk	Medium	Medium	Maximum vulnerability of flood risk receptors are less vulnerable as per NPPF
Black Brook Tributary 3	Flood risk	High	High	Maximum vulnerability of flood risk receptors are more vulnerable as per NPPF
Black Brook Tributaries 4 to 6	Water quality	Medium	Medium	Watercourse not having a WFD classification and Q95 > 0.001m <sup>3</sup> /s
	Flood risk	Medium	Medium	Maximum vulnerability of flood risk receptors are less vulnerable as per NPPF
River Tone	Water quality	High	High	Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m <sup>3</sup> /s
	Biodiversity	High		Supports water dependent nationally and internationally designated sites/habitats approximately 3.5 km downstream
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (Bristol to Exeter (rail line) as per the NPPF
Thornwater Stream	Water quality	Medium	Medium	Watercourse not having a WFD classification and Q95>0.001m <sup>3</sup> /s

Receptor	Attribute/features	Importance of receptor	Overall importance of receptor	Quality measure assigned to attribute
	Conveyance of flow			
	Biodiversity	Medium		Aquatic habitat supports protected species
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
River Tone Tributaries 2 to 6	Water quality	Low	Low	Watercourse not having a WFD classification and $Q95 \leq 0.001\text{m}^3/\text{s}$
	Flood risk	NA	NA	Covered by Flood Zone associated with River Tone
Meare Stream	Water quality	High	High	Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0\text{m}^3/\text{s}$
	Biodiversity	High		Supports water dependent nationally designated site/habitats approximately 5 km downstream
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
Meare Stream Tributary 1	Water quality	Medium	Medium	Watercourse not having a WFD classification and $Q95 > 0.001\text{m}^3/\text{s}$
	Flood risk	High	High	Maximum vulnerability of flood risk receptor is more vulnerable as per NPPF
Fivehead River Main Channel 1	Water quality	High	High	Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0\text{m}^3/\text{s}$
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
Fivehead River Tributaries 1 to 5	Water quality	Low	Low	Watercourse not having a WFD classification and $Q95 \leq 0.001\text{m}^3/\text{s}$
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
Fivehead River Main Channel 2	Water quality	High	High	Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0\text{m}^3/\text{s}$
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
Venner's Water	Water quality	Medium	Medium	Watercourse not having a WFD classification and $Q95 > 0.001\text{m}^3/\text{s}$
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
Cad Brook drainage network	Water quality	Medium	Medium	Watercourse not having a WFD classification and $Q95 > 0.001\text{m}^3/\text{s}$
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF

Receptor	Attribute/features	Importance of receptor	Overall importance of receptor	Quality measure assigned to attribute
Cad Brook	Water quality	Medium	Medium	Watercourse not having a WFD classification and Q95 >0.001m <sup>3</sup> /s
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
River Isle drainage network and tributary 1	Water quality	Low	Low	Watercourse not having a WFD classification and Q95 ≤0.001m <sup>3</sup> /s
	Flood risk	Medium	Medium	Maximum vulnerability of flood risk receptor is less vulnerable as per NPPF
River Ding	Water quality	High	High	Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m <sup>3</sup> /s
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
River Ding Tributaries 1 and 2	Water quality	Medium	Medium	Watercourse not having a WFD classification and Q95>0.001m <sup>3</sup> /s
	Flood risk	Medium	Medium	Maximum vulnerability of flood risk receptor is less vulnerable as per NPPF
Back Stream	Water quality	Medium	Medium	Watercourse not having a WFD classification and Q95 >0.001m <sup>3</sup> /s
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A358) as per NPPF
River Isle	Water quality	High	High	Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m <sup>3</sup> /s
	Biodiversity	High		Supports water dependent nationally designated site/habitats approximately 13km downstream
	Flood risk	Very High	Very High	Maximum vulnerability of flood risk receptor is Essential Infrastructure (A303) as per NPPF
<b>Groundwater</b>				
Quaternary deposits: Secondary aquifers (undifferentiated) Secondary A aquifers	Water supply/quantity	Medium	High	No groundwater SPZs within study area. Small number of non-potable abstractions
	Vulnerability	High		Medium to high vulnerability within study area
	Biodiversity/Conveyance of flow	High		Strata associated with multiple water dependent locally, nationally and internationally designated site/habitats within study area
Triassic/Jurassic sequence: Secondary aquifers (undifferentiated)	Water supply/quantity	Medium	Medium	No groundwater SPZs within study area. Small number of non-potable abstractions
	Vulnerability	Medium		Medium to high vulnerability within study area, with small areas of low vulnerability and unproductive strata in the vicinity of Ashill

Receptor	Attribute/features	Importance of receptor	Overall importance of receptor	Quality measure assigned to attribute
Secondary A aquifers Secondary B aquifers	Biodiversity/ Conveyance of flow	Medium		Strata associated with multiple water dependent locally and nationally designated site/habitats within study area
<b>Discharges</b>				
DIS-001	N/A	N/A	High	Discharge part of a sewage network and is therefore of high importance as it cannot be easily relocated
DIS-002	N/A	N/A	High	Discharge point related to industrial use and therefore large volumes of low quality water are expected and would be difficult to move
DIS-003	N/A	N/A	Medium	Discharge related to a holiday accommodation site and could have significant volumes of water making the point difficult to move
DIS-004	N/A	N/A	Low	Discharge related to an individual farm which is only of localised importance and most likely discharging low volumes of water.
DIS-005	N/A	N/A	Medium	Discharge related to a holiday accommodation site and could have significant volumes of water making the point difficult to move
DIS-006	N/A	N/A	High	Discharge part of a sewage treatment works and is therefore of high importance as it cannot be easily relocated
DIS-007	N/A	N/A	Medium	Discharge point linked to multiple properties with an associated increase in discharge volume making the point inconvenient to relocate.
DIS-008	N/A	N/A	Medium	Discharge point linked to multiple properties with an associated increase in discharge volume making the point inconvenient to relocate.
DIS-009	N/A	N/A	Low	Discharge related to an individual farm which is only of localised importance and most likely discharging low volumes of water.
DIS-010	N/A	N/A	High	Discharge point related to industrial use and therefore large volumes of low quality water are expected and would be difficult to move
DIS-011	N/A	N/A	High	Discharge part of a sewage network and is therefore of high importance as it cannot be easily relocated
DIS-012	N/A	N/A	Medium	Discharge point linked to multiple properties with an associated increase in discharge volume making the point inconvenient to relocate.
<b>Sinks</b>				

Receptor	Attribute/features	Importance of receptor	Overall importance of receptor	Quality measure assigned to attribute
SINK-001	N/A	N/A	Low	Presence of sinks attributed to either land or road drainage and therefore are of local importance.
SINK-002	N/A	N/A	Low	
SINK-003	N/A	N/A	Low	
<b>Issues</b>				
ISS-01	N/A	N/A	Medium	Importance value attributed based on watercourse that issue discharges to.
ISS-02	N/A	N/A	Medium	
ISS-03	N/A	N/A	Medium	
ISS-04	N/A	N/A	Medium	
ISS-05	N/A	N/A	Medium	
ISS-06	N/A	N/A	Low	Importance value attributed based on the fact that the issue is linked to either land or road drainage
ISS-07	N/A	N/A	High	Importance value attributed based on watercourse that issue discharges to
ISS-08	N/A	N/A	Medium	

## 13.7 Potential impacts

### Construction impacts

13.7.1 During construction, there is the potential for the proposed scheme to impact on flood risk, surface water and groundwater quality and WFD waterbodies.

13.7.2 The potential impacts to the road drainage and water environment during construction are outlined below (note that there are a number of synergies with the potential impacts discussed in Chapter 8 Biodiversity and Chapter 9 Geology and soils):

- Release of sediment and construction related pollutants (e.g. fuels, lubricants, alkaline materials such as concrete and cement and waterproofing materials), particulates, chemicals (as a result of accidental spills) and other materials into the local watercourses during routine construction activities affecting surface water quality.
- Creation of pollution pathways, for example through the installation of piling, to the surface water and groundwater receptors including WFD waterbodies.
- Mobilisation of groundwater contaminants, remaining from historical and associated with current industrial and agricultural land use, as a result of earthworks activities or below ground works.
- Increase in surface water and fluvial flood risk due to an increase in the volume and rate of water reaching watercourses and a decrease in groundwater recharge associated with an increase in the extent of impermeable surface area.
- Increase in surface water and fluvial flood risk as a result of storage of construction materials and construction activities in areas of high flood risk currently used as flood storage (Flood Zones 2 and 3 and area identified to be at risk of surface water flooding by the Environment Agency's Risk of Flooding from Surface Water (RoFSW) mapping).

- Disruption of existing surface water and groundwater flow paths due to construction activities. Specifically, earthworks activities and installation of buried structures such as foundations.
- Reduction in groundwater levels, disruption to existing groundwater flows and damage to existing groundwater abstractions as a result of the introduction of cuttings or shallow earthworks and dewatering of underlying geological strata to facilitate excavation.
- Impacts to the hydromorphological and ecological quality of watercourses associated with works within or in close proximity to watercourses, including physical change to the watercourses and longer-term changes due to sediment deposition (and any associated contaminants within that sediment).
- Damage and disruption to existing pipe, culverts, bridges and other hydraulic structures present within the study area.
- Displacement/removal of groundwater surface water features such as abstraction and discharge points and sinks, springs and issues as a result of construction. It is assumed that any features removed as a result of the proposed scheme will be replaced like-for-like.

13.7.3 The key impacts to the road drainage and water environment associated with the construction of the proposed scheme are related to working in and around watercourses.

13.7.4 These impacts have the potential to affect all the watercourses identified to be spanned by the proposed scheme as well as the other watercourses identified to be located within land required for construction of the proposed scheme. Watercourses that are not crossed or within the land required for construction will not be routinely assessed unless a specific impact is identified.

13.7.5 There may also be impacts to channel form through plant movements and operations. All works close to watercourses should be carefully designed and supervised.

13.7.6 Groundwater related impacts are likely to be of less magnitude as there are no deep cuttings, excavations or deep sub surface structures proposed that could have result in large scale changes in groundwater flow, level or yield. However, there is still a risk of construction activities introducing localised pathways to more vulnerable groundwater receptors following shallower excavations and impacts to features such as springs and issues from groundwater and sinks to groundwater located within the land required by the proposed scheme.

### **Operational impacts**

13.7.7 During operation, there is the potential for the proposed scheme to impact on flood risk, surface water and groundwater quality and WFD waterbodies.

13.7.8 The potential impacts of the proposed scheme on road drainage and water environment during operation are outlined below:

- Release of routine highway runoff to surface water receptors affecting surface water quality and indirectly aquatic habitats, abstractions and discharges. These may include hydrocarbons, particulates and maintenance materials.
- Increased surface and fluvial flood risk as a result of permanent impingement in areas of high flood risk currently used as flood storage (Flood Zones 2 and 3 and areas identified to be at risk of surface water flooding identified by RoFSW mapping).

- Reduced infiltration and increased surface water runoff due to increased impermeable surfaces.
- Changes to existing surface water flow paths including both overland flow routes (associated with cuttings and embankments) and changes to alignment of existing watercourses and land drainage features.
- Modifications to baseline watercourse hydromorphology on watercourses that require new bridge/culvert structures, extension of existing bridge/culverts and where diversion and/or realignments are required, such as the Black Brook Tributary 3 and Back Stream. These impacts have the potential to impact on WFD status and future objectives on the affected watercourses.
- Displacement/removal of groundwater surface water features such as abstraction and discharge points and sinks, springs and issues.

- 13.7.9 As with the construction stage, the key impacts to the road drainage and water environment associated with the construction of the proposed scheme are related to working in and around watercourses.
- 13.7.10 Finally, the physical changes to watercourses in terms of new culverts and bridge, extension of existing culverts and bridges and works to channels will cause permanent changes to channel hydromorphology and associated ecological receptors. Potential impacts on ecological receptors are described in Chapter 8 Biodiversity of the PEI Report.
- 13.7.11 Existing structures over Broughton Brook and Black Brook are to be reconfigured as a result of changes to Nexus roundabout. The existing structures at Meare Stream, Meare Stream Tributary 1, Venner's Water, Fivehead River Tributary 3, Fivehead River Tributary 5, Cad Brook drainage network, Cad Brook and River Ding (Ding Mill culvert) are to be extended.
- 13.7.12 New culvert crossings of Black Brook Tributary 1 and 2 and Thornwater Stream will be constructed, and new bridge crossings will be required for Fivehead River Main Channel 1 and 2 and Back Stream.
- 13.7.13 In addition to these structures, the proposed scheme would involve a major diversion of Black Brook Tributary 3 and a major realignment of Back Stream. In addition, small realignments of Thornwater Stream, Fivehead River Main Channel 2, Venner's Water and Cad Brook.
- 13.7.14 Installation of structures and channel works would potentially result in a loss of existing bed, banks and existing hydromorphological features associated with the existing channels. These in turn may result in the loss of associated habitat niches. Potential ecological impacts are assessed in Chapter 8 Biodiversity.
- 13.7.15 There may be opportunities to deliver enhancement through the design of the diverted and realigned channels.
- 13.7.16 As with the construction stage groundwater related impacts are likely to be of less magnitude as there are no deep cuttings, excavations or deep sub surface structures proposed.

## 13.8 Design, mitigation and enhancement measures

### Construction mitigation

- 13.8.1 The EMP, to be provided as part of the ES, will include measures that are considered standard good practice to be implemented by the construction

contractor to reduce the likelihood of impacts, or their magnitude if they were to occur. The EMP will include ground and surface water monitoring plans.

- 13.8.2 Requirements for monitoring will be derived during the detailed design phase.
- 13.8.3 The standard measures to be included in the EMP will be based on the Environment Agency guidance on pollution management (introduced to replace the *Pollution Prevention Guidelines* (PPG) withdrawn in 2015 and consistent with the *Guidance for Pollution Prevention*<sup>3</sup>) and relevant CIRIA publications and best practice measures outlined in the PPGs replacement series, *Guidance for Pollution Prevention* (GPP).
- 13.8.4 Examples of standard practice mitigation measures that will be included in the EMP include the provision of spill kits, restricting site traffic to dedicated haul roads and ensuring hard-standing areas are regularly swept and maintained.
- 13.8.5 Works would also be carried out in accordance with any additional permitting requirements, for example Ordinary Watercourse Consent. Land drainage consents will be obtained from the LLFA, and will include information on all works, including temporary works, methodology and permanent design approval.
- 13.8.6 Measures that are non-standard or site-specific are described below and these would be incorporated into the contractor's construction method statement.
- 13.8.7 Site-specific measures would include:
- A surface water management system using measures such as temporary silt fencing, cut off ditches, settlement ponds and bunds set up early in the construction period to capture all runoff and prevent ingress of sediments and contaminants into existing drainage ditches where necessary. This would be managed by the EMP in accordance with CIRIA guidelines and the Environment Agency's approach to groundwater protection and groundwater protection guidelines.
  - Water with a higher risk of contamination which requires discharge, including groundwater abstracted out of piles during concrete pouring, would be contained and treated using appropriate measures such as coagulation of sediments, dewatering and pH neutralisation prior to discharge. The discharge of water with a higher risk contamination would be regulated via environment permits issued by the Environment Agency.
  - Areas of exposed sediment deemed at risk of erosion during heavy rainfall or flood inundation should be protected using either temporary measures (e.g. sheeting) or semi-permanent measures (for example coir matting) until vegetation is able to establish on these surfaces.
  - Works would be suspended during out-of-bank river flows or during intense rainstorms.
  - A water quality monitoring programme prior to and during construction works would be agreed with Environment Agency
  - Consideration of local groundwater catchment and flow regimes that may be affected by dewatering and discharging abstracted water to the same groundwater catchment, down gradient.

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<sup>3</sup> It is recognised that whilst the *Guidance for Pollution Prevention* is not formally supported by the Environment Agency, it does provide an industry accepted approach and is thus considered appropriate to consider at this stage.

- Discharge from dewatering activities such as earthworks, works within a floodplain or within eight metres of a watercourse will have a tailored risk assessment, consent and licences from the Environment Agency. Dewatering abstractions may also require transfer licences from the Environment Agency.

13.8.8 Good practice guidance will also be implemented during construction, including:

- DMRB LA 113 *Road drainage and the water environment* [1] and CC501 *Design of highway drainage systems*. [20]
- *SuDS Manual (C753)* CIRIA (2015). [21]
- *Control of water pollution from construction sites: Guidance for consultants and contractors (C532)* CIRIA. (2001)
- Environment Agency guidance on pollution prevention, reporting environmental incidents, discharging to surface and groundwater, managing water on land and working on or near water.

### **Operational mitigation**

13.8.9 A preliminary surface water drainage design for the proposed scheme has been developed in accordance with DMRB CG501 *Design of highway drainage systems* [22] and DMRB LA 113 *Road drainage and the water environment* [1] and in line with best practice for sustainable drainage design. This provides appropriate measures to attenuate and treat (including pollution control devices where necessary) surface water runoff from the proposed scheme.

13.8.10 In addition, the preliminary scheme design implements the following measures in relation to watercourse crossings to minimise impacts on the affected surface watercourses:

- New crossings of watercourses would be minimised and only implemented where essential.
- The length of crossings along the watercourse would be kept to a minimum.
- The width and height would be based on existing crossings to maintain baseline conditions, although an iterative assessment process would be applied so that impacts in terms of flood risk, water quality and hydro-geomorphology can be reduced as far as it technically feasible.
- Any new crossings (including clear span bridges or culverts) would be designed to minimise effects on the existing flow regime and hydro-geomorphological conditions of the channel.

13.8.11 Channel diversions and realignments have been designed to match existing conditions (as far as possible) to maintain existing flood risk, water quality and hydro-geomorphological conditions.

13.8.12 Replacement floodplain storage has been incorporated into the preliminary scheme design at locations where existing floodplain is lost due to the creation of the proposed scheme.

### **Enhancement**

13.8.13 In line with DMRB LA 113 *Road drainage and the water environment* [1], enhancement opportunities have been considered jointly with the biodiversity, landscaping, soils and geology and drainage design teams in relation to water quality, hydro-geomorphology and habitat quality, improvements to WFD waterbodies, flood risk and resilience to climate change. All environmental enhancement opportunities will be reported in the ES.

- 13.8.14 Measures that help reduce local flood risk and enhance hydro-geomorphology, habitat establishment and biodiversity will be discussed with the relevant consultee, including Highways England, Environment Agency and Natural England.
- 13.8.15 Such measures have been considered in the preliminary design of the diversion of Black Brook 3 and Back Stream. Sinuosity has been introduced into the planform of the alignments. It is also proposed that newly created channels display multi form cross sections that vary along the length of the diversion/realignment. In this way depth/velocity variations will form encourage ecological niches to establish. This can be further enhanced through the planting regime and by introducing granular bed material. The design of these channel alignment changes will be developed and informed by fluvial hydraulic analysis, which will also take account of sediment transport characteristics.
- 13.8.16 The existing channel of the Fivehead River Main Channel 1 is a concrete lined channel at the existing bridge crossing and so is considered 'channelised'. The channelisation extends up and downstream of the existing bridge. It has been proposed to remove some of the existing concrete channel and to establish natural bed and banks, not only within both the existing and the new bridges but also away from these structures. This will have a beneficial impact on local hydromorphology and the establishment of associated ecological habitats.
- 13.8.17 Furthermore, the following watercourses have been identified where there is the potential to implement channel enhancements. This would include reprofiling the channel to provide a more sinuous planform and creating multi form cross sections so that natural depth/velocity variation can become established and to encourage habitat niches to form. The locations identified are along the following watercourses:
- Fivehead River Tributary 3
  - Fivehead River Tributary 5
  - Cad Brook
- 13.8.18 Opportunities to enhance local conditions, such as removing existing structures or sections of heavily modified channel, will continue to be identified and reviewed as part of the design development process

## **13.9 Assessment of likely significant effects**

- 13.9.1 The potential effects of construction activities and operation of the proposed scheme have been reviewed in the context of the existing baseline information described within this chapter. Potential environmental impacts associated with drainage and the water environment (groundwater and surface water) have been identified in Table 13-14 and are assessed in Table 13-15 (construction) and in Table 13-16 (operation). The assessment is preliminary, based upon currently available information and professional judgement. At this point a precautionary view has been taken, however, these effects could reduce as the EIA process progresses. The preliminary assessment presented in Table 13-15 and Table 13-16 will be updated within the ES.

## Construction effects

- 13.9.2 The following watercourses are situated within the study area but are upstream of the proposed scheme. They have therefore been scoped out of the assessment of potential impacts associated with the construction phase:
- Fivehead River Tributaries 1 and 4
  - River Ding Tributary 1
- 13.9.3 The following watercourses are situated within the study area but are sufficiently downstream of the proposed scheme that any direct impacts associated with the construction phase are considered highly unlikely to give rise to significant effects; they have therefore been scoped out of the assessment:
- River Tone
  - River Tone Tributaries 2-6
  - Fivehead River Tributary 2
  - River Ding Tributary 2
  - River Isle
- 13.9.4 The remaining watercourses within the study area have the potential to be directly or indirectly affected by the impacts outlined in 13.7.2.
- 13.9.5 The majority of the potential construction stage impacts as identified in 13.7 can be adequately dealt with by applying the mitigation measures that will be contained in the EMP (see paragraph 13.8.4) or the site specific measures outlined in 13.8.7. This means that the impacts related to the following activities can be limited to **negligible** at all locations:
- Release of sediment and construction related pollutants;
  - Creation of pollution pathways
  - Mobilisation of groundwater contaminants;
  - Localised increase in surface water runoff and associated decrease in groundwater recharge;
  - Increase in surface water and fluvial flood risk; and
  - Reduction in groundwater levels.
- 13.9.6 This will result in **neutral effects** at the following **moderate or low importance** receptors:
- Black Brook Tributaries 1 to 6
  - Thornwater Stream
  - Meare Stream tributary 1
  - Fivehead River Tributaries 1 to 5
  - Venner's Water
  - River Isle drainage network
  - Cad Brook drainage network
  - Cad Brook
  - Back Stream
- 13.9.7 This magnitude of impact will result in **slight adverse, not significant effects** at the following **high importance** receptors:
- Broughton Brook
  - Black Brook

- Meare Stream
- Fivehead River Main Channel 1
- Fivehead River Main Channel 2
- River Ding

Table 13-14 Identification of activities affecting each receptor

Feature / receptor	Overall receptor value	General description of activities affecting each receptor				
		Details of works associated with watercourses	Online carriageway construction	Offline carriageway construction	Direct Interaction with Watercourse	Fluvial and/or surface water floodplain
Broughton Brook	High	Reconfiguration of existing bridge		✓	✓	✓
Black Brook	High	Reconfiguration of existing newly built culvert and watercourse diversion to facilitate		✓	✓	✓
Black Brook Tributaries 1	Medium	New culvert and slight watercourse channel realignment		✓	✓	✓
Black Brook Tributaries 2	Medium	New culvert and watercourse diversion		✓	✓	✓
Black Brook Tributaries 3	Medium	Major diversion and transfer of water into Black Brook Tributaries 2		✓	✓	✓
Black Brook Tributaries 4-6	Medium	No construction works but watercourses within potential construction activity area				
Groundwater feature	Medium	Cutting at Henlade		✓		
Thornwater Stream	Medium	New culvert and slight watercourse channel realignment		✓	✓	✓
Groundwater feature	High/Medium	Cutting at Mattocks Tree junction		✓		
Meare Stream	High	Culvert extension	✓		✓	✓
Groundwater feature	Medium	Cutting north of Griffin Lane	✓			
Meare Stream Tributary 1	Medium	Bridge extension	✓			✓
Groundwater feature	High/Medium	Cutting at Bickenhall	✓			
Fivehead River Main Channel 1	High	New bridge	✓		✓	✓
Fivehead River Tributary 3	Low	Culvert extension				✓
Fivehead River Main Channel 2	High	New bridge	✓		✓	✓
Fivehead River Tributary 5	Low	Culvert extension	✓		✓	✓
Venner's Water	Medium	Extension of existing bridge, construction of new bridge and slight watercourse realignment	✓		✓	✓
Cad Brook drainage network	Medium	Culvert extension	✓		✓	
Cad Brook	Medium	Bridge extension and new culvert	✓		✓	✓
River Isle drainage network & tributary 1	Low	Inflows from junction and side roads	✓			✓
River Ding	High	Culvert extension	✓		✓	✓
Back Stream	Medium	Construction of new bridge and channel diversion		✓	✓	✓

**Table 13-15 Preliminary assessment of construction effects**

Applicable scenarios	Relevant water features (from Table 13-14)	Potential impacts	Duration	Direct/indirect	Magnitude	Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>4</sup>	Conclusion
<b>Surface water</b>									
Works within close proximity (<400m) from watercourses (online/offline)	All watercourses	Creation of pollution pathways to the surface water from potentially contaminated soils	Temporary/short-term	Direct	Minor adverse	All construction activities to be completed in compliance with EMP which will include items such as: <ul style="list-style-type: none"> <li>• Management of chemicals and fuels;</li> <li>• Sediment/surface water run-off control;</li> <li>• Storage of materials;</li> <li>• Dewatering design plus management protocol;</li> <li>• Piling risk assessments (where included in final design); and</li> <li>• Working near watercourses protocol.</li> </ul>	Negligible	Neutral	No significant effects predicted
		Release of sediment, silt and construction related pollutants (e.g. fuels, lubricants and waterproofing materials) and particulates into the local watercourses	Temporary/short-term	Direct	Minor adverse		Negligible	Slight	No significant effects predicted
Works within surface water or fluvial floodplain	Broughton Brook Black Brook Tributaries 1-3 Thornwater Stream Meare Stream Meare Stream Tributary 1 Fivehead River Main Channel 1 Fivehead River Tributary 3 Fivehead River Main Channel 2 Fivehead River Tributary 5 Venner's Water Cad Brook River Isle drainage network & tributary 1 River Ding Back Stream	Localised increase in surface water runoff as a result of an increase in impermeable surface area (both existing road and newly constructed carriageway would be in existence, and also area of bare soil would be increased) resulting in an increase in surface water and fluvial flood risk	Medium-term	Indirect	Negligible		Negligible	Slight	No significant effects predicted
		Increase in surface water and fluvial flood risk as a result of storage of construction materials in areas of flood risk	Medium-term	Indirect	Negligible		Negligible	Slight	No significant effects predicted
		Disruption of existing surface water flow paths due to construction activities	Medium-term	Direct	Minor adverse		Negligible	Slight	No significant effects predicted
		Damage and disruption to existing culvert and hydraulic structures present along watercourses on the existing A358 route	Temporary/short-term	Direct	Negligible		Negligible	Slight	No significant effects predicted
Works with direct interaction with watercourse	Black Brook Tributaries 1-3 Thornwater Stream Meare Stream Fivehead River Main Channel 1 Fivehead River Main Channel 2 Fivehead River Tributary 5 Venner's Water Cad Brook drainage network Cad Brook	Disruption to hydromorphology and condition of existing banks and channels of watercourses crossed by the existing A358 route	Temporary/short-term	Direct	Moderate adverse		Minor adverse	Slight	No significant effects predicted

<sup>4</sup> The residual significance of effect has been determined based on the receptor identified as having the highest environmental importance.

Applicable scenarios	Relevant water features (from Table 13-14)	Potential impacts	Duration	Direct/indirect	Magnitude	Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>4</sup>	Conclusion		
	River Ding Back Stream										
<b>Groundwater features</b>											
Works intercepting groundwater table (e.g. cutting excavation)	Triassic/Jurassic sequence: Secondary aquifers	Reduction in groundwater levels and disruption to existing groundwater flows as a result of dewatering of underlying geological strata to facilitate excavation and construction of cuttings.	Temporary/short-term	Direct	Negligible		Negligible	Neutral	No significant effects predicted		
		Disruption or damage to existing groundwater abstractions as a result of dewatering of underlying geological strata to facilitate excavation and construction of cuttings. One small scale groundwater abstraction approximately 0.5km from cutting at Mattocks Tree, sourced from the Mercia Mudstone Formation.	Temporary/short-term	Direct	Negligible		Negligible	Neutral	No significant effects predicted		
		Disruption of existing groundwater flow paths due to construction activities. No springs, sinks or issues associated with Triassic/Jurassic strata located within footprint of any proposed cutting.	Temporary/short-term	Direct	Negligible		Negligible	Neutral	No significant effects predicted		
	Quaternary deposits of Secondary aquifers	Reduction in groundwater levels and disruption to existing groundwater flows as a result of dewatering of underlying geological strata to facilitate excavation and construction of cuttings.	Temporary/short-term	Direct	Negligible		Negligible	Slight	No significant effects predicted		
		Disruption or damage to existing groundwater abstractions as a result of dewatering of underlying geological strata to facilitate excavation and construction of cuttings. No abstractions from Quaternary deposits within vicinity of proposed cuttings.	Temporary/short-term	Direct	No change		Neutral	Neutral	No significant effects predicted		
		Disruption of existing groundwater flow paths due to construction activities. No springs, sinks or issues associated with Quaternary strata located within footprint or within 200m of any proposed cutting.	Temporary/short-term	Direct	Negligible		Negligible	Slight	No significant effects predicted		
	Works within areas of high risk of groundwater flooding	Potential for disruption to construction activities in the event of groundwater flooding.	Temporary/short-term	Direct	Negligible		Negligible	Slight	No significant effects predicted		
	<b>Discharges</b>										
	Works with direct interaction with consented discharge located	DIS-002 DIS-005 DIS-007 DIS-008	Temporary damage or temporary loss of discharge during construction	Medium-term	Direct		Moderate adverse	All construction activities to be completed in compliance with EMP which will include measures to provide alternative discharging arrangements for affected discharges.	Minor adverse	Slight	No significant effects predicted

Applicable scenarios	Relevant water features (from Table 13-14)	Potential impacts	Duration	Direct/indirect	Magnitude	Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>4</sup>	Conclusion
within or adjacent to red line boundary	DIS-011								
No direct works to consented discharge located within or adjacent to red line boundary	DIS-001 DIS-003 DIS-004 DIS-006 DIS-009 DIS-010 DIS-012	No direct impacts identified that will affect consented discharges	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
<b>Sinks</b>									
Works with direct interaction with sinks located within red line boundary	SINK-001 SINK-002 SINK-003	Temporary damage to sink during construction	Medium-term	Direct	Moderate adverse	All construction activities to be completed in compliance with EMP which will include measures to avoid impacts on sinks.	Minor adverse	Slight	No significant effects predicted
<b>Issues</b>									
Works with direct interaction with issues with a direct link to watercourses located within the study area	ISS-05 ISS-08	Temporary damage to issue during construction	Medium-term	Direct	Moderate adverse	All construction activities to be completed in compliance with EMP which will include measures to avoid impacts on issues.	Minor adverse	Slight	No significant effects predicted
No direct works to issues with a direct link to watercourses located within the study area	ISS-01 ISS-02 ISS-03 ISS-04 ISS-06 ISS-07	No direct impacts identified that will affect issues	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted

### Operational effects

- 13.9.8 The potential operational impacts of the proposed scheme on watercourses and groundwater features are assessed in Table 13-16.
- 13.9.9 The impacts and effects associated with routine runoff of highway drainage have been assessed to be **negligible** based on the implementation of the drainage strategy. This will ensure that the existing rate, volume and quality of discharges of surface water to receiving watercourses is maintained.
- 13.9.10 Potential impacts and effects associated with the proposed scheme impinging on floodplain and spanning watercourses either with new bridges or culverts or extensions have been addressed in the preliminary scheme design through appropriate sizing of structures to account for the 1 in 100 year return period flow plus an allowance for climate change and through the provision of floodplain compensation. Therefore, at this preliminary scheme design stage it is assumed that fluvial flood risk impacts are negligible. This will be examined detail in the following stages of design informed by fluvial hydraulic modelling. The assessment of flood risk will be discussed in the Final FRA. Flood risk impacts will be assessed against the flood risk receptors identified in the Preliminary FRA.
- 13.9.11 The assessment of impacts related to changes in hydromorphology has entailed examining whether the proposed structures (e.g. culverts and/or bridges), realignment or diversion can be constructed without damaging the existing channel and then determining the percentage of the channel damaged compared to the total length of the channel (measured from source to nearest downstream confluence). Impacts on hydrogeomorphology are permanent and are therefore reported as operational effects. The preliminary design of the proposed structure, reinstatement of the existing channel and the nature of the proposed channel have been considered as mitigation to determine the assessment of residual effects.
- 13.9.12 This assessment has determined that new bridges, culverts and extensions to existing structures proposed at the following receptors will have a negligible impact related to changes in hydromorphology:
- Broughton Brook
  - Black Brook
  - Thornwater Stream
  - Meare Stream
  - Fivehead River Main Channel 1
  - Fivehead River Main Channel 2
  - Fivehead River Main Tributary 3
  - Fivehead River Main Tributary 5
  - Venners Water
  - Cad Brook
  - River Ding
- 13.9.13 However, greater magnitudes of impact in relation to hydromorphology and direct works to watercourse channels have been identified for the receptors discussed below.
- 13.9.14 A new culvert is proposed to span Black Brook Tributary 1. Culvert sizing and good practice design has been applied to the structure. Therefore, the natural bed and bank will be able to be reinstated. However, the construction process will still affect the hydromorphology of approximately 30m of the existing channel. The overall length of Black Brook 1 is approximately 2km. Therefore, approximately 1.5% the existing channel is affected. This is considered a **minor impact** to a **medium value receptor** leading to a **slight adverse, not significant effect**.
- 13.9.15 A new culvert is also proposed to span Black Brook Tributary 2 for the main A358 carriageway. Immediately downstream a proposed maintenance access track is proposed to span the watercourse and finally there is a proposed realignment of the channel at the culvert approach of approximately 200m. The construction process will still affect the hydromorphology of approximately 230m of the existing channel. The overall length of Black Brook 2 is only 600m. Therefore, approximately 30% the existing channel is affected. However, as with Black Brook Tributary 1, good practice design has been applied to the proposed culverts and the realignment has been designed to maintain existing gradient while seeking to improve flow variation across and along the

channel in order to improve aquatic biodiversity. Therefore, with mitigation, the magnitude of impact is **minor** to a **medium value receptor** leading to a **slight adverse, not significant effect**.

- 13.9.16 Black Brook Tributary 3 is being diverted approximately 300m to the west as the existing channel is being crossed by the proposed embankment. This results in a direct loss of 170m of existing channel which is approximately 15% of the total channel length from its existing source to the Black Brook Tributary 2. However, the proposed diversion has been designed to maintain existing gradient while seeking to improve flow variation across and along the channel in order to improve aquatic biodiversity. With correct planting and management this could result in localised benefits. Therefore, with mitigation, the magnitude of impact is **minor** to a **medium value receptor** leading to a **slight beneficial, not significant effect**.
- 13.9.17 At Back Stream a new bridge and channel realignment works affect approximately 330m of the existing channel. This is approximately 5% of the existing channel from source to nearest downstream confluence. However, taking account of the bridge and channel realignment design principles and the retention of a section of the existing channel downstream of the proposed scheme as a backwater area it is considered that with this mitigation there could be beneficial impacts and the magnitude of impact is **minor** to a **medium value receptor** leading to a **slight beneficial, not significant effect**.
- 13.9.18 The surface water flow assessment has examined the length of any channel that will be isolated from the downstream feed once a realignment or diversion has been created. The length of dry channel has also been compared to the overall length of the watercourse from source to nearest downstream confluence. The ability for the existing channel to retain some residual flow through inputs from the proposed highway drainage system or as flood storage area has been considered as mitigation to determine the residual effect assessment.
- 13.9.19 This assessment has determined that the diversions or realignments required at the Fivehead River Main Channel 2 and Venner's Water will only change flow conditions in short lengths of channel. When these lengths are compared to the overall length of the watercourse, they represent less than 1% of the total watercourse length. This is considered a **negligible impact** leading to a slight adverse, not significant effect on Fivehead River Main Channel 2 (high value receptor) and a neutral effect on Venner's Water.
- 13.9.20 The other diversions and realignment have been assessed to have greater impact magnitudes in relation to surface water flow. These are described below:
- The diversion of Black Brook Tributary 3 isolate 220m of downstream channel This represent 20% of total watercourse length. However, the channel will continue to receive water from the construction stage drainage system, local overland flow and land drainage and act as a local flood storage area. Therefore, the impact is considered **minor**, to a **medium value receptor** resulting in a **slight adverse, not significant effect**.
  - The realignment at Thornwater Stream isolates approximately 80m of existing channel this represents approximately 5% of channel with reduced flow. Applying mitigation it is likely that the impact will be **negligible** to a **medium value receptor** resulting in a **neutral effect**
  - The realignment of Back Stream diverts water away from 300m of existing channel, representing approximately 6% of existing channel length. Applying mitigation it is likely that the impact will be **negligible** to a **medium value receptor** resulting in a **neutral effect**
- 13.9.21 The proposed surface water management system has been assessed against existing natural catchments. Small changes to existing surface water catchments have been identified where water is being transferred from one catchment to another. This has the potential to reduce the water balance in the following catchments:
- Meare Stream Tributary 1
  - Fivehead River Tributary 5
  - River Isle Drainage network
- 13.9.22 All these impacts have been assessed as negligible, leading to neutral effects at these low and medium values receptors.

13.9.23 The potential increase in flows to the receiving watercourses (Meare Stream, Fivehead River Main Channel 2 and Cad Brook) has also been assessed but again the impacts have been determined to be negligible when the scale of the catchment changes are considered. This results in a slight adverse impact, when the value of the flood risk receptors associated with these watercourses are taken into account.

**Table 13-16 Preliminary assessment of operational effects**

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
<b>Surface water features</b>										
Broughton Brook	High (Quality)	Surface water quality	Small area of additional hardstanding created on the existing M5 slips. Potential deterioration of water quality due to routine runoff from the motorway via existing outfall into watercourse	Long-term	Direct	Negligible	Preliminary drainage design compliant with CG501 including appropriate pollution prevention measures	No change	Neutral	No significant effects predicted
		Surface water flood risk	Potential for small increase in impermeable area due to need to realign M5 slip roads	Long-term	Direct	Negligible	Preliminary drainage design compliant with CG501 including appropriate attenuation volumes	Negligible	Slight	No significant effects predicted
Black Brook	High (Quality) High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via new outfall into watercourse	Long-term	Direct	Minor adverse	SuDS based preliminary drainage design. Drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Slight	No significant effects predicted. Pollution risks to be confirmed at ES through HEWRAT assessment
		Hydrogeomorphology	Reconfiguration of existing Nexus 25 roundabout culvert and associated realignment	Long-term	Direct	Minor adverse	Adopt culvert design good practice. Maintain existing cross section and long section conditions in realignment	Negligible	Slight	No significant effects predicted
		Fluvial flood risk	Reconfiguration of existing culvert crossing and development within area of existing floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. More vulnerable receptors as per NPPF, with a value of high, are the highest value flood risk receptors that could be affected by Black Brook	Long-term	Direct	Minor adverse	Adopt culvert design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation. Maintain existing cross section and long section conditions in realignment	Negligible	Slight	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. More vulnerable receptors as per NPPF, with a value of high, are the highest value flood risk receptors that could be affected by Black Brook	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted

<sup>5</sup> The residual significance of effect has been determined based on the receptor identified as having the highest environmental importance.

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
Black Brook Tributaries 1-3	Medium (Quality) Medium (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via new outfalls into watercourses	Long-term	Direct	Minor adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Neutral	No significant effects predicted. Pollution risks to be confirmed at ES through HEWRAT assessment
		Hydrogeomorphology	Black Brook Tributary 1. 6m wide culvert. Approximately 50m of existing natural bed and bank lost. Loss equates to approximately 1.5% of existing channel.	Long-term	Direct	Minor adverse	Culvert sizing and good practice design has been applied to the structure. Therefore, natural bed and bank will be able to be reinstated	Minor adverse	Slight	No significant effects predicted
		Hydrogeomorphology	Black Brook Tributary 2. 6m wide culvert. Approximately 50m of existing natural bed and bank lost. In addition, approximately 230m of existing channel loss and a realignment is required. These works represent approximately 30% of existing channel.	Long-term	Direct	Moderate adverse	Culvert sizing and good practice design has been applied to the structure. Therefore, natural bed and bank will be able to be reinstated Sinuous open channel design to the 200m realignment of Black Brook Tributary 2.	Minor adverse	Slight	No significant effects predicted
		Hydrogeomorphology	Black Brook Tributary 3. Direct loss of 170m of existing channel which is approximately 15% of the total channel length	Long-term	Direct	Moderate adverse	Sinuous open channel design to the 300m diversion of Black Brook Tributary 2. Represents channel enhancement	Minor beneficial	Slight beneficial	No significant effects predicted
		Fluvial flood risk	New culvert crossings of Black Brook Tributaries 1 and 2 and channel realignments. In addition, development within area of existing floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. Less vulnerable receptors as per NPPF, with a value of medium, are the highest value flood risk receptors that could potentially be affected by flooding from the Black Brook Tributaries	Long-term	Direct	Moderate adverse	Adopt culvert design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation Maintain existing cross section and long section conditions in realignment	Negligible	Neutral	Full assessment only possible after completion of hydrological modelling and reported in the ES.
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. Less vulnerable receptors as per NPPF, with a value of medium,	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate	Negligible	Neutral	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
			are the highest value flood risk receptors that could potentially be affected by flooding from the Black Brook Tributaries				change allowance.			
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Drainage catchment changes and diversion of Black Brook Tributary 3, removing flow of water to existing channel	Long-term	Direct	Moderate adverse	Retain inflow from routine runoff to existing channel	Minor	Neutral	No significant effects predicted
Black Brook Tributaries 4-6	Medium (Quality)	No impacts identified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Tone	High (Quality)	No impacts identified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thornwater Stream	Medium (Quality) High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via new outfalls into watercourse .	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Neutral	No significant effects predicted Pollution risks to be confirmed in the ES through HEWRAT assessment
		Hydrogeomorphology	New culvert and channel realignment works affect approximately 80m of the existing channel. This is approximately 5% of the existing channel .	Long-term	Direct	Moderate adverse	Culvert sizing and good practice design has been applied to the structure. Therefore, natural bed and bank will be able to be reinstated Sinuous open channel design to the short length of realignment and existing channel will be retained	Negligible	Neutral	No significant effects predicted
		Fluvial flood risk	New culvert crossing of Thornwater Stream and development within area of existing floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. More vulnerable receptors as per NPPF, with a value of High, are the highest value flood risk receptors that could potentially be affected by Thornwater Stream	Long-term	Direct	Moderate adverse	Adopt culvert design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation Maintain existing cross section and long section conditions in realignment	Negligible	Neutral	Full assessment only possible after completion of hydrological modelling and reported in the ES.
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. More vulnerable receptors as per NPPF, with a value of High, are	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Neutral	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
			the highest value flood risk receptors that could be affected by Thornwater Stream							
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Realignment of channel removing flow of water existing channel	Long-term	Direct	Minor adverse	Retain inflow from routine runoff to existing channel	Negligible	neutral	No significant effects predicted
River Tone Tributaries 2-6	Low	No impacts identified	none	N/A	N/A	N/A	N/A	N/A	NA	NA
Meare Stream	High (quality) High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway outfalls	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Slight	No significant effects predicted. Pollution risks to be confirmed in the ES through HEWRAT assessment
		Hydrogeomorphology	Extension of existing culvert. Loss of natural bed and bank. Loss represents less than 1% of overall channel length	Long-term	Direct	Negligible	None required	Negligible	Slight	No significant effects predicted
		Fluvial flood risk	Culvert extension and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. More vulnerable receptors as per NPPF, with a value of High, are the highest value flood risk receptors with the potential to be affected by the Meare Stream	Long-term	Direct	Moderate adverse	Provide floodplain compensation	Negligible	Slight	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. More vulnerable receptors as per NPPF, with a value of High, are the highest value flood risk receptors with the potential to be affected by the Meare Stream	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Existing surface water catchment feeding Meare Stream 1 diverted into Meare Steam	Long-term	Direct	Negligible	None	Negligible	Neutral	No significant effects predicted
Meare Stream Tributary 1	Medium	Surface water quality	Deterioration of water quality due to routine runoff from highway outfalls	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT	Negligible	Neutral	No significant effects predicted. Pollution risks to be confirmed in the ES

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
							assessment.			through HEWRAT assessment.
		Hydrogeomorphology	No Impact	N/A	N/A	N/A	None	N/A	Neutral	No significant effects predicted
		Fluvial flood risk	No impact as no loss of fluvial flood plain	N/A	N/A	N/A	None	N/A	Neutral	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk More vulnerable receptors as per NPPF, with a value of High are the highest value flood risk receptors with the potential to be affected by the Meare Stream Tributary 1	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Neutral	No significant effects predicted
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Existing surface water catchment feeding Meare Stream 1 diverted into Meare Steam	Long-term	Direct	Negligible	None	Negligible	neutral	No significant effects predicted
Fivehead River Main Channel 1	High (quality) Very High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Slight	No significant effects predicted. Pollution risks to be confirmed in the ES through HEWRAT assessment.
		Hydrogeomorphology	Extension of bridge (approx. 25m) under which the existing channel is heavily engineered	Long-term	Direct	Negligible	Removal of existing concrete bed. Natural bed and banks reinstated	Negligible	Slight beneficial	No significant effects predicted
		Fluvial flood risk	New bridge and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Fivehead River Main Channel 1	Long-term	Direct	Moderate adverse	Adopt bridge design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation Maintain existing cross section and long section conditions in realignment	Negligible	Slight	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
			by the Fivehead River Main Channel 1							
Fivehead River Tributaries 1, 2 and 4	Low	No impacts identified	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fivehead River Tributary 3	Low (Quality) Medium (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall into watercourse	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Neutral	No significant effects predicted. Pollution risks to be confirmed in the ES through HEWRAT assessment.
		Hydrogeomorphology	Access track directly adjacent to existing channel	Long-term	Direct	Negligible	None	Negligible	Neutral	No significant effects predicted
			Investigate channel enhancement works at a long stretch of channel that extends from Village Road to Stock Lane	Long-term	Direct	Minor beneficial	Proposed works are included to offset adverse changes in hydrogeomorphology at other locations within the Fivehead River WFD waterbody	Minor beneficial	Neutral	No significant effects predicted
		Fluvial flood risk	No impact as no loss of flood zone	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk Less vulnerable, as per NPPF, with a receptor value of Medium is the highest potential receptor to be affected by the Fivehead River Tributary 3	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Neutral	No significant effects predicted
Fivehead River Main Channel 2	High (Quality) Very High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall into watercourse	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Slight	No significant effects predicted. Pollution risks to be confirmed at ES through HEWRAT assessment.
		Hydrogeomorphology	New High Bridge Underbridge	Long-term	Direct	Moderate adverse	Bridge sizing and good practice design has been applied to the structure. Therefore, natural bed and bank will be able to be reinstated Sinuous open channel design to the short length of realignment downstream of the structure and existing channel will be retained	Negligible	Slight	No significant effects predicted.
		Fluvial flood risk	New bridge and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors.	Long-term	Direct	Moderate adverse	Adopt bridge design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation	Negligible	Slight	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
			Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Fivehead River Main Channel 2				Maintain existing cross section and long section conditions in realignment			
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. Drainage strategy indicates that water from the Fivehead River Tributary 5 catchment will be crossed into the Fivehead River Main Channel 2 catchment.	Long-term	Direct	Negligible	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Existing surface water catchment feeding Fivehead River Tributary 5 diverted into Fivehead River Main Channel 2	Long-term	Direct	Negligible	None required	Negligible	Neutral	No significant effects predicted
Fivehead River Tributary 5	Low (quality) Very High (Flood Risk)	Surface water quality	No impact as no outfalls from routine runoff to watercourse as part of proposed scheme	N/A	N/A	N/A	None	N/A	Neutral	No significant effects predicted
		Hydrogeomorphology	Extension of existing culvert. Loss of natural bed and bank.	Long-term	Direct	Negligible	None	Negligible	Neutral	No significant effects predicted
		Fluvial flood risk	Culvert extension and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Fivehead River Main Tributary 5	Long-term	Direct	Moderate adverse	Provide floodplain compensation	Negligible	Slight	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Fivehead River Main Tributary 5 Potential of cross catchment transfer from Tributary 5 to Fivehead Main Channel 2	Long-term	Direct	Negligible	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Existing surface water catchment feeding Fivehead River Tributary 5 diverted into Fivehead River Main Channel 2	Long-term	Direct	Negligible	None required	Negligible	Neutral	No significant effects predicted
Venner's Water	Medium (Quality) Very High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall into watercourse.	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Neutral	No significant effects predicted. Pollution risks to be confirmed in the ES through HEWRAT assessment.
		Hydrogeomorphology	Extension of existing bridge and construction of new bridge for Stewley Link and associated channel realignment.	Long-term	Direct	Moderate adverse	Bridge sizing and good practice design has been applied to the structure. Therefore, natural bed and bank will be able to be reinstated Sinuous open channel design to the short length of realignment downstream of the structure and existing channel will be retained	Negligible	Neutral	No significant effects predicted
		Fluvial flood risk	Bridge extension, new bridge construction and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Venner's Water	Long-term	Direct	Moderate adverse	Adopt bridge design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation Maintain existing cross section and long section conditions in realignment	Negligible	Slight	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Venner's Water	Long-term	Direct	Moderate Adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted
River Isle drainage network	Medium (Quality) Medium (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall into watercourse.	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Neutral	No significant effects predicted. Pollution risks to be confirmed in the ES through HEWRAT assessment.

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. Less vulnerable, as per NPPF, with a receptor value of Medium is the highest potential receptor to be affected by the River Isle drainage network	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Existing surface water catchment feeding River Isle drainage network diverted into Cad Brook	Long-term	Direct	Negligible	None	Negligible	Slight	No significant effects predicted
Cad Brook including Cad Brook drainage network	Medium (Quality) Very High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall into watercourse (increase in impermeable area of approximately 3.6ha)	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Neutral or slight	No significant effects predicted. Pollution risks to be confirmed in the ES through HEWRAT assessment.
		Hydrogeomorphology	Extension of existing bridge and construction of new bridge for Broadway Link.	Long-term	Direct	Moderate adverse	Bridge sizing and good practice design has been applied to the structure. Therefore, natural bed and bank will be able to be reinstated	Negligible	Neutral	No significant effects predicted
		Fluvial flood risk	Bridge extension, new bridge construction and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Cad Brook	Long-term	Direct	Moderate adverse	Adopt bridge design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation Maintain existing cross section and long section conditions in realignment	Negligible	Slight	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. Surface water flow path from Ashill Junction and routine highway runoff diverted to the Cad Brook when previously was discharging into the River Isle Drainage Network.	Long-term	Direct	Negligible	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	Slight	No significant effects predicted
River Ding	High (Quality) Very High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall into watercourse.	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control	Negligible	Slight	No significant effects predicted. Pollution risks to be confirmed in the ES

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
							measures as required by HEWRAT assessment.			through HEWRAT assessment.
		Hydrogeomorphology	Extension of existing culvert. Loss of natural bed and bank. Loss represents less than 1% of overall channel length	Long-term	Direct	Negligible	None required	Negligible	Slight	No significant effects predicted
		Fluvial flood risk	Culvert extension and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. More vulnerable receptors as per NPPF, with a value of High, are the highest value flood risk receptors with the potential to be affected by the Meare Stream	Long-term	Direct	Moderate adverse	Provide floodplain compensation	Negligible	slight	No significant effects predicted
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk. More vulnerable receptors as per NPPF, with a value of High, are the highest value flood risk receptors with the potential to be affected by the River Ding	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	slight	No significant effects predicted
River Ding Tributaries 1 and 2	Medium	No impacts	N/A	N/A	N/A	NA	N/A	NA	Neutral	No significant effects predicted
Back Stream	Medium (Quality) Very High (Flood Risk)	Surface water quality	Deterioration of water quality due to routine runoff from highway via existing outfall into watercourse.	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501 and incorporating pollution control measures as required by HEWRAT assessment.	Negligible	Slight	No significant effects predicted. Pollution risks to be confirmed in the ES through HEWRAT assessment.
		Hydrogeomorphology	Direct loss of 100m of existing channel which is less than % of the total channel length as a result of embankment over existing channel and new bridge	Long-term	Direct	Negligible adverse	Sinuuous open channel design to the 300m realignment of Back Stream. Section of existing channel being retained. Represents channel enhancement	Minor beneficial	Slight beneficial	No significant effects predicted
		Fluvial flood risk	New for the A358 and access track bridge and loss of floodplain. Has the potential to increase flood level, extent or hazard to flood risk receptors. Essential infrastructure (A358), as per NPPF, with a receptor value of very high is the highest potential receptor to be affected by the Back Stream	Long-term	Direct	Moderate adverse	Adopt bridge design good practice. Size structure to convey 1%+CC flow. Provide floodplain compensation. Maintain existing cross section and long section conditions in realignment	Negligible	Slight	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
		Surface water flood risk	Generation of additional surface water run-off from increased hardstanding results in increase in surface water flood risk More vulnerable receptors as per NPPF, with a value of High, are the highest value flood risk receptors with the potential to be affected by the River Ding	Long-term	Direct	Moderate adverse	Preliminary drainage design compliant with CG501. Flows restricted to undeveloped rate of run-off, including climate change allowance.	Negligible	slight	No significant effects predicted
		Catchment hydrology	Changes to water balance caused by changes to drainage and overland flow paths. Diversion of Back Stream, removing flow of water to existing channel	Long-term	Direct	Moderate adverse	Retain inflow from routine runoff to existing channel	Minor	neutral	No significant effects predicted
River Isle	High	No Impacts	N/A	N/A	N/A	N/A	NA	Neutral	No significant effects predicted	
<b>Groundwater features</b>										
Quaternary deposits	High	Water supply/quantity	No impact as proposed scheme does not affect any abstractions	N/A	N/A	N/A	The current preliminary drainage design does not include any discharge to ground. However, if required, surface water run-off from the proposed scheme will be intercepted and treated prior to discharge to ground.	N/A	Neutral	No significant effects predicted
		Vulnerability	Potential for discharge of contamination run-off from the proposed scheme.	Long-term	Direct	Minor adverse		Negligible	Slight	No significant effects predicted
		Biodiversity Conveyance of flow	No impact as cuttings not located in areas of significant groundwater flow	N/A	N/A	N/A		N/A	Neutral	No significant effects predicted
Triassic/Jurassic sequence	Medium	Water supply/quantity	No impact as proposed scheme does not affect any abstractions	N/A	N/A	N/A		N/A	Neutral	No significant effects predicted
		Vulnerability	Potential for discharge of contamination run-off from the proposed scheme.	Long-term	Direct	Minor adverse		Negligible	Slight	No significant effects predicted
		Biodiversity Conveyance of flow	No impact as cuttings not located in areas of significant groundwater flow	N/A	N/A	N/A		N/A	Neutral	No significant effects predicted
<b>Discharges</b>										
DIS-001	High	N/A	No works impacting discharge point.	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
DIS-002	High	Damage to consented discharge	Potential impact as works are close to discharge point but unlikely for discharge point to need to be removed	Long-term	Direct	Minor Adverse	Measures to be taken as part of the preliminary scheme design to avoid discharge point	Negligible	Slight	No significant effects predicted
DIS-003	Medium	N/A	No works impacting discharge point.	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
DIS-004	Low	N/A	No works impacting discharge point.	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
DIS-005	Medium	Damage to consented discharge	Potential impact as works are close to discharge point but	Long-term	Direct	Minor Adverse	Measures to be taken as part of the preliminary scheme design to avoid discharge point	Negligible	Slight	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
			unlikely for discharge point to need to be removed							
DIS-006	High	N/A	No works impacting discharge point.	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
DIS-007	Medium	Damage to consented discharge	Potential impact as works are close to discharge point but unlikely for discharge point to need to be removed	Long-term	Direct	Minor Adverse	Measures to be taken as part of the preliminary scheme design to avoid discharge point	Negligible	Slight	No significant effects predicted
DIS-008	Medium	Damage to consented discharge	Discharge point located beneath existing A358 so no further impacts are expected	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
DIS-009	Low	N/A	No works impacting discharge point.	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
DIS-010	High	N/A	No works impacting discharge point.	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
DIS-011	High	Damage to consented discharge	Potential impact as works are close to discharge point but unlikely for discharge point to need to be removed	Long-term	Direct	Minor Adverse	Measures to be taken as part of the preliminary scheme design to avoid discharge point	Negligible	Slight	No significant effects predicted
DIS-012	Medium	N/A	No works impacting discharge point.	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
<b>Sinks</b>										
SINK-001	Low	Damage to sink	No proposed works affecting sink assumed to be linked to existing drainage on Greenway Lane	N/A	N/A	N/A	None required	Negligible	Neutral	No significant effects predicted
SINK-002	Low	Damage to sink	No proposed works affecting sink which is clearly linked to existing A358 drainage	N/A	N/A	N/A	None required	Negligible	Neutral	No significant effects predicted
SINK-003	Low	Damage to sink	No proposed works affecting sink which is clearly linked to existing A358 drainage	N/A	N/A	N/A	None required	Negligible	Neutral	No significant effects predicted
<b>Issues (Linked watercourse)</b>										
ISS-001 (Black Brook Tributary 4)	Medium	Damage to issue	No works impacting issue	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
ISS-002 (Black Brook Tributary 6)	Medium	Damage to issue	No works impacting issue	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
ISS-003 (Thornwater Stream)	Medium	Damage to issue	No works impacting issue	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
ISS-004 (Thornwater Stream)	Medium	Damage to issue	No works impacting issue	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
ISS-005 (Thornwater Stream)	Medium	Damage to issue	Potential impact to issue as a result of works to existing A358	Long-term	Direct	Minor adverse	Measures to be taken as part of the preliminary scheme design to avoid issue location	Negligible	Slight	No significant effects predicted

Surface water feature/ receptor	Overall receptor value	Category of impact	Proposed change/ potential impacts	Impacts			Proposed or potential embedded mitigation/ management measures	Magnitude of impact (with embedded mitigation)	Residual significance of effects <sup>5</sup>	Conclusion
				Duration	Direct/ indirect	Magnitude				
			(including proposed footpath) in vicinity of the issue							
ISS-06 (Fivehead River Tributary 5)	Low	Damage to issue	No works impacting issue	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
ISS-07 (Fivehead River Main Channel 1)	High	Damage to issue	No works impacting issue	N/A	N/A	N/A	None required	N/A	Neutral	No significant effects predicted
ISS-08 (Venner's Water)	Medium	Damage to issue	New Caplands Link being built over issue location. Issue has direct link to Venner's Water. Issue location will be displaced.	Long-term	Direct	Minor adverse	Issue point to be relocated as part of the preliminary drainage design	Negligible	Slight	No significant effects predicted

## 13.10 Monitoring

13.10.1 Water quality sampling will take place at the locations shown in Figure 13.4 Water quality survey locations in order to inform baseline and EIA and will be reported within the ES. The need for long-term water quality monitoring will be discussed with consultees and agreed as necessary.

## 13.11 Summary

- 13.11.1 The assessment undertaken for road drainage and water environment has identified the potential impacts of the proposed scheme on surface water and groundwater receptors located within the study area. The implementation of appropriate mitigation measures during construction should ensure that there are no significant effects on water receptors.
- 13.11.2 During operation, no potentially significant effects have been identified on surface water features. The potential impact of the proposed scheme on pollution risk to surface water receptors will be determined using HEWRAT and reported in the ES. The impact of the proposed scheme on flood risk for Black Brook Tributaries 1-3, River Tone Tributary 1, West Sedgemoor Main Drain, Fivehead River Main Channels 1 and 2, Venner's Water, River Ding and Tributaries 1 and 2 and Back Stream will be assessed in the ES utilising hydraulic modelling.
- 13.11.3 During operation, no potentially significant effects have been identified on groundwater receptors.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 14  
Climate

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## 14 Climate

### 14.1 Introduction

- 14.1.1 This chapter provides a preliminary assessment of the potential climate impacts and effects from the construction and operation of the A358 Taunton to Southfields Dualling Scheme (the 'proposed scheme'), following the methodology set out in the *Design Manual for Roads and Bridges* (DMRB) LA 114 *Climate* [1] and the Environmental Impact Assessment (EIA) Scoping Report [2].
- 14.1.2 This chapter summarises the legislative and policy framework related to climate change, presents the methodology followed for the assessment and describes the existing and projected future baseline for the study area surrounding the proposed scheme. The chapter presents the assessment of effects on identified receptors during construction and operation of the proposed scheme. The design, mitigation and residual effects of the proposed scheme are discussed, along with any limitations of the assessment.
- 14.1.3 In line with the requirements of DMRB LA 114 *Climate*, the *National Policy Statement for National Networks* (NPSNN) [3] and the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2017*, this chapter describes the likely significant effects of the proposed scheme on the environment resulting from the:
- impact of the proposed scheme on climate (greenhouse gas (GHG) emissions)
  - vulnerability of the proposed scheme to climate change (adaptation)

### 14.2 Legislative and policy framework

- 14.2.1 As documented in the Preliminary Environmental Information (PEI) Report Chapter 1 Introduction, the *National Policy Statement for National Networks* (NPSNN) is the primary planning policy for the proposed scheme and forms the principal basis for making decisions on Development Consent Order (DCO) applications in England. The *National Planning Policy Framework* (NPPF) is noted as being 'important and relevant' and is to be considered, however, if there is a conflict between the NPSNN and NPPF, the NPSNN takes precedence.
- 14.2.2 This section summarises the legislative, policy and strategy positions relating to climate change and the development of highways. This includes some which are directly applicable to the proposed scheme and some which provide wider policy context.

#### Legislation

##### The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

- 14.2.3 The *Infrastructure Planning (Environmental Impact Assessment) Regulations 2017* place a requirement upon projects which have the potential for significant effects on the surrounding environment and communities to make a formal assessment of these effects. The important role that the EIA process can play in assessing climate change impacts is also identified. The regulations state that EIAs shall identify, describe and assess the direct and indirect significant effects of climate change relevant to the proposed scheme (i.e. GHG, climate change resilience (CCR) and in-combination climate change impacts). This chapter reports the preliminary outcomes of the GHG and CCR assessment.

### Climate Change Act 2008 (2050 Target Amendment) Order 2019

- 14.2.4 The *Climate Change Act 2008* committed the UK to its first statutory carbon reduction target to reduce carbon emissions by at least 80% from 1990 levels by 2050. The *Climate Change Act 2008 (2050 Target Amendment) Order 2019* amended the *Climate Change Act 2008* by introducing a target for at least a 100% reduction of GHG emissions (relative to 1990 levels) in the UK by 2050, following advice from the Committee on Climate Change [4]. The 100% reduction is often referred to as 'net zero' GHG emissions.
- 14.2.5 The *Climate Change Act 2008* requires that that five-yearly carbon budgets are set and not exceeded to ensure that regular progress is made towards the target. The first three carbon budgets were set in 2009, with the fourth, fifth and sixth following in 2011, 2016 and 2021 respectively, as outlined in Table 14-1. The sixth carbon budget was published by the Committee on Climate Change on 9 December 2020 and was set in law in June 2021.
- 14.2.6 The third, fourth and fifth carbon budgets, as set out in the *Carbon Budgets Order 2009*, the *Carbon Budget Order 2011* and the *Carbon Budget Order 2016*, are based on an 80% reduction as legislated by the *Climate Change Act 2008*. The sixth carbon budget, as set out in the *Carbon Budget Order 2021* (SI2021/750) is based on the target for 100% reduction in emissions by 2050. GHG emissions from the proposed scheme are reported against the latest legislated carbon budgets, in line with the requirements of DMRB LA 114 *Climate* and the NPSNN.

**Table 14-1 UK third, fourth, fifth and sixth carbon budgets**

<b>Carbon budget</b>	<b>Carbon budget level (million tonnes of carbon dioxide (CO<sub>2</sub>) equivalents (MtCO<sub>2</sub>e))</b>
Third (2018-2022)	2,544
Fourth (2023-2027)	1,950
Fifth (2028-2032)	1,725
Sixth (2033-2037)	965

- 14.2.7 The *Climate Change Act 2008* also established a requirement for the UK government to undertake a climate change risk assessment (CCRA) every five-year period and develop a programme for adaptation action in response to the risks identified. The UK government's second CCRA was published in 2017 [5] and the third will be issued in 2022. The CCRA will be based on the *Independent Assessment of Climate Change Risk* (CCRA3) [6] published by the Committee on Climate Change in June 2021. It establishes eight priority risk areas for action over the following two years:
- Increased flooding and drought
  - Emissions from natural carbon stores
  - Failure of the power system
  - Supply chain system
  - Health and well-being from high temperatures
  - Natural capital
  - Food production and trade
  - Climate change impacts overseas that affect the UK [7]

14.2.8 The CCRA3 identifies significant risks to national infrastructure including transport networks from embankment and bridge failure, river, surface/groundwater and coastal flooding, erosion and increases in the frequency and severity of extreme weather such as high winds, high temperatures, lightening, storms and high waves. It highlights the need for infrastructure to be located, planned and designed and maintained to be resilient to climate change including severe weather events. It also recognises that more action is needed to encourage information sharing between infrastructure operators to improve overall risk management. Section 14.8 Design, mitigation and enhancement measures and section 14.9 Assessment of likely significant effects identifies and assesses the adaptation measures adopted by the proposed scheme.

**National planning policy**

National Policy Statement for National Networks (2014)

14.2.9 Paragraph 5.16 of the *NPSNN* notes that the impact of road development on aggregate levels of emissions is likely to be very small (paragraph 3.8 asserts less than 0.1% of annual carbon budgets) and needs to be seen against significant projected reductions in carbon emissions because of meeting the government’s legally binding carbon budgets. Paragraph 5.18 notes that an increase in carbon emissions is not a reason to refuse development consent, unless the increase is large enough to have a material impact on the ability of the government to meet its carbon reduction targets.

14.2.10 Table 14-2 identifies the *NPSNN* policies relevant to the climate assessment and specifies where in this PEI Report information is provided to address each requirement.

**Table 14-2 Relevant NPSNN policies for the climate change assessment**

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where information is provided in this PEI Report chapter to address the requirement
4.40	<i>Applications should consider the impacts of climate change when planning location, design, build and operation.</i>	Sections 14.9 Design, mitigation and enhancement measures and section 14.10 Assessment of likely significant effects consider how the proposed scheme would account for the projected impacts of climate change.
4.42	<i>Applications should consider the potential impacts of climate change over the estimated lifetime of the new infrastructure, making use of the latest UK Climate Projections available, and ensuring that any Environmental Statement (ES) which is prepared should identify appropriate mitigation or adaptation measures.</i>	Section 14.7 Baseline conditions details UK Climate Projections (UKCP18) high emissions scenario (Representative Concentration Pathways (RCP) 8.5) against the 2080 projections at the 50% probability level. Section 14.9 Design, mitigation and enhancement measures considers appropriate mitigation and adaption measures. Section 14.10 Assessment of likely significant effects considers the potential impacts of climate change over the estimated lifetime of the proposed scheme.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where information is provided in this PEI Report chapter to address the requirement
4.43	<i>Applications should demonstrate that there are no critical features of the design of new national networks infrastructure which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections.</i>	Section 14.10 Assessment of likely significant effects considers potentially critical features of the design which may be seriously affected by climate change beyond that projected in the latest UK climate projections. Additionally, the safety of the proposed scheme is assessed against the high emissions RCP 8.5 global warming scenario. An assessment using H++ climate scenarios on the safety critical features will be undertaken and reported in the ES.
4.44	<i>Any adaptation measures should also be based on the most recent set of UK Climate Projections, the Government's national Climate Change Risk Assessment and consultation with statutory consultation bodies. The adaptation measures must also be assessed as part of any environmental impact assessment and included in the ES.</i>	Adaptation measures have been based on the most recent set of UK Climate Projections and the Government's CCRA. Section 14.9 Design, mitigation and enhancement measures identifies the adaption measures that have been adopted.
5.17	<i>Applicants should consider carbon impacts as part of the appraisal of scheme options and need to describe an assessment of any likely significant climate factors within the Environmental Statement. It is very unlikely that the impact of a road project would, in isolation, affect the ability of the Government to meet its carbon reduction targets. However, applicants should provide both evidence of the carbon impacts of a scheme and an assessment of these impacts against the Government's carbon budgets.</i>	Chapter 3 Assessment of alternatives of this PEI Report sets out the appraisal of options which has included consideration of climate. Section 14.10 Assessment of likely significant effects considers the carbon impact of the proposed scheme and assesses the proposed scheme against the government's carbon budgets. Further reporting will be presented in the ES.
5.19	<i>Appropriate climate mitigation measures to be implemented, including both engineering plans and the use of materials, in both design and construction of a road scheme, so that the associated carbon footprint is not unnecessarily high. Of particular note is the statement that the Secretary of State's view of the adequacy of the mitigation measures relating to design and construction would be a material consideration in the decision-making process.</i>	Section 14.9 Design, mitigation and enhancement measures identifies the mitigation measures that have been implemented to minimise the carbon footprint of the proposed scheme.

### National Planning Policy Framework

14.2.11 The *National Planning Policy Framework* (NPPF) [8] sets out the UK government's planning policies for England and how these are expected to be applied and provides a high-level framework within which other development can come forward. The *NPPF* does not contain specific policies for nationally significant infrastructure projects (including the proposed scheme), which are primarily determined in accordance with the decision-making framework in the *Planning Act 2008* and the relevant national policy statement (which for the

proposed scheme is the *NPSNN*, as described in paragraphs 14.2.9 of this report), as well as any other matters that are relevant (which may include the *NPPF*). The *NPPF* describes the role of planning policy in meeting the challenges posed by climate change and helping to shape places to secure radical reductions in GHG emissions, as well as reducing vulnerability and providing resilience to the impacts of climate change. Section 14 of the *NPPF* states that developments should avoid increased vulnerability to the range of impacts arising from climate change and should be planned for in ways that can help to reduce GHG emissions, in line with the objectives and provisions of the *Climate Change Act 2008*. Section 14.8 Design, mitigation and enhancement measures, section 14.9 Assessment of likely significant effects and Appendix 14.2 Vulnerability to climate change assessment (the latter produces in the ES) consider the identification and implementation of avoidance and mitigation measures for the proposed scheme.

#### The Climate Change: second national adaptation programme (2018-2023)

- 14.2.12 The *Climate Change: second national adaptation programme (2018-2023)* (NAP) [9] was produced by the Department for Environment, Food and Rural Affairs (Defra) and launched in 2018. The plan sets out the UK government's response to the second CCRA. It forms part of the five-yearly cycle of requirements laid down by the *Climate Change Act 2008*, with the aim of driving a dynamic and adaptive approach to building the nation's resilience to climate change. Section 3.4.4 of the NAP highlights the economic and strategic value of the strategic road network (SRN) in the UK and notes the implications of risks to severance and safety posed by climate change. It details how Highways England is embedding resilience to climate change, based on the UK Climate Projections 2009 (UKCP09) future climate projections, including measures such as safeguarding against flooding, erosion, falling trees, instability and risk of failure across the SRN to increase safety.

#### Clean Growth Strategy

- 14.2.13 In 2017, the UK government published the *Clean Growth Strategy* [10], which is a plan for meeting the legislated carbon budgets as set out in the *Carbon Budget Order 2016*. The strategy includes a key policy to accelerate the shift to low carbon transport, which primarily focuses on a transition to low emission vehicles, investing in new technologies such as autonomous vehicles and low carbon fuels, promoting cycling and walking and shifting freight from road to rail.

#### Road to Zero Strategy (2018) and Decarbonising transport: a better, greener Britain (2021)

- 14.2.14 In July 2018, the UK government launched the *Road to Zero Strategy* [11], a policy paper which includes a forward-looking route map to articulate the steps required to decarbonise and electrify road transport in line with their industrial strategy. The document outlines 46 policy interventions to aid in the drive to decarbonise road transport. Its main focuses are on supporting modal shift, reducing emissions from vehicles and investing in electric vehicle infrastructure. Since then, the UK government has published the *Decarbonising transport: a better, greener Britain* [12] in July 2021, which outlines 78 commitments to decarbonising all forms of transport and details key enablers and measures for achieving this. This includes a focus on achieving zero emissions for road transport through provision of infrastructure that supports the transition to zero

emissions and a phasing out of non-zero emissions road vehicles in a shift towards electric.

### **Highways England policy**

#### Highways England Climate Adaptation Risk Assessment Progress Update – 2016

- 14.2.15 Highways England is taking action to safeguard against climate risks on the road network through a series of adaptation plans, as set out in Section 8 of their climate change adaptation risk assessment [13]. These include adaptation actions related to pavements; drainage; structures; geotechnics; non-motorised users; soft estate (landscape and ecology); vehicle restraint systems; signs and signals; and road markings. For some risks doing the minimum is appropriate because the rigorous design standards or existing procedures are already sufficient to cope with the predicted impacts of climate change. In other cases, including those relating to drainage, it has been considered necessary to act. For example, updating technical standards through the DMRB or the *Manual of Contract Documents for Highway Works* (MCHW) to ensure that new designs and projects are prepared for the future climate.

#### Highways England's Net Zero Highways: Our 2030/2040/2050 Plan (2021)

- 14.2.16 Highways England's *Net Zero Highways: Our 2030/2040/2050 Plan* [14] was published in July 2021, which details three key action areas for achieving net zero for their corporate emissions by 2030, maintenance and construction emissions by 2040 and for road users' emissions by 2050. Three roadmaps outline the key actions for each of these areas, which include a focus on: cutting corporate energy use and fleet emissions through investment in renewable energy and electric vehicles; reducing emissions during construction, for example through the use of zero carbon construction products; and supporting the use of zero carbon vehicles, including heavy goods vehicles (HGV).

#### Highways England's Sustainable Development Strategy (2017)

- 14.2.17 The Highways England's *Sustainable Development Strategy* [15] outlines five key areas of focus for sustainability which are aligned with the five capitals approach. One focus is on achieving resilience through adaptation of the road network to climate change and making effective investment decisions in this respect. As such, building a climate-resilient road network is a key aspect of Highways England's sustainable development.

#### Highways England's Delivery Plan (2020-2025)

- 14.2.18 The Highways England's *Delivery Plan (2020-2025)* [16] states that Highways England will develop a more proactive approach to addressing flood risk and improving our network's resilience to climate change. For example, Highways England will improve the resilience of our concrete pavements to prolonged high temperatures as part of the maintenance and renewals programme, taking remedial action where necessary. It also states that Highways England will work to reduce the carbon emissions associated with the construction, use, management and operation of the network and support the government's ambition to achieve net zero carbon emissions by 2050.

## Local planning policy

### South Somerset District Council Local Plan (2006-2028)

- 14.2.19 The *Local Plan* [17] asserts that the potential impacts of climate change must be considered in planning for all new development, both in terms of location and design.

### Taunton Deane Core Strategy (2011-2028)

- 14.2.20 The *Core Strategy* [18] requires all development to incorporate sustainable design features to reduce their impact on the environment, mitigate and adapt to climate change, and particularly to help deliver a reduction in carbon dioxide (CO<sub>2</sub>) and other GHG emissions.

### Somerset's Climate Emergency Strategy (2020)

- 14.2.21 The *Climate Emergency Strategy* [19] was adopted by all five Somerset local authorities in 2020. The strategy has a focus on transitioning to electric vehicles and changes in travel behaviours. It also notes that networks need to be resilient to climate change and therefore futureproofed. It notes that the rural nature of Somerset is a key barrier. A number of key outcomes are set out for 2030, which include a reduction in GHGs through increased electric vehicle use, reduced emissions through encouraging behaviour change; and the development and implementation of Climate Change Action Plans to build and maintain the resilience of transport infrastructure.

### Somerset West and Taunton Carbon Neutrality and Climate Resilience Action Plan (2020)

- 14.2.22 The Councils have set out a framework to enable Somerset to become a carbon neutral county by 2030 and to have a Somerset which is resilient to the impacts of climate change [20]. The action plan includes a list of actions of which a number are focused on transport. These include the installation of electric vehicle charge points, improved active travel, improvements to the Park and Ride scheme at Taunton, improvements to its own vehicle fleet and working towards future rail link improvements.

## Standards and guidance

### GHG emissions

- 14.2.23 The following standards and guidance have been used to guide the preliminary assessment of GHG emissions:
- DMRB LA 114 *Climate*, which provides the requirements for the assessment and reporting the effects of GHG emissions for highways.
  - DMRB LA 105 *Air quality* [21], which provides the calculation method for regional emissions from vehicles that use the road network.
  - *Publicly Available Specification 2080 (PAS 2080)* [22] on carbon management in infrastructure, a global standard for managing infrastructure carbon.
  - Royal Institution of Chartered Surveyors (RICS) professional standards and guidance document on *Whole life carbon assessment for the built environment* (1st edition, 2017) [23].
  - Department for Transport (DfT), *Transport Analysis Guidance (TAG) Unit A3 Environmental Impact Appraisal, Chapter 4 Greenhouse Gases* [24].
  - Department for Transport, *Decarbonising transport: a better, greener Britain* [12].

- Highways England, Net zero highways: Our 2030 / 2040 / 2050 plan.

#### Vulnerability to climate change

14.2.24 The following standards and guidance have been used to guide the preliminary assessment of vulnerability to climate change:

- DMRB LA 114 *Climate*, which provides the requirements for assessment and reporting the effects of climate on Highways England highways projects (both CCR and adaptation).
- The Institute of Environmental Management and Assessment (IEMA), *Guidance on climate change resilience and adaptation* [25] in response to the requirements specified in the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2017*. This guidance provides an approach to undertaking CCR assessments for EIA in the UK.

### 14.3 Assessment methodology

#### Greenhouse gas emissions

14.3.1 The preliminary assessment of the magnitude of GHG emissions has been undertaken in accordance with DMRB LA 114 *Climate*.

14.3.2 The goal of the emissions quantification exercise is to calculate the emissions anticipated to be generated or avoided by the proposed scheme, within the DCO boundary and emissions scope set out in section 14.5 Study area of this chapter. The purpose of this is to:

- determine the magnitude of the proposed scheme's emissions for the relevant scenarios: 'Do-Something' and 'Do-Minimum'.
- enable comparison of the 'Do-Something' scenario against the 'Do-Minimum' scenario and the UK carbon budgets.
- enable identification of emissions hot spots within the 'Do-Something' scenario to inform the identification and prioritisation of mitigation measures.

14.3.3 The preliminary assessment considers three sources of GHG emissions as defined in PAS 2080 and RICS guidance, during the construction and operation (use) lifecycle stages over a 60-year assessment period, including:

- **Construction emissions.** Carbon is assessed based on information provided by design teams including where available relevant drawings of the design, the use of products or materials, construction transport, construction plant and construction waste. Section 14.4 Assessment assumptions and limitations, outlines the assumptions that were made. The Highways England carbon emissions calculation tool is used, along with its carbon factors, for the calculation, supplemented with other factors where necessary as discussed in Section 14.4 Assessment assumptions and limitations.
- **Operational maintenance-related emissions.** An estimation of carbon emissions associated with maintenance of the road (calculated using the same method as the construction works).
- **Operational traffic carbon emissions (user carbon) from vehicle tailpipes.** These are calculated based on data from the traffic model, with the study area being determined by the Affected Road Network (ARN). The methodology used is consistent with that of the air quality assessment, using the DMRB screening tool. Consideration has also been given to Transport Analysis Guidance (TAG) Unit A3 Environmental Impact Appraisal, which

provides a methodology for the reporting of GHG emissions and data tables for future trends in vehicle technology changes.

- 14.3.4 Further details on the underlying information for the assessment is presented in Appendix 14.1 Greenhouse gas assessment assumptions, methodology and emissions factors.
- 14.3.5 In line with DMRB LA 114 *Climate*, 'end of life' or decommissioning impacts have not been considered due to the long design life of the asset and given that emissions associated with end of life are commonly relatively small.
- 14.3.6 Emissions from the considered sources are compared to a baseline 'Do-Minimum' scenario to quantify the impact of the proposed scheme. The scenarios used for the GHG emissions assessment of the proposed scheme are summarised in Table 14-3.

**Table 14-3 GHG emissions assessment scenarios**

Scenario	Description
'Do-Minimum'	'Business as usual' – the proposed scheme is not implemented.
'Do-Something'	The proposed scheme is implemented, taking into account embedded GHG mitigation measures.

- 14.3.7 GHG emissions in each scenario have been compared in order to assess the contribution of the proposed scheme to climate change. Values are reported in metric tonnes of carbon dioxide equivalents (tCO<sub>2</sub>e). This measure considers the six Kyoto Protocol gases – CO<sub>2</sub>; methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulphur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs) – converted into tCO<sub>2</sub>e. This calculation normalises the global warming potential of the main GHGs into one measure, based on the global warming potential of CO<sub>2</sub>.
- 14.3.8 In accordance with DMRB LA 114 *Climate*, the third lifecycle stage for a project's GHG emissions (the first and second being construction and operation) comprises opportunities to reduce the production/use of GHG emissions. Measures to reduce GHG emissions as far as practicable are considered in section 14.8 Design, mitigation and enhancement measures.

#### Assessment of significance

- 14.3.9 An assessment of significance has been undertaken in accordance with DMRB LA 114 *Climate*. The emissions assessment is based on the Highways England carbon reporting tool and assessment of road user emissions in line with DMRB LA 105 Air quality.
- 14.3.10 A preliminary estimate of the likely magnitude of GHG emissions associated with the proposed scheme has been assessed against the national UK carbon budgets. This approach is in accordance with DMRB LA 114 *Climate*. As mentioned previously, the UK government has passed into law carbon budgets up to 2037 as follows:
- 4<sup>th</sup> carbon budget (2023 to 2027) allows the UK to emit 1,950 MtCO<sub>2</sub>e.
  - 5<sup>th</sup> carbon budget (2028 to 2032) allows the UK to emit 1,725 MtCO<sub>2</sub>e.
  - 6<sup>th</sup> carbon budget (2033 to 2037) would allow the UK to emit 965 MtCO<sub>2</sub>e.
- 14.3.11 In accordance with paragraph 3.20 of DMRB LA 114 *Climate*, a significant effect occurs where the increase in carbon emissions resulting from the proposed scheme would have a "...material impact on the ability of Government to meet its carbon reduction targets". In the absence of any specific thresholds, professional

judgement has been used to determine whether the emissions predicted from the project are significant.

### Vulnerability to climate change

- 14.3.12 The vulnerability to climate change assessment qualitatively assesses the impacts of climate change on the proposed scheme during construction and operation based on professional expertise and judgement.
- 14.3.13 In line with DMRB LA 114 *Climate*, and as required by the NPSNN, the preliminary assessment of the proposed scheme's vulnerability to climate impacts has been undertaken by employing the following:
- Detailed receptor identification for the construction and operation phase, in liaison with the proposed scheme design team.
  - Analysis of current baseline climate conditions and projected climate hazards, utilising appropriate UKCP18 datasets in order to identify any likely significant climate changes and the likelihood of the proposed scheme to be exposed to these changes.
  - The likelihood and consequence of the climate impact on the proposed scheme are qualitatively assessed to determine the significance.
  - Identification of mitigation/adaptation measures for any significant effects, in liaison with the proposed scheme design team and relevant environmental discipline specialists.
- 14.3.14 The receptors that have been considered in this preliminary assessment are presented in Table 14-4.

**Table 14-4 Preliminary assessment receptors**

Value/Sensitivity	Receptor	Examples within the study area
Medium	Construction process	Workforce, plant and machinery
High	Assets and their operation, maintenance and refurbishment	Road pavement surfaces, structures, earthworks and drainage, technology assets and soft estate.
Very High	End-users	Members of the public or commercial operators using the proposed scheme

- 14.3.15 The following primary climate change hazards, which are likely to be relevant in the vulnerability to climate change assessment include: high temperatures; high levels of precipitation; and low levels of precipitation. Additional climate change hazards considered include: windstorms and wind gusts; drought conditions; and cold weather events.
- 14.3.16 After identifying the climate change impacts, a risk assessment of those impacts on the identified receptors during construction and operation of the infrastructure and assets associated with the proposed scheme has been undertaken. The climate impacts are scored using a qualitative five-point scale based on the DMRB LA 114 *Climate* framework in Table 14-5 and Table 14-6.

**Table 14-5 Likelihood categories**

Likelihood category	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the project (60 years), e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the project (60 years), e.g. approximately once every five years, typically 12 events.

Likelihood category	Description (probability and frequency of occurrence)
Medium	The event occurs limited times during the lifetime of the project (60 years), e.g. approximately once every 15 years, typically 4 events.
Low	The event occurs during the lifetime of the project (60 years), e.g. once in 60 years.
Very Low	The event can occur once during the lifetime of the project (60 years).

**Table 14-6 Measure of consequence**

Consequence of impact	Description
Very large adverse	Operation – national level (or greater) disruption to strategic route(s) lasting more than 1 week.
Large adverse	Operation – national level disruption to strategic route(s) lasting more than 1 day but less than 1 week or regional level disruption to strategic route(s) lasting more than 1 week.
Moderate adverse	Operation – regional level disruption to strategic route(s) lasting more than 1 day but less than 1 week.
Minor adverse	Operation – regional level disruption to strategic route(s) lasting less than 1 day.
Negligible	Operation – disruption to an isolated section of a strategic route lasting less than 1 day.

14.3.17 The likelihood and consequence are combined to determine the significance of each effect using the matrix shown in Table 14-7. The vulnerability to climate change assessment identifies the design and mitigation measures required to protect the proposed scheme against the impacts of climate change for any effects assessed as significant.

**Table 14-7 Significance matrix**

		Measure of likelihood / sensitivity				
		Very Low	Low	Medium	High	Very High
Measure of consequence	Very Large	Not Significant	Significant	Significant	Significant	Significant
	Large	Not Significant	Not Significant	Significant	Significant	Significant
	Moderate	Not Significant	Not Significant	Significant	Significant	Significant
	Minor	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
	Negligible	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

14.3.18 For any significant effects that are identified, relevant mitigation measures have been identified in discussion with the environmental discipline specialists. This has made linkages with mitigation measures identified within other relevant PEI Report chapters.

14.3.19 The *NPPF* sets requirements for flood risk, and design guidance relating to climate change and flood risk is available. A preliminary Flood Risk Assessment (FRA) has been undertaken as part of this PEI Report and is provided in Appendix 13.1 Flood Risk Assessment. The FRA considers current Environment

Agency climate change allowances for increases in peak river flow and rainfall intensity.

- 14.3.20 The impact of climate change on habitats and soft landscape features is considered in Chapter 8 Biodiversity and Chapter 7 Landscape and visual of this PEI Report, respectively. The effects on ground conditions and water quality arising from land contamination are considered in Chapter 9 Geology and soils of this report. The effects on air quality arising from construction practices are considered in Chapter 5 Air quality of this PEI Report.
- 14.3.21 In line with DMRB LA 114 *Climate*, H++ climate scenarios are used to test the sensitivity of vulnerable safety critical features, to ensure that such features would not be affected by more extreme changes to the climate beyond that projected in UKCP18 [26]. The following safety critical features have been identified: retaining walls; bridges and structures; pavements; road restraint system; drainage; lighting and earthworks.
- 14.3.22 The PEI Report has considered the safety of the proposed scheme against UKCP18 and Representative Concentration Pathways 8.5 (RCP8.5). An assessment of the safety critical features against H++ climate scenarios will be undertaken to inform the ES.

## 14.4 Assessment assumptions and limitations

### Greenhouse gas emissions

- 14.4.1 The GHG emissions assessment has been undertaken on the basis of the information available at the time of assessment and is therefore preliminary. Where assumptions have been made, they have been selected to present the 'worst-case' scenario for the particular item/factor.
- 14.4.2 Assumptions/judgements in each case have been made using:
- emerging design detail
  - engineering specialist knowledge
  - environmental specialist knowledge
  - climate change/carbon specialist knowledge
  - manufacturer specifications
  - proxy engineering data from previous comparable projects
- 14.4.3 Appendix 14.1 GHG assessment assumptions sets out details on information used to undertake this assessment. Table 14-8 provides a summary (aligned to the structure of the PAS 2080 life-cycle modules) of the information that has formed part of the assessment along with justification where modules have been excluded.

**Table 14-8 Justification for inclusion or exclusion of PAS 2080 life-cycle stages and individual modules within GHG emissions quantification**

Life-cycle stage	Boundary stage	Module	Description	Included in scope?	Justification
Before use Stage	Pre-construction	A0	Preliminary studies, consultations	×	Carbon emissions from preliminary studies and works are largely office-based and are assumed to be insignificant.
	Product	A1	Raw material supply	✓	A1 - A3 emissions (i.e. from raw material extraction,

Life-cycle stage	Boundary stage	Module	Description	Included in scope?	Justification
		A2	Transport	✓	product processing, and final product manufacture, its energy use, and waste management within these processes, transportation within the supply chain, and manufacture) has been calculated using carbon emissions factors and carbon conversion factors from the Highways England carbon emissions calculation tool [27], based on preliminary information provided by design teams and relevant design drawings where available.
		A3	Manufacture	✓	
	Construction process	A4	Transport to works site	✓	A4 emissions have been calculated using the RICS guidance [23], applying transport conversion factors from Defra [28]. They are calculated using emissions factors from the Highways England carbon emissions calculation tool [27], based on information provided by design teams based on relevant drawings of the design where available.
		A5	Construction/installation processes	✓	A5 emissions have been based on an average per kilometre emissions factor derived from a sample of comparable highway schemes and applying this to the length of the proposed scheme as insufficient information was available for the PEI Report.
	Use stage	Installed products and materials	B1	Use	✗
B2			Maintenance	✓	B2 - B5 emissions associated with maintenance, repair, replacement and refurbishment assume that certain assets (such as the road surface) are repaired and/or replaced during the 60-year design life. B2 - B5 emissions included at this stage have been based on
B3		Repair	✓		
B4		Replacement	✓		
B5		Refurbishment	✓		

Life-cycle stage	Boundary stage	Module	Description	Included in scope?	Justification
					an average per kilometre emissions factor derived from a sample of comparable highway schemes and applying this to the length of the proposed scheme as insufficient information was available for the PEI Report. B2 - B5 emissions will be calculated using the same method as the construction works and supply chain carbon emissions for the ES.
		B6	Operational energy use	✓	B6 emissions have been based on an average per kilometre emissions factor derived from a sample of comparable highway schemes and applying this to the length of the proposed scheme as insufficient information was available for the PEI Report.
		B7	Operational water use	x	Carbon emissions resulting from the consumption of water required by the proposed scheme to enable it to operate and deliver its service are assumed to be insignificant.
		B8	Other operational processes	x	Other process carbon emissions arising from the proposed scheme to enable it to operate and deliver its service, such as management of operational waste, are assumed to be insignificant.
		B9	Users' utilisation of infrastructure	✓	B9 emissions have been estimated for the ARN using the DMRB Screening Tool [29], considering a 60-year assessment period. B9 emissions have been based on Project Control Framework (PCF) stage 2 data and therefore 2023 opening year with traffic growth applied. This will be updated in the ES to reflect a 2028 opening year.
End of life stage		C1	Deconstruction	x	End of life (C1 - C4) impacts have not been considered due to the long design life of the asset and given that emissions associated with end of life are commonly relatively small.
	C2	Transport			
	C3	Waste processing for recovery			
	C4	Disposal			

Life-cycle stage	Boundary stage	Module	Description	Included in scope?	Justification
Supplementary information beyond the infrastructure life-cycle		D	Boundary of benefits and loads beyond the infrastructure life cycle	x	GHG emissions associated with ongoing land use change/sequestration are not included within the PEI Report, due to a lack of data at this stage. Emissions from land use change will instead be presented within the ES, over the construction phase and 60-year operational period.

- 14.4.4 For transport-related emissions (module A4), data on default transport scenarios for UK projects contained within the RICS professional standards and guidance [23] document on whole life carbon assessment for the built environment (2017), were used. For locally manufactured materials and products, a transport distance of 50km by road has been applied. For nationally manufactured materials and products, a transport distance of 300km by road has been applied. Carbon emission factors and carbon conversion factors from the Highways England carbon emissions calculation tool [27] have been used exclusively.
- 14.4.5 GHG emissions related to the construction element of embodied carbon (A5) have been calculated using emissions factors from the Highways England carbon emissions calculation tool, based on preliminary information provided by the design team. For the PEI Report, preliminary information was available for the structures, pavement, drainage and earthworks elements of construction. Further information will become available and will be incorporated into the A5 calculation to be reported within the ES.
- 14.4.6 For user emissions (module B9), the assessment has used the DMRB Screening Tool (which references the UK Emission Factor Toolkit v10) [29] for consistency with the air quality assessment. As noted in the Air Quality Chapter, PCF stage 2 traffic data has been used for this PEI Report using modelled years of 2023 and 2038 (and a 60-year assessment period overall). However, it is noted that the DMRB Screening Tool [29] is limited in its projections to 2030. This means that for this assessment, any emission predictions after 2030 use 2030 assumptions. The DfT TAG methodology [24] provides data on the potential uptake of electric vehicles, which would likely substantially reduce emissions in the future. This would apply to both the 'Do-Minimum' and the 'Do-Something' scenarios equally and would therefore reduce any potential difference in emissions between the scenarios. Furthermore, this preliminary assessment likely represents a conservative scenario. This is discussed further in Section 14.9. The approach presented in this section will be reviewed for the ES in light of any new guidance that is published, such as the *Decarbonising transport: a better, greener Britain* [12].
- 14.4.7 For the calculation of GHG emissions associated with ongoing land use change/sequestration (module D) and in line with DMRB LA 114 *Climate*, a proportionate approach has been taken. A high-level assessment of CO<sub>2</sub> sequestration rates was undertaken using data from Natural England's research report [30]. It is estimated that an area of between 200-300 hectares (ha) of forest would be required to sequester the embodied carbon impacts of the proposed scheme over its design life. Therefore, an intervention to sequester the carbon

impacts of the proposed scheme is not considered feasible and has not formed part of the GHG emissions preliminary assessment. A more detailed assessment will be presented within the ES.

- 14.4.8 The methodology used to calculate the UK carbon budgets is different to that used for the calculation of lifecycle emissions from a road scheme and therefore caution should be used when making a direct comparison. However, for the purposes of identifying to what extent the proposed scheme may impact the ability of the UK to meet its carbon budgets, it is necessary to make this comparison to put the proposed scheme into context.

### **Vulnerability to climate change**

- 14.4.9 Data on the climate baseline and future projections are based on freely available information from third-parties, including the historical meteorological variables recorded by the Meteorological Office (Met Office) and the UKCP18 developed by the Met Office [31]. This preliminary assessment has been informed by a range of existing climate change research and literature, available at the time of writing.
- 14.4.10 The vulnerability to climate change assessment has been undertaken using UKCP18, the latest set of probabilistic climate projections for the UK. The UKCP18 Climate Projections are based on a range of GHG emissions scenarios, which are subject to a degree of uncertainty. How the climate will react to different levels of emissions is also uncertain. There are three key sources of uncertainty within climate projections:
- Natural climate variability: either from natural external influences on climate (e.g. change in atmospheric particulates due to volcanic activity) or changes in the energy received from the sun.
  - Incomplete understanding of earth system processes and their imperfect representation in climate models (modelling uncertainty).
  - Uncertainty in future man-made emissions (of GHGs and other pollutants).
- 14.4.11 The vulnerability to climate change assessment is largely qualitative, with the exception of assessments relevant to drainage assets and flood risk, which have been informed by the Environment Agency climate change allowances for increases in peak river flow and rainfall intensity.
- 14.4.12 It is recognised that there can be uncertainty between the assets' performance in response to climate hazards. This uncertainty has been assessed qualitatively in the vulnerability to climate change assessment.

## **14.5 Study area**

### **Greenhouse gas emissions**

- 14.5.1 The assessment of GHG emissions has considered the following emissions sources:
- GHG emissions resulting from construction (i.e. material supply including primary extraction, manufacturing, transportation and construction process and site works associated with the proposed scheme).
  - GHG emissions resulting from the operation and maintenance of the proposed scheme.
  - GHG emissions resulting from the use of the proposed scheme (i.e. vehicle emissions).

- 14.5.2 Opportunities to mitigate the effects on climate through minimising activities that generate GHG emissions, reusing and adopting low carbon materials are also considered and are outlined in section 14.8 Design, mitigation and enhancement measures.

#### Carbon emissions during construction

- 14.5.3 For the assessment of carbon emissions associated with the construction of the proposed scheme, the study area takes account of emissions associated with the extraction, processing and transport of materials (refer to paragraph 14.4.4) from outside of the DCO boundary, as well as site-based emissions that result from construction activities within the DCO boundary.

#### Carbon emissions during operation

- 14.5.4 For the assessment of carbon emissions associated with repair and/or maintenance of the proposed scheme, the study area is defined by the DCO boundary and takes account of emissions associated with the extraction, processing and transport of materials, as well as site based GHG emissions that result from maintenance activities within the DCO boundary.

#### Road user carbon emissions (during operation)

- 14.5.5 The study area for operational road user carbon emissions is consistent with the ARN, as defined by the proposed scheme's traffic model. The ARN is described in section 5.5 Study area of Chapter 5 Air quality and shown in Figure 5.5 Affected Road Network. This includes emissions from vehicles using the proposed scheme and those in the wider road network, which have been positively or negatively influenced by the proposed scheme. The assessment of road user carbon includes the total emissions across the ARN model, as described in Chapter 5 Air quality and shown in Figure 5.5 Affected Road Network.

#### Baseline and assessment scenarios

- 14.5.6 The baseline scenario is the 'Do-Minimum' approach, which represents continual operation of the existing network without the proposed scheme. The baseline scenario includes current operational maintenance GHG emissions, operational user GHG emissions and land use change/sequestration GHG emissions. A 60-year appraisal period has been adopted in line with the methodology set out in DMRB LA 114 *Climate*. The baseline scenario is set out in section 14.6 Baseline conditions.
- 14.5.7 The assessment scenario is the 'Do-Something' approach, i.e. implementing the proposed scheme. The assessment scenario includes the construction, operational maintenance, operational user and sequestration GHG emissions described in paragraph 14.5.1. GHG emissions in this scenario are compared to the baseline in order to assess the net contribution of the proposed scheme to climate change (in tCO<sub>2</sub>e) from construction and operation over the 60-year appraisal period.

### **Vulnerability to climate change**

#### Spatial scope

- 14.5.8 The study area comprises the construction footprint of the proposed scheme, including compounds and temporary land take.

### Temporal scope

- 14.5.9 The study includes all potential climate hazards for infrastructure and assets associated with the proposed scheme. The assessment of climate effects on the proposed scheme is assessed over the 60-year operational life-cycle in line with the methodology set out in DMRB LA 114 *Climate*.
- 14.5.10 Assessment scenarios are based on current and future climate baselines. The vulnerability to climate change assessment is based on climate trends associated with the UKCP18 high emissions scenario (50% probability). The current climate baseline is established by using observed weather patterns and extreme weather events to assess the proposed scheme's vulnerability to climate change in the immediate future during construction. The time periods for climate projections are selected based on the assumed lifespan and stages of the proposed scheme (60 years), with construction assumed to commence in 2024 and operation assumed from 2028.

## 14.6 Baseline conditions

### GHG emissions

#### Current and future baseline

- 14.6.1 As part of the assessment process, DMRB LA 114 *Climate* requires that GHG emissions without the proposed scheme should be identified for both the current and future baseline, including all the relevant sources of GHG emissions included in the study area. This section identifies the GHG emissions without implementing the proposed scheme for the current and future baseline ('Do-Minimum' scenarios). In these scenarios it is assumed that no construction activity would take place on any of the roads in the area, aside from maintenance, across the study period.
- 14.6.2 The estimated baseline GHG emissions for the 'Do-Minimum' scenario in the 2016 baseline year, future baseline years (2023 and 2038) and over the study period (60 years) are summarised in Table 14-9.

**Table 14-9 Estimate of baseline GHG emissions (ktCO<sub>2</sub>e) for study area**

GHG emissions component	Definition	2019 baseline scenario (historic)	2023 annualised (modelled opening year)	2038 annualised design (future) modelled assessment year	Cumulative estimated GHG emissions over 60-year study period
Operational user GHG emissions	GHG emissions from the tailpipes of vehicles driving in the ARN (consistent with the study area outlined for the proposed scheme (see section 14.5 Study area).	147,000	150,000	161,000	9,883,000

Note: Values been rounded to the nearest 1,000 tCO<sub>2</sub>e.

Note: The reported value for 2038 is currently overestimated as it does not account for widespread changes in vehicle fleets towards electric after 2030.

- 14.6.3 For wider context, information on emissions from all road transport is published annually by the Department for Business, Energy & Industrial Strategy (BEIS) in its *UK local authority and regional carbon dioxide emissions national statistics* series [32]. This provides estimates of CO<sub>2</sub> emissions from users of all roads within each UK local authority. The latest available set of data from this source is for 2018, which was published in 2020. A summary of this information is presented in Table 14-10.
- 14.6.4 The data shows that GHG emissions from transport sources represent approximately half of all emissions in the local authority areas within Somerset (42-58% by area in 2019). This is consistent in the three most recent years of data available. Within the transport category, almost all of these emissions are from road transport, with sources of emissions from minor roads representing the largest proportion in Somerset West and Taunton; and sources of emissions from A-roads representing the largest proportion in South Somerset. Across all of Somerset, total emissions have fallen by approximately 7% between 2016 and 2019, whilst total transport related emissions in 2019 are almost the same as those reported in 2016.
- 14.6.5 Total emissions in the Somerset region were estimated by BEIS to be 3,352ktCO<sub>2</sub>e in 2019, with 1,478ktCO<sub>2</sub>e attributable to transport (mainly roads) [38]. For context, total emissions in all of England in 2019 were 276,090ktCO<sub>2</sub>e of which 104,187ktCO<sub>2</sub>e was attributable to transport.

**Table 14-10 Summary of estimated GHG emissions (ktCO<sub>2</sub>e) for Somerset by source**

Name	Somerset West and Taunton				South Somerset				Somerset (County) Total			
	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019
<b>Industry and Commercial Total</b>	171	162	171	151	306	290	277	268	<b>977</b>	<b>908</b>	<b>883</b>	<b>848</b>
<b>Domestic Total</b>	230	215	215	209	261	242	243	236	<b>852</b>	<b>793</b>	<b>793</b>	<b>774</b>
<b>Transport Total</b>	420	432	424	418	375	386	375	379	<b>1479</b>	<b>1526</b>	<b>1501</b>	<b>1478</b>
of which Road Transport (A roads)	107	111	106	102	235	244	233	234	<b>568</b>	<b>584</b>	<b>562</b>	<b>553</b>
of which Road Transport (Motorways)	130	134	130	123	0	0	0	0	<b>357</b>	<b>379</b>	<b>372</b>	<b>348</b>
of which Road Transport (Minor roads)	173	177	179	184	118	120	122	125	<b>492</b>	<b>502</b>	<b>509</b>	<b>522</b>
of which Diesel Railways	5	5	4	4	20	20	19	18	<b>51</b>	<b>50</b>	<b>47</b>	<b>44</b>
of which Transport Other	5	5	5	5	2	2	2	2	<b>11</b>	<b>11</b>	<b>11</b>	<b>11</b>
LULUCF Net Emissions	-65	-69	-71	-72	4	2	2	2	<b>186</b>	<b>162</b>	<b>193</b>	<b>174</b>

Name	Somerset West and Taunton				South Somerset				Somerset (County) Total			
	784	764	768	727	977	949	924	911	3596	3477	3458	3352
<b>Grand total</b>												

[Note: LULUCF = Land Use, Land Use Change and Forestry]

### Vulnerability to climate change

#### Current climate baseline

14.6.6 A climate baseline is provided by Met Office Historic Climate Data [33] which presents a set of 30-year averages, covering the period 1981 to 2010 for a range of parameters and locations (the data that is available from UKCP18 runs from 1981-2010 for the baseline period, there is no available data from 2010 – present day). The Met Office uses districts when generating climate data for the UK. The proposed scheme is located within Somerset, in the South-West of England and South of Wales region. This district comprises counties such as Cornwall, Devon and Somerset together with the four administrative areas around Bristol (formerly Avon) and the Isles of Scilly. The climate observations for the South-West of England and South Wales region are summarised in Table 14-11.

**Table 14-11 High level climate observations for the South-West of England and South Wales region (1981-2010)**

Climate conditions	Climate observations
Temperature	Mean minimum temperatures between 1-2°C in winter and mean maximum temperatures between 19-21.5°C in summer.
Rainfall	Annual rainfall averages between 800-900mm, with less rainfall occurring in the Somerset area (700mm). Monthly rainfall is variable but is highest in winter months. The number of days with rainfall greater than 1mm in the Somerset area are 12-13 days in winter months, dropping to an average of 7-9 days in summer.
Wind	South-West England is one of the more exposed areas of the UK. The strongest winds are associated with the passage of deep depressions close to or across the British Isles. The frequency and strength of these depressions is greatest during the winter, when mean speeds and gusts are strongest at approximately 80 knots.
Sunshine	Average annual sunshine totals are between 1,450 – 1,600 hours, with the coastal areas in the South-West receiving more sunshine than inland areas.
Air Frost	The average number of days with air frost varies between 35 – 60 days per year.

#### Future baseline

- 14.6.7 The future projected climate conditions and extreme weather events for the proposed scheme for the 2020s and 2080s are outlined in this section. These time periods cover the assumed construction period (commencing in 2024 for a period of 44 months) and the assumed 60-year operational life (2028 to 2088).
- 14.6.8 To establish the future climate baseline for the boundary of the proposed scheme, the following methods were implemented:
- The projected changes in average climate conditions were obtained from the UKCP18 probabilistic projections of climate change [31].
  - The projected changes in extreme weather events were obtained using UKCP18 regional projections [31].

- 14.6.9 Climate change projections for a range of meteorological parameters are presented for different probability levels within the RCP8.5 high emission scenario for the short-term and long-term future time periods.
- 14.6.10 Table 14-12 summarises the projected changes in extreme weather events for the 2020s and 2080s, such as number of heat waves and frost days.
- 14.6.11 The mean number of hot days, when the maximum temperature is above 25°C, is anticipated to increase from 7.74 to 54.16 days per year in the 2080s for the high emissions scenario. The average number of days in a given year, when the mean daily temperature is below 0°C, is anticipated to decrease from 33.97 to 9.50 in the 2080s under the high emissions scenario.
- 14.6.12 In the case of extreme precipitation, the number of days with heavy rain (precipitation greater than 25mm/day) in a given year is expected to increase from 2.57 in the baseline period to 3.22 in the 2080s. The average annual number of dry spells (periods of at least ten consecutive days with no precipitation) is projected to decrease from 4.22 for the baseline period to 2.80 for the 2080s under the high emissions scenario. This climate trend is aligned with *The State of the UK Climate 2020 Report* which shows that there has been a general decline in the number of dry spells in the UK [34].

**Table 14-12 UKCP18 climate change projections for extreme weather events for the local area (12 km grid square) for the 2020s and 2080s (under the RCP 8.5 high emissions scenario)**

Climate Parameter		Baseline (1981-2010)	2020s (2010-2039)			2080s (2070-2079)*		
			Min.	Mean	Max.	Min.	Mean	Max.
Temperature	Number of frost days (daily minimum temperature equal or lower than 0°C)	33.97	13.83	23.38	36.12	4.57	9.50	15.33
	Heatwaves (2 days with maximum temperature higher than 29°C and minimum temperature higher than 15°C)	0.64	0.45	1.74	3.87	2.78	4.79	6.82
	Average summer highest daily maximum temperature (°C)	27.50	27.44	30.12	32.85	31.77	34.81	37.48
	Number of hot days (daily maximum temperature higher than 25°C)	7.74	7.25	18.67	40.18	27.50	54.16	80.28
Precipitation	Dry spells (10 days or more with no precipitation)	4.22	0.90	1.65	2.55	1.80	2.80	3.78
	Annual number of days per year when precipitation is greater than 25mm per day (Met Office definition of 'heavy rain')	2.57	1.75	2.67	4.07	2.13	3.22	4.80

[\*Regional (12km) projections are only available up to 2079.]

- 14.6.13 Table 14-13 summarises the projected changes in climate conditions, such as mean temperature and precipitation for the 2020s and 2080s. There is no

baseline information available for wind, therefore this has been excluded from the anomalies presented in Table 14-13.

- 14.6.14 Temperatures within the boundary of the proposed scheme are projected to increase in winter and summer. The largest increase in temperature is projected to be in the mean daily maximum temperature in summer, which is expected to increase by between 2.14°C and 9.75°C in the 2080s, relative to the baseline in the high emissions scenario.
- 14.6.15 Precipitation within the boundary of the proposed scheme is projected to decrease in the summer and increase in the winter. The largest decrease in precipitation is projected to be in the summer, which is expected to decrease between 5.9% and 72.3% in the 2080s, relative to the baseline in the high emissions scenario.
- 14.6.16 In general, climatic changes in the region of the proposed scheme are projected to result in increasingly wetter and warmer winters and drier and warmer summers.

**Table 14-13 UKCP18 climate change projections for average climate variables for the local area (25km grid square) for the 2020s and 2080s (under the RCP 8.5 high emissions scenario)**

Climate parameter		Baseline (1981-2010)	Anomalies from baseline for 2020s (2010-2039)			Anomalies from baseline for 2080s (2070-2099)		
			10 <sup>th</sup> P.*	50 <sup>th</sup> P.	90 <sup>th</sup> P.	10 <sup>th</sup> P.	50 <sup>th</sup> P.	90 <sup>th</sup> P.
Temperature (°C) (change from baseline)	Mean winter daily temperature	5.25	0.33	0.74	1.10	1.71	3.04	4.46
	Mean summer daily temperature	15.54	-0.01	0.63	1.09	2.35	5.14	7.92
	Mean daily summer maximum temperature	19.68	0.55	1.24	1.94	2.14	5.76	9.75
	Mean daily winter minimum temperature	2.62	-0.16	0.63	1.48	0.90	3.07	5.65
Precipitation (%) (change from the baseline)	Winter mean precipitation rate	3.53mm	-2.16%	6.16%	17.87%	2.47%	24.60%	50.66%
	Summer mean precipitation rate	1.77mm	-29.24%	-10.46%	6.73%	-72.35%	-40.77%	-5.91%

[P. = Percentiles which is a percentage of values that fall below a particular value in a set of data scores.]

## 14.7 Potential impacts

### GHG emissions

- 14.7.1 The proposed scheme would result in GHG emissions during construction as well as changes to emissions during operation. Potential impacts are identified in this section and a preliminary assessment of effects is provided in section 14.9 Assessment of likely significant effects.
- 14.7.2 Sources of GHG emissions during construction include:
- GHG emissions associated with the required raw materials, including raw material supply, transport and manufacture.

- GHG emissions associated with construction processes, including transport to/from works site and construction/installation processes.
- GHG emissions associated with land use change, e.g. those mobilised from vegetation or soil loss during construction.

14.7.3 Sources of potential GHG emissions during operation include:

- GHG emissions from vehicles using the highway infrastructure (road users).
- GHG emissions from the maintenance, repair and refurbishment of the proposed scheme, for example emissions associated with raw materials and transport required to replace the road surface.
- GHG emissions associated with ongoing land use change/sequestration.

14.7.4 Opportunities identified for reduction of GHG emissions and mitigation measures incorporated in the design and construction of the proposed scheme are set out in section 14.8 Design, mitigation and enhancement measures.

### **Vulnerability to climate change**

14.7.5 The A358 provides an important transport link for the Somerset region and is a part of the SRN in the region. The proposed scheme is expected to increase the resilience of transport systems in the region to hazards arising from climate change. The proposed scheme would improve safety for all road users and provide benefits for the overall resilience of the region. Potential impacts are identified in this section and a preliminary assessment of effects is provided in section 14.9 Assessment of likely significant effects.

### Construction impacts

14.7.6 A change in climate conditions and extreme weather events in the short-term has the potential to cause significant effects on elements of the proposed scheme during construction.

14.7.7 Examples of the climate impacts that have been identified include:

- Intense rainfall events that could lead to flooding of excavations and obstructions to access roads.
- Wind gusts that could damage construction materials such as earthworks and stockpiles.
- Unsuitable conditions for construction activities such as pouring concrete and asphalt causing programme delays and increased costs.
- Impacts on the health and safety of site personnel during severe weather events.

14.7.8 The potential climate risks are anticipated to be mitigated through the use of appropriate design standards and following best practice construction measures.

### **Operational impacts**

14.7.9 Climate change and more frequent severe weather events in the medium to longer-term have the potential to cause significant effects on elements of the proposed scheme during operation. Examples of the climate impacts that have been identified include:

- Intense rainfall events that could increase the risk of debris and sediment run-off washing into drainage gullies causing a blockage leading to flooding of road surfaces
- Damage to or deterioration of the road pavement from intense rainfall events leading to health and safety risks to road users.

- Extreme heat events leading to the soft landscape design (trees and shrubs) being compromised.
- Damage to signs/signals and minor structures (e.g. gantries) and vegetation as a result of wind loading or wind-blown debris leading to health and safety risks to road users.

14.7.10 The potential climate impacts are anticipated to be mitigated through following appropriate asset management procedures.

## 14.8 Design, mitigation and enhancement measures

### Greenhouse gas emissions

- 14.8.1 In accordance with DMRB LA 114 *Climate*, the third lifecycle stage for a project's GHG emissions (the first and second being construction and operation) comprises opportunities to reduce the production of GHG emissions.
- 14.8.2 In line with Highways England's *Net zero highways: Our 2030/2040/2050 plan* (2021) [14], which sets out Highways England's ambition to decarbonise the road network in order to reach net zero by 2050, and the UK government's carbon reduction targets, the proposed scheme has sought and would continue to seek to reduce GHG emissions as far as reasonably practicable to contribute to the UK's net reduction in carbon emissions and maximise its potential for reducing GHG emissions.
- 14.8.3 This PEI Report includes a range of environmental mitigation measures. Mitigation measures of relevance to GHG emissions are set out in this section under the following categories:
- Embedded mitigation: measures that form part of the engineering design, developed through the iterative design process.
  - Essential mitigation: any additional proposed scheme-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered to be significant in the context of the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2017*. Essential mitigation has been identified taking into account the embedded mitigation measures.

### Design and construction mitigation

- 14.8.4 Mitigation measures presented in Table 14-14 have been and will continue to be considered during the design process to reduce GHG emissions from the proposed scheme. Key GHG emissions impacts during construction will be from construction activities and the embedded/embodyed carbon of the materials. Mitigation measures identified in Table 14-14 are divided into the following hierarchy options:
- Avoid/prevent – maximise the potential for re-using and/or refurbishing existing assets to reduce the extent of new construction required, and/or explore alternative lower carbon options to deliver the proposed scheme objectives.
  - Reduce – low carbon and/or reduced resource consumption solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation, and at end of life.
  - Remediate – measures to further reduce carbon through on or off-site offsetting or sequestration.

**Table 14-14 GHG mitigation measures during design and construction**

Mitigation measure	Delivery mechanism	Embedded/ Essential	Method of reduction
<p>The proposed scheme looked at a variety of alternative options to solve the identified capacity problem on the existing A358 before defining and refining the preferred option. A preliminary assessment of carbon was undertaken during option selection, which identified the pink option as having a small benefit (lower construction emissions) compared to the orange and blue options (these options are described in Chapter 3 Assessment of alternatives of this PEI Report).</p>	Proposed scheme design	Embedded	Avoid/ prevent
<p>As the proposed scheme design has been refined during the preliminary design stage, consideration has been given to options that reduce or avoid carbon emissions. This included:</p> <ul style="list-style-type: none"> <li>• removal of retaining walls at Stoke Road/Henlade.</li> <li>• simplification of overbridge and connecting road junction at Mattock’s Tree Green junction which reduces overall material demand compared to the baseline option.</li> </ul> <p>Further refinements to the design will be reported in the ES.</p>	Proposed scheme design	Embedded	Avoid/ prevent
<p>The construction contractor will develop and implement a plan to reduce energy consumption and associated carbon emissions. This could include the consideration of renewable and/or low or zero carbon energy sources and recording the savings implemented. Highways England is committed to reducing carbon emissions and works closely with suppliers to reduce emissions from network related activity. Energy consumption and materials use will be recorded and reported on an ongoing basis during the construction phase of the proposed scheme using the Highways England Carbon Reporting Tool.</p>	Environmental Management Plan (EMP)	Essential	Reduce
<p>Where practicable, measures would be implemented to manage material resource use during construction including:</p> <ul style="list-style-type: none"> <li>• using materials with lower embedded GHG emissions and water consumption</li> <li>• using sustainably sourced materials</li> <li>• using recycled or secondary materials</li> </ul>	EMP	Essential	Reduce
<p>Material excavated during construction would be processed for use in the works wherever possible to reduce the amount of material disposed of off-site as well as imported from other sources, and associated GHG emissions. The preliminary assessment indicates that most of the excavated materials are suitable for reuse elsewhere within the proposed scheme. Possible uses include general fill and other graded materials. Processing of material would take place on-site.</p>	EMP	Essential	Reduce
<p>Existing pavements would be retained wherever possible within the proposed scheme to reduce the requirement for additional materials and construction.</p>	EMP	Embedded	Avoid/ prevent

### Operational mitigation

- 14.8.5 In addition to the embedded design mitigation measures identified within Table 14-14, no essential operational mitigation measures have been proposed. It is not considered appropriate to monitor GHG emissions from road users during the operational phase of the proposed scheme as Highways England does not have direct control over road user emissions.

### **Vulnerability to climate change**

#### Construction mitigation

- 14.8.6 The proposed scheme has been designed to improve its resilience to climate change through a range of design and construction standards, good engineering practice and material specification measures including:
- The use of construction materials with appropriate durability requirements (such as increased resilience to thermal loading from fluctuating temperatures).
  - Incorporation of current road design standards and future climate change allowances.
  - Structures to be prefabricated off-site where feasible to reduce on-site construction activities.
  - Construction materials to be delivered 'just-in-time' to avoid on-site storage of materials and construction materials and allowing materials which are stored on-site to be protected to minimise damage and thereby enter the waste stream, e.g. by periods of heavy precipitation.
  - Risk of heat stress to site personnel from exposure to extreme temperatures to be managed through the provision of necessary personal protective equipment and facilities.
  - Sufficient time to be included within the construction programme or consider changing the timing of construction activities to reduce risks relating to site personnel, plant and machinery associated with high temperatures and prolonged periods of heavy precipitation.
  - Material stockpiles and structures to be inspected before and after extreme weather events to ensure stability and incorporate such measures into materials management plans.
- 14.8.7 A comprehensive list of embedded mitigation and adaption measures during construction for all climate impacts identified will be further developed in the ES.
- 14.8.8 All weather and climate-related impacts to construction activities are expected to be mitigated through best practice site management, including specific measures which would be set out in a Register of Environmental Actions and Commitments within an EMP, which would be submitted with the ES. The best practice site management measures and relevant specific measures will provide a level of resilience to the proposed scheme throughout construction.

#### Operational mitigation

- 14.8.9 A number of preliminary general mitigation and adaptation measures to address the potential impacts associated with climate change events have been considered. Most weather and climate-related resilience effects during operation are expected to be mitigated through measures embedded in the design of the proposed scheme, providing a level of resilience throughout operation. Mitigation measures considered in this preliminary assessment include:

- Drainage infrastructure has been designed with sufficient allowance to account for climate change and to withstand extreme rainfall events.
- The number of structures constructed within the floodplain have been avoided or reduced.
- Flood compensation storage areas will be provided.
- The material properties of the pavement (i.e. use of phenylmagnesium bromide) will be considered to enhance the durability of the pavement during high temperatures.
- Soft landscape features are to be maintained following establishment through watering in periods of dry weather and carrying out periodic inspections to monitor the establishment of new planting.
- Regular inspection of drainage infrastructure and structures has been specified to assess the condition after extreme weather events.

14.8.10 A comprehensive list of embedded mitigation and adaption measures for the operation of the proposed scheme for all climate impacts identified will be further developed in the ES.

## **14.9 Assessment of likely significant effects**

### **GHG emissions**

- 14.9.1 This assessment presents a preliminary calculation of the GHG emissions for the 'Do Something' scenario, a comparison against the 'Do Minimum' baseline, and assessment against UK government's carbon budgets. The GHG emissions in this section are a high-level indication only and will be updated and refined for the ES as the proposed scheme design develops and updated traffic and air quality modelling becomes available.
- 14.9.2 Due to the embedded nature of the mitigation measures proposed, as outlined in Section 14.8 Design, mitigation and enhancement measures, some of which have already been incorporated into the design and some of which are yet to be incorporated, it is not practicable to complete a quantitative assessment of 'before' and 'after' mitigation. Rather, the assessment shows a snapshot of the current design.

#### Do Something scenario GHG emissions

##### *Construction effects*

- 14.9.3 A high-level breakdown of construction phase emissions is presented in Table 14-15. All assumptions used in the calculations are contained within Appendix 14.1 GHG assessment assumptions, methodology and emissions factors and section 14.4 Assessment assumptions and limitations.

**Table 14-15 Construction stage GHG emissions**

Main stage of project life cycle	Sub-stage of life cycle*		Emissions (tCO <sub>2</sub> e)	% of total construction emissions**
Construction stage	Product stage including raw material supply, transport and manufacture (A1 - A3)		40,000	50%
	Construction process stage including:	Transport to/from works site (A4)	6,000	8%
		Construction/installation processes (A5)	34,000	43%
	Construction stage total		<b>80,000</b>	<b>100%</b>

Note: Values which are over 1,000 tCO<sub>2</sub>e have been rounded to the nearest 1,000 tCO<sub>2</sub>e.

\* Sub-stages of the construction life cycle and modules shown in this table align with PAS 2080 boundary stages and individual modules as shown in Table 14-8.

\*\* Due to rounding, percentages may not always appear to add up to 100%

14.9.4 GHG emissions from the construction phase are predicted to total in the region of 80,000 tCO<sub>2</sub>e. The largest magnitude of emissions during construction (50%) is likely to arise from the production of materials. Emissions from on-site construction processes, particularly from fuel used in construction plant equate to 43% of the total, and transport of materials totals 8% of GHG emissions. Further information on the construction and installation processes will become available and will be incorporated into the A5 calculation to be reported within the ES. This will increase the total A5 emissions and may also change the relative percentages.

#### *Operational effects*

14.9.5 As noted in Table 14-8, road users' emissions have been based on PCF stage 2 data and therefore 2023 opening year with traffic growth applied. This will be updated in the ES to reflect a 2028 opening year.

14.9.6 As noted in Table 14-8, information relative to direct emissions associated with operating the proposed scheme is not available at this stage. GHG emissions have therefore been based on an average per kilometre emissions factor derived from a sample of comparable highway schemes and applying this to the length of the proposed scheme PEI Report.

14.9.7 Emissions associated with maintenance assume that certain assets are replaced periodically during the assumed 60-year design life. Road user GHG emissions are expected to constitute the majority of the whole life GHG emissions of the proposed scheme. Operational phase emissions for the modelled opening and design years and total over the modelled 60-year operational period are shown in Table 14-16.

**Table 14-16 Operation ('use stage') emissions for modelled opening year (2023), design year (2038) and total over the assumed 60-year operational period (2023-2082)**

Main stage of project lifecycle	Sub-stage of lifecycle*	Emissions (tCO <sub>2</sub> e)		
		2023 annualised (modelled opening year)	2038 annualised design (future) modelled assessment year	Total (cumulative) over modelled 60-year operation (2023 – 2082)
Operation ('use-stage')	Use of the infrastructure by the end-user (road user emissions) (B9)	169,000	188,000	11,718,000
	Maintenance, refurbishment and lighting energy use (B2 - B6)	2,000	2,000	127,000
<b>Operation ('use-stage') total</b>		<b>171,000</b>	<b>190,000</b>	<b>11,846,000</b>

Note: Values which are over 1,000 tCO<sub>2</sub>e have been rounded to the nearest 1,000 tCO<sub>2</sub>e.

\* Sub-stages of the operation ('use-stage') life cycle and modules shown in this table align with PAS 2080 boundary stages and individual modules as shown in Table 14-8.

Comparing 'Do-Minimum' and 'Do-Something' scenarios

- 14.9.8 As GHG emissions associated with construction do not occur in the 'Do-Minimum' scenario, it can be considered that the construction stage of the proposed scheme would have the effect of releasing an additional emission of 80,000 tCO<sub>2</sub>e into the atmosphere in the 'Do-Something' scenario.
- 14.9.9 The calculated annualised operation stage emissions for the modelled 2023 and 2038 'Do-Minimum' and 'Do-Something' scenarios and the cumulative operation stage emissions over the 60-year operation for the 'Do-Minimum' and 'Do-Something' scenarios (with the difference between them being the impact) are compared in Table 14-17.

**Table 14-17 'Do-Something' and 'Do-Minimum' operation ('use stage') emissions comparison over the 60-year operational period modelled (2023 – 2082)**

Main stage of project lifecycle	Emissions (tCO <sub>2e</sub> )								
	2023 (annualised) Do-Minimum	2023 (annualised) Do-Something	Difference	2038 (annualised) Do-Minimum	2038 (annualised) Do-Something	Difference	Total (cumulative) over 60-year operation (2023 – 2082) Do-Minimum	Total (cumulative) over 60-year operation (2023 – 2082) Do-Something	Difference
Total operational 'use stage' emissions (maintenance and road user)	150,000	171,000	21,000	161,000	190,000	29,000	9,883,000	11,846,000	1,963,000

Note: Values which are over 1,000 tCO<sub>2e</sub> have been rounded to the nearest 1,000 tCO<sub>2e</sub>.

14.9.10 The proposed scheme is estimated to lead to an increase of approximately 1,963,000tCO<sub>2e</sub> during the modelled 60-year operational period (2023-2082), relative to the 'Do-Minimum' scenario.

**Assessment against total UK carbon budgets**

14.9.11 Table 14-18 shows the relevant carbon budgets to which emissions from the proposed scheme would contribute. This approximation assumes an even distribution of emissions across the assumed overall construction period.

14.9.12 If the DCO is granted, construction is planned to start in 2024/5 and the proposed scheme is due to open to traffic in 2028. Note that the traffic data modelled in this assessment represents 2023. It is assumed however, that these emissions would occur from 2028 for the purposes of comparing to the carbon budgets. Therefore, the construction period for the proposed scheme falls wholly within the 4<sup>th</sup> carbon budget. Operation of the proposed scheme would commence in 2028 and is assessed against the 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> carbon budgets, up to 2037. Operational and maintenance emissions after 2037 are not assessed since a carbon budget has not yet been set for after this date.

**Table 14-18 Assessment of proposed scheme net emissions (up to 2037) against UK government carbon budgets**

Project stage	Estimated total (cumulative) GHG emissions over carbon budgets (tCO <sub>2e</sub> ) ('Do-Something' scenario)	Net (cumulative) GHG emissions over carbon budgets (tCO <sub>2e</sub> ) ('Do-Something' - 'Do-Minimum')	Net (cumulative) proposed scheme GHG emissions per relevant carbon budget (tCO <sub>2e</sub> )		
			4 <sup>th</sup> (2023-2027)	5 <sup>th</sup> (2028-2032)	6 <sup>th</sup> (2033-2037)
Construction (between 2023-2027)	80,000	80,000	80,000	n/a	n/a

Operation (modelled from 2023, represented here as if occurring from 2028 and 2043)	1,834,000	265,000	n/a	126,000	139,000
<b>Total</b>	<b>1,914,000</b>	<b>345,000</b>	<b>80,000</b>	<b>126,000</b>	<b>139,000</b>
<b>UK Carbon Budget</b>	-	-	<b>1,950,000,000</b>	<b>1,725,000,000</b>	<b>965,000,000</b>

Note: Values which are over 1,000 tCO<sub>2</sub>e have been rounded to the nearest 1,000 tCO<sub>2</sub>e.

### Significance of effects

- 14.9.13 Construction of the proposed scheme is estimated to contribute approximately 0.004% of the 4<sup>th</sup> carbon budget. Operation of the proposed scheme is estimated to contribute approximately 0.007% of the 5<sup>th</sup> carbon budget and 0.014% of the 6<sup>th</sup> carbon budget. It is considered that this magnitude of emissions from the proposed scheme in isolation would not have a material impact on the ability of the Government to meet its carbon budgets, and therefore is not anticipated to give rise to a significant effect on climate, in line with the position set out within Section 5.18 of the NPSNN.
- 14.9.14 Further information on construction process emissions will become available and will be incorporated into the final GHG calculations to be published in the ES. This will increase the total estimated construction emissions. Additionally, operational emissions are currently overestimated as they do not account for widespread changes in vehicle fleets towards electric after 2030. However, these additions are not expected to change the conclusion that the proposed scheme would not have a significant impact on the ability of the government to meet its carbon budgets.

### Comparison with other schemes

- 14.9.15 Table 14-19 compares the estimated GHG emissions performance of the proposed scheme against other comparable highway projects, normalised to take account of differences in size and scale.

**Table 14-19 Comparison of the proposed scheme’s GHG emissions with other road infrastructure projects**

Carbon footprint lifecycle modules	Project/length and width component												
	M4 [35]	A14 [35]	A417 [36]	A428 [37]	A465 [35]	A47 [38]	A47 / A11 [39]	HA Project A [35]	HA Project B [35]	HA Project C [35]	HA Project D [35]	HA Project E [35]	Proposed scheme
	14.3 miles (23km) new relief road	23 miles (37km) improvement scheme	3.4 miles (5.5km) widening of A road	10 miles (16km) new dual 2-lane carriageway + 1.8 miles (3km) of tie-in	4.8 miles (7.8km) embankment section	5.6 miles (9km) dualling of A road	1 mile (1.65km) new slip road	16.5 miles (26.6km) widening of A road	4 miles (6.5km) single to 2 lane dual carriageway	2.5 miles (4km) upgrade of existing junction	0.4 miles (0.7km) refurbished existing viaduct	13.7 miles (22.1km) upgrade from dual to 3 lanes	8.5 miles (13.6km) new, rural all-purpose dual carriageway
<b>Capital (embodied) CO<sub>2</sub>e (tCO<sub>2</sub>e)</b>													
Material	436,600	740,100	40,698	163,230	44,300	25,865	15,235	74,500	77,300	36,100	5,800	213,700	40,000
Labour + plant	42,800	243,800	23,486	51,000	5,800	3,509	1,998	38,500	27,500	8,200	4,000	20,900	34,000
Earthworks	43,200	n/a			2,500	52,873	13,775	n/a	n/a	n/a	n/a	n/a	n/a
Transport													6,000
<i>Construction tCO<sub>2</sub>e/km</i>	<i>21,800</i>	<i>26,600</i>	<i>11,670</i>	<i>13,024</i>	<i>6,700</i>	<i>9,747</i>	<i>15,725</i>	<i>4,300</i>	<i>16,100</i>	<i>11,100</i>	<i>13,900</i>	<i>10,600</i>	<i>6,000</i>
<b>Operational CO<sub>2</sub>e (tCO<sub>2</sub>e)</b>													
Operation + Maintenance/ annum	1,600	2,400	858	n/a	2,600	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2,000
Use/annum (road users)	2,268,700	4,386,400	209,642	1,835,778	882,000	894,192	894,033	n/a	n/a	n/a	n/a	n/a	197,000

Note: HA stands for Highways Agency, which is the former name for Highways England.

14.9.16 With the current information available, construction related emissions are expected to be lower than other projects on a per kilometre basis. Operational and maintenance GHG emissions are also expected to be significantly lower than other projects. On a per kilometre basis, estimated use phase emissions per annum are notably lower than comparable projects. However, it is noted that the current footprint is based on incomplete data due to limited availability of information at this stage. As such, it is expected that the carbon footprint of the proposed scheme will increase at the ES stage, due to more detailed information being available, which may change the conclusions drawn here.

### **Vulnerability to climate change**

#### Construction effects

14.9.17 Projected changes in climate variables such as temperature, precipitation and wind over the short term (2020-2039), have the potential to affect receptors during the construction of the proposed scheme. Table 14-20 summarises the climate impacts on receptors including human health (i.e. site personnel and road users), drainage assets and earthworks and qualitatively assesses the likelihood and consequence of the climate impact on the proposed scheme to determine the significance.

**Table 14-20 Construction vulnerability to climate (change) impacts**

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect  (NS – Not Significant)
<p>Increased frequency and intensity of extreme weather events: Intense rainfall events</p>	<p>Intense rainfall events could result in the erosion of stockpiles and earthworks and resultant silting of drainage assets. This could result in secondary impacts such as localised flooding or release of pollutants to watercourses.</p>	<p>Infrastructure (drainage assets and earthworks)</p>	<p>The proposed scheme is predominately situated in Flood Zone 1 and crosses some areas in Flood Zones 2 and 3. As stated in Section 4.1 of the Drainage Strategy, fluvial flooding will be mitigated by raising the highway above flood levels for a 1 in 100-year event +40% for climate change. As stated in Section 13.8 of Chapter 13 Road drainage and water resources, the EMP will specify standard good practice measures to be implemented by the construction partner including:</p> <ul style="list-style-type: none"> <li>• Measures such as temporary silt fencing, cut off ditches, settlement ponds and bunds to capture all runoff and prevent ingress of sediments and contaminants into existing drainage ditches.</li> <li>• Areas of exposed sediment should be protected using temporary measures (e.g. sheeting) or semi-permanent measures (for example coir matting) until vegetation is able to establish on these surfaces.</li> <li>• Works would be suspended during intense rainstorms.</li> </ul> <p>The EMP will specify that stockpiles are placed outside of flood zone areas and</p>	<p>Low</p>	<p>Minor</p>	<p>NS</p>

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
			local surface water flow paths wherever possible.			
	Intense rainfall events could affect the ability to undertake certain construction activities leading to programme delays and increased project costs. (e.g. pouring of concrete, earthworks and asphalt).	Infrastructure	The EMP is anticipated to specify that specific site activities, such as pouring concrete, trimming formation and laying asphalt, should be postponed during rainfall events. Protect sub-base surface from rainfall before laying the asphalt by laying an extra 100mm sub-base and remove the top layer and recompact prior to placing the asphalt. Earthworks operations will be suspended during intense rainfall events and the exposed surfaces sealed/finished to a slope if there is an extended break in works, to facilitate drainage and minimise deterioration of the fill already placed or any exposed formation.	Low	Moderate	NS
	Increased frequency of intense rainfall events could lead to flooding of excavations and obstructions to access roads. This could result in secondary impacts such as safety risk of slips, trips and falls to site personnel.	Infrastructure (drainage assets) Human health (site personnel)	As stated in section 3.4 of the FRA in Appendix 13.1, dewatering activities may be required to remove groundwater seepage from excavations enabling the works to be undertaken safely. As stated in section 13.8 of Chapter 13 Road drainage and water resources, discharge from dewatering activities such as earthworks, works within a floodplain or within eight metres of a watercourse will have a tailored risk assessment, consent and licences from the Environment Agency.	Low	Moderate	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
			A Health and Safety Plan is anticipated to be specified within the proposed Construction EMP.			
	Increased frequency of intense rainfall events could result in flooding of the drainage assets which could result in overflow of contaminated water (containing fuels, oil and de-icing salts) from the foul and surface water infrastructure impacting the water quality and ecology of nearby watercourses.	Environment (watercourses and ecology)	<p>As stated in section 13.8 of Chapter 13 Road drainage and water resources, the EMP is anticipated to specify standard good practice measures to be implemented by the construction partner including:</p> <ul style="list-style-type: none"> <li>Measures such as temporary silt fencing, cut off ditches, settlement ponds and bunds to capture all runoff and prevent ingress of sediments and contaminants into existing drainage ditches.</li> <li>Water with a higher risk of contamination which requires discharge, to be contained and treated using appropriate measures such as coagulation of sediments, dewatering and pH neutralisation prior to discharge.</li> </ul> <p>Contractor to assess requirements for the temporary drainage design during construction which would typically accommodate 1 in 10-year events +30% for climate change.</p>	Very Low	Minor	NS
	Increased frequency of intense rainfall events could lead to contaminants (from historic landfill sites or	Environment (watercourses)	As stated in section 9.7 of Chapter 9 Geology and soils, disturbance of potentially contaminated soils could be caused due to earthworks and/ or use of	Low	Minor	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
	contained within soils) entering watercourses during ground excavations.		<p>piled foundations for structures. This may cause an increase in leaching of contaminants in soils and mobilising of contaminants. The EMP, an action plan and procedures on how to manage and assess unexpected contamination will mitigate this risk.</p> <p>As stated in section 13.8 of Chapter 13 Road drainage and water resources, the EMP is anticipated to specify standard good practice measures to be implemented by the construction partner including:</p> <ul style="list-style-type: none"> <li>Water with a higher risk of contamination which requires discharge, including groundwater pumped out of pilings to be contained and treated using appropriate measures such as coagulation of sediments or dewatering prior to discharge.</li> </ul>			
	Intense rainfall events could result in risk of earthworks failure and landslides caused by the variation of soil moisture levels from high and low rainfall events.	Infrastructure (earthworks)	The geotechnical design of cutting and embankment slopes will incorporate appropriate groundwater assumptions to minimise the risk of failure. As the materials on-site are generally cohesive, rainfall will not tend to infiltrate the earthworks.	Low	Large	NS
	Intense rainfall events could lead to flooding of water crossings resulting in risk to	Infrastructure (drainage assets)	Contractor to assess requirements for a temporary drainage design during construction on a case-by-case basis, as	Low	Large	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
	site personnel working on water diversions or temporary works over water crossings for access tracks.	Human health (site personnel)	the risks and requirements will be dependent on the topography and hydrology of each watercourse. The drainage design would typically accommodate 1 in 10-year events +30% for climate change.			
Increased frequency of extreme weather events: windstorms and wind gusts	Windstorms or wind gusts could result in the damage of earthworks and stockpiles.	Infrastructure (earthworks)	The EMP is anticipated to specify best practice measures to reduce damage to stockpiles and earthworks. Measures include management of stockpiled materials by rolling, covering and/or revegetating as soon as appropriate.	Low	Minor	NS
	Windstorms or wind gusts could result in damage to temporary hoarding or temporary traffic signage and cones leading to damage to site personnel or road users.	Infrastructure (hoarding) Equipment (signage and cones) Human health (site personnel and road users)	The EMP is anticipated to specify best practice construction measures to ensure that hoarding would be designed to account for wind loading, would be strengthened along the boundaries of the site and kept in good working order. This would ensure that hoardings would be resilient to windstorms/gusts and could be erected and removed safely. Traffic signage and cones would be weighed down and signs could be removed during storm events to prevent damage to site personnel.	Low	Minor	NS
	Windstorms could result in inability to undertake specific construction activities (e.g. site crane operations, laying concrete and asphalt)	Infrastructure	The EMP is anticipated to specify safe working procedures such as undertaking vulnerable activities including operating cranes, heavy equipment and laying pavement surfaces during appropriate	Low	Moderate	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
	increasing programme delays.		weather conditions. Health and Safety Plans are anticipated to be specified within the proposed EMP.			
	Windstorms or wind gusts could impact on construction and maintenance site personnel and road users.	Human health (site personnel and road users)	<p>The EMP is anticipated to specify best practice measures to reduce effects from construction dust including:</p> <ul style="list-style-type: none"> <li>• minimising areas to be stripped of vegetation</li> <li>• dampening down of dust generating activities and materials</li> <li>• ensuring vehicles are covered to prevent escape of materials during transport</li> </ul> <p>Dust monitoring could be undertaken to identify and further reduce the impacts of soiling.</p>	Low	Large	NS
Increased frequency and intensity of high temperatures: Heatwaves	Heatwaves and higher temperatures leading to the delay of construction activities such as laying asphalt pavement surface layers.	Infrastructure (pavement)	The EMP is anticipated to specify best practice working procedures such as undertaking vulnerable activities (i.e. laying asphalt) during appropriate weather conditions.	Low	Minor	NS
	Heatwaves and higher temperatures could impact the welfare of construction and maintenance site personnel, for example, heat stress and unsafe working conditions.	Human health (site personnel)	The proposed EMP is anticipated to specify the risks associated with heat stress to ensure that Highways England's health and safety requirements are met.	Low	Large	NS

<b>Climate trend</b>	<b>Climate (change) impact on receptor</b>	<b>Asset type / receptor</b>	<b>Design or mitigation measure</b>	<b>Likelihood of climate impact</b>	<b>Consequence of climate impact (should the impact occur)</b>	<b>Significance of effect (NS – Not Significant)</b>
Increased frequency and intensity of high temperatures: Drought conditions	Higher temperatures and drought conditions could increase risks to construction and maintenance site personnel associated with increased potential for dust generation and dispersal.	Human health (site personnel and road users)	The EMP is anticipated to specify best practice mitigation measures to reduce effects from construction dust. It is anticipated that dust monitoring will be undertaken to identify and further reduce the impacts of soiling.	Low	Minor	NS

### Operational effects

- 14.9.18 The climate change impacts to assets designed and constructed as part of the proposed scheme have been assessed during operation.
- 14.9.19 Projected changes in climate variables such as temperature, precipitation and wind over the long-term by the end of the century (2080-2099), have the potential to affect receptors during the operation of the proposed scheme.
- 14.9.20 Table 14-21 summarises the climate impacts on receptors including infrastructure elements (e.g. structures, drainage assets, bridges and pavement), earthworks, soft landscape design and human health (i.e. site personnel and road users). It assesses the likelihood and consequence of the climate impact on the proposed scheme qualitatively to determine the significance.

**Table 14-21 Operational vulnerability to climate (change) impacts**

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
Increased frequency and intensity of extreme weather events: Intense rainfall events	Intense rainfall events could result in risk of earthworks failure and landslides caused by the variation of soil moisture levels from high and low rainfall events. This could result in secondary impacts such as earthworks material causing obstruction on the road creating dangerous driving conditions for road users.	Infrastructure (earthworks) Human health (road users)	Landslides are a known hazard in the boundary of the proposed scheme. Appropriate design measures will manage the risk such as designing shallow slopes, checking for landslide prone materials, incorporating slope drainage for unstable areas and increasing stability of slopes through engineered measures.  The geotechnical design of cutting and embankment slopes will incorporate appropriate groundwater assumptions to minimise the risk of failure. As the materials on-site are generally cohesive, rainfall will not tend to infiltrate the earthworks.	Low	Large	NS
	Increased frequency of intense rainfall events could result in water ingress to signalling, lighting and other operational electrical equipment. This could result in secondary impacts such as creating dangerous driving conditions for road users.	Electrical equipment Human health (road users)	Electrical cables will be housed in watertight plastic ducts preventing water ingress to underground cables.  Electrical cabinets will be fitted with heaters to prevent moisture from forming. The electrical cabinets will be located outside of floodplains.	Very Low	Large	NS
	Increased risk of debris and sediment run-off washing into drainage gullies causing a blockage. This could result in secondary impacts such as	Infrastructure (drainage assets) Human health (road users)	As stated in Section 4.6 of the Drainage Strategy, active system (i.e. values and penstocks), and passive system (i.e. Sustainable Drainage Systems or SuDS, swales/grassed channels, silt traps)	Low	Large	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
	localised flooding creating dangerous driving conditions for road users.		mitigation measures will reduce the proportion of suspended solids from entering the drainage system. A proposed Maintenance and Repair Strategy Statement (MRSS) is anticipated to specify maintenance proposals for drainage assets and how these assets would be maintained during operation.			
	Increased frequency of intense rainfall events could result in overwhelming of drainage assets leading to flooding of road surfaces. This could result in secondary impacts such as hydroplaning and unsafe driving conditions.	Infrastructure (drainage assets) Human health (road users)	As stated in Section 4.1 of the Drainage Strategy, fluvial flooding will be mitigated by raising the highway above flood levels for a 1 in 100-year event +40% climate change allowance plus a freeboard of 600mm. Where an existing floodplain storage has been impeded by the construction of the highway, appropriate flood storage compensation will be provided. The drainage systems will be designed to manage 1 in 100-year event +40% climate change allowance. The risks associated with exceedance events will also be evaluated and appropriate design measures will be implemented (i.e. exceedance routes which minimise adverse impacts to people and property).	Low	Large	NS
	Increased frequency of intense rainfall events could result in damage to pavements, bridges and culverts due to scour.	Infrastructure (pavement, bridges and drainage assets)	As stated in Section 4.1 of the Drainage Strategy, the pavements and culverts will be protected from scour by designing a freeboard of 600mm above carriageway levels. Sections 4.7 and 4.8 state that	Low	Minor	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
			scour protection for culverts will be assessed and an appropriate form of protection will be proposed. Ditches will be located at the crest of cut slopes and toe of embankments to prevent flows scouring the earthworks or inundating the highway.			
	Increased frequency of intense rainfall events could result in potholing, rutting and cracking from moisture entering and remaining in road surfaces.	Infrastructure (pavement)	The proposed MRSS for road surfaces will ensure that the pavement surface is kept in good condition. Pavement surface materials will be selected that are resistant to deformation and cracking. The risk of water infiltration will be minimised by ensuring the void content of the compacted bituminous materials is less than 5%. A bond coat will be applied within each layer to provide a waterproofing layer.	Medium	Minor	NS
	Increased frequency of intense rainfall events could result in wet pavement surface leading to reduced skid resistance creating dangerous driving conditions for road users.	Infrastructure (pavement) Human Health (road users)	Suitable road surface materials will be selected to improve skid resistance which will be maintained through the proposed MRSS for road surfaces.	Low	Large	NS
	Increased frequency of intense rainfall events could result in increased groundwater flow causing accelerated weathering effects, weakening the embankment.	Infrastructure (earthworks)	This risk is anticipated to be accounted for by appropriately conservative assumptions made during design.	Very Low	Large	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
	Increased groundwater level in winter may lead to flooding of underpasses deterring Walkers, Cyclists and Horse riders (WCH) from their journey and preventing site personnel from completing maintenance work.	Infrastructure (drainage assets) Human health (WCHs, site personnel)	As stated in Section 4.1 of the Drainage Strategy, the drainage systems will be designed to manage 1 in 100-year event +40% allowance for climate change. The risks associated with events that exceed the capacity of the drainage system will be evaluated and appropriate design measures will be implemented where significant risks of flooding are identified. The design will ensure that, flows in excess of a 1 in 100-year storm event are managed in exceedance routes that minimise adverse impacts to people and property.	Very Low	Moderate	NS
	Increased frequency of intense rainfall events could result in flooding of the drainage assets which could result in overflow of contaminated water (containing fuels, oil and de-icing salts) from the foul and surface water infrastructure impacting the water quality and ecology of nearby watercourses	Infrastructure (drainage assets) Environment (watercourses and ecology)	As stated in Section 4.6 of the Drainage Strategy, mitigation measures such as active systems (i.e. valves and penstocks) and passive systems (i.e. SuDS, filter drains, oil separators) will reduce the amount of contaminants from entering the drainage system. The EMP is anticipated to specify further mitigation measures to manage wastewater and foul discharge.	Low	Moderate	NS
Increased frequency of extreme weather events:	Windstorms could impact on maintenance site personnel and road users.	Human health (site personnel and road users)	The proposed MRSS is anticipated to specify safe working procedures such as undertaking vulnerable activities, including operating heavy equipment, during appropriate weather conditions.	Low	Moderate	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
Windstorms and wind gusts			Health and Safety Plans to be further specified within the EMP.			
	Windstorms could damage signs, signals and structures (e.g. gantries or light columns) as a result of wind loading or wind-blown debris. This could result in secondary impacts such as unsafe driving conditions.	Infrastructure (signs, signals, and structures) Human health (road users)	The structural design of the gantries and light columns will account for appropriate wind loading in accordance with Eurocode standards and DMRB guidance.	Very Low	Large	NS
	Windstorms or wind gusts could damage the soft landscape design as a result of or wind-blown debris.	Environmental (soft landscape)	As stated in section 7.10 of Chapter 7 Landscape and visual, mitigation planting will be monitored every year for the first three years to ensure successful establishment and then inspected every 2-5 years for the next 12 years. Full details will be provided in the Landscape and Ecological Management Plan (LEMP) which will set out a framework in which the successful establishment of these measures can be managed and ensured.	Low	Minor	NS
Extreme weather events: cold weather events	Cold weather events leading to the presence of ice and frost conditions requiring the use of de-icers, e.g. grit salt which could result in corrosive action on bridge components.	Infrastructure (bridges)	The structural design of bridges will account for corrosive action on bridge components from grit salt in accordance with Eurocode standards and DMRB guidance.	Very Low	Moderate	NS
Increased frequency and	Heatwaves and higher temperatures leading to the delay of maintenance activities	Infrastructure	The proposed MRSS is anticipated to specify that specific site activities, such as	Low	Minor	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
intensity of high temperatures: Heatwaves	such as laying asphalt pavement surface layers.		laying asphalt, should be postponed during heatwaves.			
	Heatwaves and higher temperatures could impact the welfare of maintenance site personnel, for example, heat stress and unsafe working conditions.	Human health (site personnel)	The proposed Health and Safety Plans are anticipated to specify maintenance regimes to ensure that site personnel are prepared to work safely in higher temperatures.	Low	Large	NS
	Heatwaves and higher temperatures could lead to deformation of the asphalt pavement surface. This could result in secondary impacts such as unsafe driving conditions for road users.	Infrastructure (pavement) Human health (road users)	This risk will be managed through the selection of suitable road surface material including the use of polymer modified binder and quality control on site. The pavement is anticipated to be monitored, maintained and replaced in line with the proposed MRSS.	Low	Large	NS
	Heatwaves and higher temperatures could lead to vegetation drying out, increasing the risk of spontaneous grassland fires near the proposed scheme, affecting safety of road users. This could result in secondary impacts such as damage to soft landscape design and habitats.	Human health (site personnel and road users) Environmental (soft landscape and habitats)	The standard emergency procedures are anticipated to mitigate this risk and the proposed Health and Safety Plans are anticipated to specify appropriate response to grassland fires.	Very Low	Very Large	NS
	Freeze-thaw during cold snaps and extreme high temperatures can cause damage to road surfaces including pavement	Infrastructure (pavement)	The selection of suitable road surface material including use of polymer modified binder to enhance the resistance to deformation and cracking properties of	Medium	Minor	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
	cracking and deformation resulting in a reduction of road service life.		the bituminous materials and quality control on site will mitigate this risk. The pavement will be monitored, maintained and replaced in line with the proposed MRSS.			
	Heatwaves and higher temperatures could lead to stress on pavement surfaces (i.e. degradation of macrotexture and reduction of texture depth, wearing away of asphalt compromising support layers).	Infrastructure (pavement)	Suitable road surface materials will be selected that are more resilient to warm temperatures and the pavement will be monitored, maintained and replaced in line with the proposed MRSS.	Medium	Minor	NS
	Heatwaves and higher temperatures could lead to increased thermal loading overstressed bearings that could eventually compromise structural stability of the asset.	Infrastructure (bridges)	The structural design of bridges will account for thermal loading overstressed bearings in accordance with Eurocode standards and DMRB guidance.	Very Low	Very Large	NS
	Heatwaves and higher temperatures could result in the soft landscape design (trees and shrubs) being compromised (e.g. plant failures).	Environmental (soft landscape)	As stated in Section 7.10 of Chapter 7 Landscape, mitigation planting will be monitored every year for the first three years to ensure successful establishment and then inspected every 2 - 5 years for the next 12 years. Full details will be provided in the LEMP which will set out a framework in which the successful establishment of these measures can be managed and ensured.	Medium	Minor	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
Increased frequency and intensity of high temperatures: Drought conditions	Higher temperatures and drought conditions could increase risks to maintenance site personnel associated with increased potential for dust generation and dispersal.	Human health (site personnel and road users)	The EMP is anticipated to specify best practice mitigation measures to reduce effects from construction dust.	Low	Moderate	NS
	Higher temperatures and drought conditions could lead to soil shrinkage impacting foundations, including bridges and other structures.	Infrastructure (earthworks and bridges)	This risk is likely to be accounted for by appropriately conservative assumptions made during design. The bridge foundations should be below the shrink/swell zone.	Very Low	Large	NS
	Higher temperatures and drought conditions could lead to the vegetation failure of the soft landscape design.	Environmental (soft landscape)	As stated in section 7.10 of Chapter 7 Landscape and visual, mitigation planting will be monitored every year for the first three years to ensure successful establishment and then inspected every 2-5 years for the next 12 years. Full details will be provided in the LEMP which will set out a framework in which the successful establishment of these measures can be managed and ensured.	Medium	Minor	NS
	Higher temperatures and drought conditions could increase the risk of ignition of diesel resulting in damage to roads or fires. This could result in secondary impacts such as damage to soft landscape design and habitats or the	Infrastructure (pavement) Environmental (soft landscape and watercourses)	The EMP is anticipated to specify mitigation to reduce the risk of fuel ignition from damaging roads and causing fires. The standard emergency procedures will further mitigate this risk and the proposed Health and Safety Plans are anticipated to specify appropriate response to fuel spills and fires.	Very Low	Very Large	NS

Climate trend	Climate (change) impact on receptor	Asset type / receptor	Design or mitigation measure	Likelihood of climate impact	Consequence of climate impact (should the impact occur)	Significance of effect (NS – Not Significant)
	release of pollutants to watercourses.					
	Higher temperatures and drought conditions could lead to shrink swell processes resulting in desiccation, cracking and embankment and earthwork instability. This is a particular risk when drought conditions are followed by intense rainfall events.	Infrastructure (earthworks)	This risk is anticipated to be accounted for by appropriately conservative assumptions made during design. Shrink swell of earthworks should be avoided by proper compaction.	Very Low	Large	NS

## 14.10 Monitoring

### GHG emissions

- 14.10.1 As no preliminary significant effects have been identified for the GHG emissions assessment, no monitoring of significant effects is expected to be required.
- 14.10.2 In line with the monitoring requirements set out in DMRB LA 114 *Climate*, and to be secured through the EMP, quarterly GHG emissions returns during construction and operation shall be reported in accordance with Highways England's requirements. Data provided for the GHG returns shall be evaluated to inform any ongoing monitoring of GHG emissions and feed back into future assessment of projects during design development and planning approval.
- 14.10.3 Highways England is committed to reducing carbon emissions and working closely with suppliers to reduce emissions from network related activity. An EMP, will be prepared and submitted with the DCO application, which will require energy consumption and materials use to be recorded and reported on an ongoing basis during the construction phase of the proposed scheme using the Highways England Carbon Reporting Tool. It is not considered beneficial to monitor GHG emissions from road users during the operational phase of the proposed scheme.

### Vulnerability to climate change

- 14.10.4 The vulnerability to climate change assessment identified no preliminary likely significant effects therefore, no monitoring of significant effects is proposed at this stage.
- 14.10.5 During the construction stage, the EMP would specify monitoring to be undertaken to ensure that the mitigation measures embedded in the proposed scheme design are implemented.
- 14.10.6 In line with the monitoring requirements of DMRB LA 114 *Climate*, once the proposed scheme is operational, asset data would be managed, maintained and monitored. During the operational stage, asset management measures would evolve to respond appropriately to climate impacts. Where a design issue is identified, an assessment shall be made to determine if corrective action is required.

## 14.11 Summary

### GHG emissions

- 14.11.1 The proposed scheme would result in GHG emissions due to construction materials and activities during the construction phase, maintenance during the operation phase and vehicles using the road during the operation phase.
- 14.11.2 Based on the preliminary assessment presented in this PEI Report, no significant effects in relation to GHG emissions are predicted during the construction and operation phases. The preliminary assessment indicates that the expected change in GHG emissions is very small in comparison with the national carbon budgets. The preliminary assessment of proposed scheme impacts is considered to be not significant based on evidence that in isolation the proposed scheme would not have a material impact on the ability of the UK government to meet its carbon reduction targets.

### **Vulnerability to climate change**

- 14.11.3 The preliminary vulnerability of the proposed scheme to climate change assessment during the construction stage is not anticipated to be significant due to relevant design and mitigation measures that have been identified to improve resilience to current climate and reduce any potential impacts.
- 14.11.4 The preliminary vulnerability to climate change assessment during the operational stage indicates that all impacts are likely to be 'not significant' because of mitigation measures proposed to be included in the design and assumed management practices to be implemented.

#### **Further work**

##### GHG emissions

- 14.11.5 Between the PEI Report and the ES, further work will be done on proposed design of the proposed scheme. As part of the design process, GHG emissions are one of the criteria considered for option selection and further workshops and reviews will be held to consider potential mitigation measures. The ES will report on the potential impacts of the final proposed design and include an updated assessment of GHG emissions associated with the construction phase using updated design information and of operation phase emissions using the PCF stage 3 traffic model data and latest GHG calculation methodologies.
- 14.11.6 Climate policy continues to evolve, and the ES will also take account of any changes in Government policy that are relevant to the proposed scheme.

##### Vulnerability to climate change

- 14.11.7 The focus of the work between the PEI Report and the ES will be to discuss planned mitigation measures with the design team and relevant environmental discipline specialists to confirm if any effects that have been identified are potentially significant and mitigate them where possible.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

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# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 15  
Assessment of Cumulative Effects

HE551508-ARP-EGN-ZZ-RP-LE-000029

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## 15 Assessment of cumulative effects

### 15.1 Introduction

- 15.1.1 Cumulative effects are those that arise as a result of impacts from more than one project, or element of a single project, combining to have an effect on a receptor, or group of receptors, that may be larger than if the effect were considered separately.
- 15.1.2 The *Design Manual for Roads and Bridges (DMRB) LA 104 Environmental assessment and monitoring* [1] states that environmental assessments shall assess cumulative effects which include those from:
- A single project (for example, numerous different effects impacting a single receptor). These are known as ‘combined’ impacts/effects or ‘impact interactions’.
  - Different projects (together with the project being assessed). These are known as ‘cumulative’ effects with other existing development and/or approved development.
- 15.1.3 In addition, to align with the requirements of EU Directive 2014/52/EU [2] and the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2017* [3] (the ‘EIA Regulations’), the in-combination climate change impact (ICCI) assessment of the proposed scheme where the focus is on those effects of the proposed scheme identified by an environmental factor that are also affected by climate change is assessed on a case by case basis by the environmental factors. An ICCI assessment has not been undertaken for the Preliminary Environmental Information (PEI) Report but will be produced for the Environmental Statement (ES). We are working to the latest guidance and should new guidance emerge, we will incorporate this into the assessment as necessary.
- 15.1.4 This PEI Report chapter details the legislative context and methodology for the assessment of combined and cumulative effects. It presents the preliminary findings of the combined effects assessment, and where required, goes on to identify any preliminary design, mitigation and enhancement measures, and any ongoing monitoring requirements.
- 15.1.5 DMRB LA 104 *Environmental assessment and monitoring* notes that cumulative effects should be assessed when the conclusions of individual environmental factor assessments have been reached and reported. Therefore, cumulative effects are not reported in this PEI Report, but will be assessed and reported in the ES which will support the Development Consent Order (DCO) application.

### 15.2 Legislative context

- 15.2.1 The EIA Regulations set out in paragraph 5 of Schedule 4 that an ES should include:

*“...the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.”*

15.2.2 The requirement to consider cumulative effects is also outlined in planning policy. The *National Policy Statement for National Networks* (NPSNN) [4], paragraph 4.3 states that:

*“In considering any proposed development, and in particular, when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State should take into account:*

- *its potential benefits, including the facilitation of economic development, including job creation, housing and environmental improvement, and any long-term or wider benefits.*
- *its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.”*

### 15.3 Cumulative assessment methodology

15.3.1 There is currently no standard methodology for cumulative effects assessment (CEA) and combined effects assessment although there is a range of guidance available. The following standards and guidance have been taken into consideration during the preparation of the PEI Report:

- DMRB LA 104 *Environmental assessment and monitoring* (section 3.19 – 3.22), which sets out a high-level methodology for assessing cumulative effects on highways projects.
- Planning Inspectorate (PINS) *Advice note 17 Cumulative Effects Assessment* [5], which sets out a methodology, relevant to nationally significant infrastructure projects (NSIP).

15.3.2 Consistent with the distinction between combined effects and cumulative effects, as defined within DMRB LA 104 *Environmental assessment and monitoring*, and outlined in section 15.1 above, the assessment is split in to two sections:

- **Combined effects assessment:** comprising an assessment of the combined impact of a number of different impacts from the proposed scheme upon a single resource/receptor, which are individually assessed, and preliminary findings reported within each environmental factor chapter of this PEI Report.
- **Cumulative effects assessment:** comprising an assessment of cumulative impacts of a number of different projects within the vicinity, in combination with the environmental impact of the proposed scheme on a single resource/receptor.

15.3.3 The methodology for each of these assessments is described separately below.

#### **Combined effects assessment**

15.3.4 Combined impacts from the action of a number of different impacts upon a single resource/receptor are considered within the environmental factor chapters of the PEI Report as follows. The preliminary combined effects are summarised in section 15.4 and Table 15-6.

- Chapter 5 Air quality uses traffic data provided by the transport consultants for the air quality assessment that contains vehicle movements associated with committed developments at a strategic scale.
- Chapter 6 Cultural heritage considers effects from different sources on heritage resources, such as the removal of buried archaeological remains, or

impacts arising from changes to the setting of heritage resources as a result of visual or noise changes.

- Chapter 7 Landscape and visual considers effects from different sources on landscape and visual receptors, including landscape features and character areas, and visual amenity experienced by people.
- Chapter 8 Biodiversity considers the combined ecological effects on single receptors of a number of individual environmental impacts such as area of land required, disturbance due to noise, vibration and light, changes in air quality and airborne dust deposition, changes in the water environment due to surface run-off and pollution events and cumulative loss of certain habitat types.
- Chapter 12 Population and human health considers combined effects. For amenity impacts to community assets such as residential property, recreation infrastructure and existing businesses, the assessment draws on the conclusions of other environmental factors such as changes in traffic, severance, air quality, landscape, visual and noise impacts. The human health assessment considers combined effects since health determinants are influenced by a wide range of environmental factors such as air quality, noise and visual amenity.
- Chapter 13 Road drainage and the water environment considers combined effects such as the accumulation of impacts on water resources and receptors such as rivers and aquifers, which when considered together constitute a greater impact. It has also considered cumulative impacts on the water environment as a result of construction phasing.
- Chapter 14 Climate has not considered combined effects in the PEI Report as an ICCI assessment will be produced for the ES.

15.3.5 The combined effects outlined above are considered to adequately report on the full range of potential combined effects from the proposed scheme and further assessment is therefore not undertaken within this chapter.

**Cumulative effects assessment**

15.3.6 PINS’s *Advice note 17 Cumulative Effects Assessment* provides a systematic approach to CEA which can be split into four distinct phases explained in Table 15-1. Paragraph 2.5 of the guidance notes that the recommended process focusses on cumulative effects with ‘other existing development and/or approved development’.

**Table 15-1 Stages of cumulative effects assessment (CEA)**

CEA Stage	Activity
<p><b>Stage 1:</b> Establish the Zone of Influence (Zoi) of the proposed scheme and identify long list of other developments</p>	<ul style="list-style-type: none"> <li>• Identify the Zoi for each of the environmental factors covered by the ES.</li> <li>• Identify a long list of other developments in the vicinity of the proposed scheme which may have cumulative effects.</li> <li>• Undertake desktop review of available environmental information for identified cumulative developments.</li> </ul>
<p><b>Stage 2:</b> Identify the short list of ‘other developments’</p>	<ul style="list-style-type: none"> <li>• Identify which of the identified other developments from Stage 1 has the potential to give rise to significant cumulative effects by virtue of overlaps in temporal scope, due to the scale and nature of the ‘other development’/receiving environment; or any other relevant factors.</li> </ul>

CEA Stage	Activity
<b>Stage 3:</b> Information gathering	<ul style="list-style-type: none"> <li>Information related to the shortlisted cumulative developments is gathered and reviewed.</li> </ul>
<b>Stage 4:</b> Assessment	<ul style="list-style-type: none"> <li>CEA of shortlisted cumulative development is undertaken. Each individual 'other development' is reviewed in turn to identify whether there is potential for significant cumulative effects.</li> <li>Mitigation measures are identified.</li> </ul>

Stage 1 establish the NSIP’s zone of influence and long list of ‘other development’

*Establishing the zone of influence*

15.3.7 The Zol refers to the spatial area over which an effect from a project is likely to be experienced. The Zol for the proposed scheme varies for each environmental factor and is set out in the study area for each environmental factor assessment, shown in Figure 15.1 Cumulative zone of influence.

*Establishing the long list of ‘other developments’*

15.3.8 PINS’s *Advice note 17 Cumulative Effects Assessment* recommends that a wide range of future projects is included within the CEA which can be tiered (from Tier 1-3) according to how far advanced the development is within the planning system and to the level of detail that is likely to be available for each tier. The tiers are set out in Table 15-2.

**Table 15-2 Project tiering to assign certainty for the purpose of CEA (as provided in Table 2 within PINS’s *Advice note 17 Cumulative Effects Assessment*)**

<b>Tier 1</b>	<ul style="list-style-type: none"> <li>Projects under construction [6].</li> <li>Permitted application(s) but not yet implemented.</li> <li>Submitted application(s) but not yet determined [7].</li> </ul>	<p><b>Decreasing level of detail likely to be available</b></p> 
<b>Tier 2</b>	<ul style="list-style-type: none"> <li>Projects on the PINS’s Programme of Projects where a scoping report has been submitted [8].</li> </ul>	
<b>Tier 3</b>	<ul style="list-style-type: none"> <li>Projects on the PINS’s Programme of Projects where a scoping report has not been submitted [9].</li> <li>Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited [10].</li> <li>Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.</li> </ul>	

15.3.9 The less information that is available for the future projects (for example environmental impacts predicted and project definition), the less likely that the CEA will be able to make any robust assessment in relation to these projects. Reasonable steps have been taken to review publicly available information when conducting the CEA.

15.3.10 Whilst projects that are Tier 2 and Tier 3, as defined by the PINS guidance are included within this assessment, it is considered that there is limited value in assessing developments for which there is no environmental assessment information available as it will be more challenging to identify environmental effects arising from those projects. Moreover, it will be challenging to determine

the timeframe (temporal scope) within which effects arising from these developments are likely to occur.

15.3.11 In accordance with the methodology outlined in DMRB LA 104 *Environmental assessment and monitoring* (section 3.21.2), the assessment of cumulative effects with other developments for the proposed scheme will report on:

- “roads projects which have been confirmed for delivery over a similar timeframe [11]
- other development projects with valid planning permission or consent orders, and for which EIA is a requirement
- proposals in adopted development plans with a clear identified programme for delivery”

15.3.12 Relevant ‘other developments’, as listed above, have been identified through a combination of consultation with the relevant authorities and directly from published sources [12]. Relevant planning authorities within 3.1 miles (5 kilometres) of the proposed scheme (the greatest ZOI) were included as follows, as shown on Figure 15.1 Cumulative zone of influence:

- PINS:
  - consented NSIPs within 3.1 miles (5km) of the proposed scheme [13]
- The Department for Transport (DfT):
  - approved Transport and Works Act Order (TWAo) applications [14] within 3.1 miles (5km) of the proposed scheme
- Somerset County Council (SCC):
  - approved planning applications (EIA development only) within 3.1 miles (5km) of the proposed scheme
  - site allocations within adopted planning policy (within 3.1 miles (5km) of the proposed scheme):
    - Somerset Minerals Plan (Up to 2030)
- Somerset West and Taunton District Council (SWTC) [15]:
  - approved planning applications (EIA development only) within 3.1 miles (5km) of the proposed scheme
  - site allocations within adopted planning policy (within 3.1 miles (5km) of the proposed scheme):
    - Taunton Deane Core Strategy 2011-2028
    - Taunton town centre area action plan 2008
    - West Somerset Local Plan to 2032
    - Site allocations and development management plan 2028
- South Somerset District Council (SSDC) [16]:
  - approved planning applications (EIA development only) within 3.1 miles (5km) of the proposed scheme
  - site allocations within adopted planning policy (within 3.1 miles (5km) of the proposed scheme):
    - South Somerset Local Plan 2006-2028

### Stage 2 identify shortlist of 'other developments' for CEA

15.3.13 The 'long list' of other developments identified under Stage 1 has been subject to further threshold and criteria to identify a proportionate list of developments to be assessed within the CEA.

15.3.14 The threshold and criteria considered in shortlisting a development is outlined in Table 15-3. Criteria has been adapted from the PINS guidance within *Advice note 17 Cumulative Effects Assessment* and the EIA Regulations.

**Table 15-3 Criteria for shortlisting 'other development'**

Threshold	Description
The temporal scope of 'other development' potential for interaction	<ul style="list-style-type: none"> <li>• consideration of relative construction, operation and decommissioning programmes of the 'other development' identified in the Zol with the proposed scheme programme, to establish whether there is overlap, or similar temporal scope for construction and operation phases, and any potential for interaction</li> </ul>
The scale and nature of 'other development'	<ul style="list-style-type: none"> <li>• consideration of whether the scale and nature of the developments identified in the Zol are likely to interact with the proposed scheme and to result in a cumulative effect</li> <li>• characteristics of other developments in relation to use of natural resources, pollution and nuisances, and risks to human health</li> <li>• the scale of developments which are more than 1 hectare of urban development which is not a dwelling development</li> <li>• the development includes more than 150 dwellings</li> <li>• the overall area of the development exceeds 5 hectares</li> </ul>
Any other relevant factors	<ul style="list-style-type: none"> <li>• nature and/or capacity of the receiving environment that would make a significant cumulative effect with 'other development'. The sensitivity of the receiving environment includes whether the sites are within: <ul style="list-style-type: none"> <li>○ wetlands, riparian areas, river mouths</li> <li>○ coastal zones and the marine environment</li> <li>○ mountain and forest areas</li> <li>○ nature reserves and parks</li> <li>○ European sites and other areas classified or protected under national legislation</li> <li>○ areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure</li> <li>○ densely populated areas</li> <li>○ landscapes and sites of historical, cultural or archaeological significance</li> </ul> </li> <li>• the relative abundance, availability, quality and regenerative capacity of natural resources in the area</li> <li>• potential for creation of source-pathway-receptor impacts</li> <li>• the likely significance of effects where environmental assessments have been undertaken for the 'other developments' as having moderate to large significance</li> </ul>

15.3.15 Professional judgement has been applied to 'other developments' that exceed the thresholds but do not give rise to discernible effects. Where relevant, the reasons for excluding any 'other development' from further consideration is outlined in Appendix 15.1 Consideration of cumulative effects.

### Stage 3 information gathering

15.3.16 In line with PINS's *Advice note 17 Cumulative Effects Assessment*, the following information on the 'other developments' has been compiled from publicly available information as outlined under Stage 1 above:

- *“proposed design and location information*
- *proposed programme of construction, operation and decommissioning*
- *environmental assessments that set out baseline data and effects arising from the 'other existing development and/or approved development'”.*

### Stage 4 assessment

15.3.17 The assessment of significance of the cumulative effects is determined in accordance with the significance assessment as detailed within Chapter 4 Environmental assessment methodology.

15.3.18 For the purposes of the CEA, the value of a resource and magnitude of impact is determined according to the criteria set within the preceding chapters of this PEI Report (Chapters 5-14). The significance of effect is then carried forward from preceding chapters to identify the significance of cumulative effects with other developments.

15.3.19 The significance criteria for cumulative effects has been derived from guidance set out within DMRB LA 104 *Environmental assessment and monitoring*. This is set out in Table 15-4 and will be used in the assessment to be reported in the ES.

15.3.20 Where significant cumulative effects beyond those identified as residual significant effects from the proposed scheme in isolation are identified, an assessment of the need for additional mitigation (further to that already set out in the preceding chapters) (Chapters 5-14) will be undertaken.

**Table 15-4 Determining significance of cumulative effects**

<b>Significance category</b>	<b>Typical Description</b>
Very Large (Adverse or Beneficial)	Effects as this level are material in the decision-making process
Large (Adverse or Beneficial)	Effects at this level are likely to be material in the decision-making process
Moderate (Adverse or Beneficial)	Effects at this level can be considered to be material decision-making factors
Slight (Adverse or Beneficial)	Effects at this level are not material in the decision-making process
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

15.3.21 The assessment of cumulative effects will vary depending on each environmental factor's individual assessment criteria and thresholds for significant effects.

### **Zone of Influence**

15.3.22 Table 15-5 explains the rationale for the Zol extent for potential cumulative impacts with other developments used by each environmental factor. These individual Zols were subsequently combined to define an overall Zol representing the search area within which other development has been identified, as shown

on Figure 15.1. The Zol for Air quality (from the affected road network) and Biodiversity (for impacts on Bats) has been limited to 6.2 miles (10 kilometres (km)) and Material Assets and Waste has been limited to 3.1 miles (5km) due to the study area for those factors encompassing areas much greater than would be feasible to identify other development. Climate impacts (i.e. those as a consequence of global heating) are observable at a national/global scale. Climate has therefore been scoped out of the CEA in combination with other local/regional developments.

**Table 15-5 Zol extents for assessment of potential cumulative impacts**

Environmental factor	Zone of influence (Zol)
Air quality	Up to 200m from the proposed scheme (for construction dust) and up to 200m (0.1 miles) from the affected road network (ARN) once operational. [Note that other development for inclusion within the CEA is only identified out to 3.1 miles (5km) from the proposed scheme.]
Cultural heritage	Setting of designated heritage assets (construction and operation) up to 0.6 miles (1km). Designated and non-designated heritage assets (operation and construction) up to 0.19 miles (300m).
Landscape and visual	Construction and operation effects up to 1.2 miles (2km).
Biodiversity	Zols vary depending on the ecology of the habitat or species being assessed, generally construction and operation effects are considered up to 1.2 miles (2km) or 6.2 miles (10km) where rare bat species are present; however, where European protected sites lie close to the proposed scheme, the following study areas or criteria are used: <ul style="list-style-type: none"> <li>• 18.6 miles (30km) where bats are a qualifying feature of the European site.</li> <li>• 12.4 miles (20km) where wildfowl and wader birds are a qualifying feature of the European site.</li> <li>• Where there is a hydrological connectivity between the proposed scheme and the European sites.</li> </ul>
Geology and soils	Construction and operational effects on geology and soil receptors within the limits of the land to be used temporarily or permanently. For other receptors such as controlled waters, human health, up to 0.16 miles (250m) for construction and operational effects from pollution incidents and 0.3 miles (500m) for landfill and waste management sites (historical and current).
Material assets and waste	Construction footprints/project boundary. Study area for material supply and waste infrastructure in the county of Somerset where the proposed scheme is located although consideration has also been included for the wider South West region (i.e. Cornwall, Devon, Dorset, Gloucestershire, Somerset and Wiltshire). Consideration of other developments for CEA limited to 3.1 miles (5km).
Noise and vibration	Construction noise up to 0.2 miles (300m) and construction vibration up to 0.06 miles (100m). However, in the event that another development is located 300m beyond a receptor located in the Zol, then the Zol would be extended to a maximum of 600m (i.e. 300m to the receptor plus 300m beyond to the other development). Similarly for vibration, the Zol could be increased to 200m where there is another development 100m beyond a receptor in the Zol. Operational noise up to 0.4 miles (600m) from scheme roads and up to 50m from non-scheme roads experiencing a greater than negligible noise change.
Population and human health	Construction and operation land use and accessibility up to 0.3 miles (500m). Cyclists, recreational walkers and horse riders up to 3.1 miles (5km). Health effects within wards considered in the assessment.

Environmental factor	Zone of influence (Zol)
Road drainage and the water environment	Groundwater, Geomorphology, Water Framework Directive (WFD), flood risk, and Water quality for operation and construction) up to 0.6 miles (1km). The Zol will be extended beyond 0.6 miles (1km) where surface water or groundwater features are identified as further than 0.6 miles (1km) from the proposed scheme but still have a hydraulic connection with the proposed scheme.
Climate change	Vulnerability to climate change is limited in spatial extent to the footprint of the Proposed Scheme, therefore no cumulative impacts with other developments is considered. Greenhouse gas (GHG) emissions contribute cumulatively with all sources of GHG emissions globally to cause climate change. This assessment has considered GHG emissions in the context of the UK carbon budgets and no further consideration of the Proposed Scheme's GHG emissions with other sources of GHGs is necessary.

## 15.4 Preliminary assessment of combined effects

- 15.4.1 This section provides a summary of the potential combined effects which have been identified as part of the preliminary assessments reported within the relevant environmental factor chapters of the PEI Report (Chapter 5 Air quality, Chapter 6 Cultural heritage, Chapter 7 Landscape and visual, Chapter 8 Biodiversity, Chapter 9 Geology and soils, Chapter 10 Material assets and waste, Chapter 11 Noise and vibration, Chapter 12 Population and human health, Chapter 13 Road drainage and the water environment and Chapter 14 Climate), and which are considered likely to affect a single resource or receptor. These preliminary in-combination assessments are summarised in Table 15-6.

**Table 15-6 Combined effects as assessed and reported in environmental factor assessment chapters**

Environmental factor and scope of combined effects assessed within chapter	Residual significant effects
Chapter 5 Air quality: Traffic data provided by the transport consultants used in the air quality assessment contains vehicle movements associated with committed developments at a strategic scale.	See summary of preliminary residual significant effects in Table 15-7 of this chapter.
Chapter 6 Cultural heritage considers effects from different sources on heritage resources, such as the removal of buried archaeological remains, or impacts arising from changes to the setting of heritage resources as a result of visual or noise changes.	See summary of preliminary residual significant effects in Table 15-7 of this chapter.
Chapter 7 Landscape and Visual considers effects from different sources on landscape and visual receptors, including landscape features and character areas, and visual amenity experienced by people.	See summary of preliminary residual significant effects in Table 15-7 of this chapter.
Chapter 8 Biodiversity considers the combined ecological effects on single receptors of a number of individual environmental impacts such as area of land required, disturbance due to noise, vibration or light, changes in air quality and airborne dust deposition, changes in water quality due to surface run-off and pollution events and cumulative loss and fragmentation of certain habitat types.	See summary of preliminary residual significant effects in Table 15-7 of this chapter.
Chapter 12 The population assessment considers the combined effects from other environmental factors (noise, air quality, traffic, landscape and visual) which could affect people's enjoyment of private property and housing, community land and assets, development land and businesses, agricultural land holdings and routes used by walkers, cyclists and horse riders. The assessment of human health considers the environmental determinants of health including air quality, noise, ground conditions such as contaminated land, climate change and landscape and visual amenity. It also considers impacts to other material assets such as community and transport facilities as a result of the proposed scheme.	See summary of preliminary residual significant effects in Table 15-7 of this chapter.
Chapter 13 Road drainage and the water environment considers combined effects such as the accumulation of impacts on water resources and receptors such as rivers and aquifers, which when considered together constitute a greater impact.	See summary of preliminary residual significant effects in Table 15-7 of this chapter.
Chapter 14 Climate has not considered combined effects. The ES will consider the ICCI of the proposed scheme where the focus is on those effects of the proposed scheme identified by an environmental factor that are also affected by climate change.	Not applicable

## **15.5 Preliminary assessment of cumulative effects**

- 15.5.1 Table 15-7 provides a summary of the preliminary significant effects of the proposed scheme (as assessed by each PEI Report chapter) and sensitive receptors identified as potentially affected by the other developments. The longlist and short-list of other developments is provided within Appendix 15.1 Consideration of cumulative effects of this PEI Report.

**Table 15-7 Preliminary significant effects and key receptors for environmental factors**

<b>Environmental factor</b>	<b>Summary of preliminary significant effects (as reported in environmental factor chapter)</b>	<b>Key receptors provisionally identified as being potentially affected by 'other developments'</b>
Air quality	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>No likely significant effects anticipated from construction activities. <i>[Note: An assessment of construction traffic emissions is still to be undertaken and will be reported in the ES.]</i></li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>No likely significant effects anticipated</li> </ul>	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Sensitive human and ecological receptors within 200m of the draft DCO boundary.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Residential properties, schools, hospitals, care homes and designated ecological sites within 200m of the ARN.</li> </ul>
Cultural heritage	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Temporary adverse effect on Henlade House resulting from the change to designed views from the front of the Grade II* Listed Building.</li> <li>Temporary and permanent adverse effects on Musgrave Farmhouse Grade II* Listed Building resulting from the proposed scheme altering the rural setting of the resource and the change to its farmyard.</li> <li>Temporary and permanent adverse effects on Grade II listed Ashe Farmhouse arising from increased noise both during construction and from the operation of the proposed scheme.</li> <li>Temporary adverse effect on The Thatch Grade II Listed Building resulting from increased noise altering the rural setting of the resource.</li> <li>Permanent adverse effect on Ruishton House Grade II Listed Building resulting from the scheme altering the immediate setting of the resource.</li> <li>Permanent adverse effect on the Grade II Listed Road Bridge (located at NGR ST 2815 2249) from construction of new road embankment under the bridge arch.</li> <li>Temporary and permanent adverse effect on non-designated historic parkland at Hatch Park and Jordans from ground excavation.</li> </ul>	<p><b>Construction and operation</b></p> <ul style="list-style-type: none"> <li>Church of the Blessed Virgin Mary, Ashill – a Grade II* Listed Building.</li> </ul>

Environmental factor	Summary of preliminary significant effects (as reported in environmental factor chapter)	Key receptors provisionally identified as being potentially affected by 'other developments'
	<ul style="list-style-type: none"> <li>Permanent adverse effect on the historic landscape character of the central part of the proposed scheme, where there would be the loss of several anciently enclosed fields.</li> <li>Permanent adverse effect on the removal of three non-designated historic milestones (Capland Spa, Ash Cross, Three Oaks Cross).</li> <li>Permanent adverse significant effects on below ground archaeology (known and unknown) within the footprint of the proposed scheme.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Potential significant adverse effects identified on Ashe Farmhouse and The Thatch, both Grade II listed buildings, which are likely to experience increased operational noise altering their currently quiet rural settings.</li> </ul>	
Landscape and visual	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Temporary adverse significant effects on local landscape character areas (LLCA) that are directly affected by the proposed development, including: Vale of Taunton Deane and North Curry Sandstone Ridge;.</li> <li>Temporary adverse significant effects experienced by residential properties located near the engineering footprint, such as those around Henlade and Ashill, and individual properties with clear views across open fields towards vegetation alongside the existing A358 corridor. From public rights of way (PRoW), significant effects are likely from elevated positions in relatively close proximity to the scheme, such as from Stoke Hill and Thorn Hill, where a length of the proposed scheme will be visible in the middle distance across a large proportion of the view.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Permanent adverse significant effects on local landscape character areas (LLCA) that are directly affected by the proposed development, including: Vale of Taunton Deane (years 1 and 15) and North Curry Sandstone Ridge (years 1 and 15).</li> </ul>	<ul style="list-style-type: none"> <li>Vale of Taunton Deane LLCA.</li> <li>Residential properties west of Henlade, in Kenny, and in Ashill.</li> <li>Visual receptors within 'other developments'.</li> <li>PRoW around Henlade, Ashill, Kenny, and at Herne Hill.</li> </ul>

Environmental factor	Summary of preliminary significant effects (as reported in environmental factor chapter)	Key receptors provisionally identified as being potentially affected by 'other developments'
	<ul style="list-style-type: none"> <li>• Permanent adverse significant effects experienced by residential properties for year 1 located near the engineering footprint, such as those around Henlade and Ashill, and individual properties with clear views across open fields towards vegetation alongside the existing A358 corridor. From PRow, significant effects for year 1 are likely from elevated positions in relatively close proximity to the proposed scheme, such as from Stoke Hill and Thorn Hill, where a length of the proposed scheme would be visible in the middle distance across a large proportion of the view. For year 15, likely significant visual effects are anticipated to be limited to those residential properties or rights of way:               <ul style="list-style-type: none"> <li>○ With views towards new elevated structures or junctions and the offline sections of the proposed scheme.</li> <li>○ In close proximity and facing the online section of the proposed scheme.</li> <li>○ Users of PRow around the offline section of the proposed scheme, including from Stoke Hill.</li> </ul> </li> </ul>	
Biodiversity	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>○ Adverse significant effects on Road Verges West of Hatch Beauchamp (Local Wildlife Site) LWS, Jordans Park LWS and River Rag LWS due to direct habitat loss within these designated sites.</li> <li>○ Adverse significant effect on Bickenhall Wood and Saltfield Copse LWS ancient woodlands due to direct habitat loss.</li> <li>○ Adverse significant effect on veteran trees due to the loss of up to three veteran trees.</li> <li>○ Adverse significant effect on semi-natural broadleaved woodland due to habitat loss.</li> <li>○ Beneficial significant effect on semi-natural broadleaved woodland due to habitat creation.</li> <li>○ Adverse significant effect on species-rich hedgerows due to habitat loss.</li> </ul>	<ul style="list-style-type: none"> <li>• Designated sites – South Taunton Stream Local Nature Reserves (LNR), Children's Wood/Riverside Park LNR, potential effects and cumulative effects on internationally important designated sites (Special Area for Conservation (SAC), Special Protection Area (SPA), Ramsar) will be reported in the ES following completion of the Habitats Regulations Assessment (HRA)</li> <li>• Non-statutory designated sites</li> <li>• Ancient woodland and veteran trees</li> <li>• Semi-natural broadleaved woodland</li> <li>• Scattered trees</li> <li>• Hedgerows</li> <li>• Semi-improved neutral grassland</li> <li>• Marsh grassland</li> </ul>

Environmental factor	Summary of preliminary significant effects (as reported in environmental factor chapter)	Key receptors provisionally identified as being potentially affected by ‘other developments’
	<ul style="list-style-type: none"> <li>○ Beneficial significant effect on species-rich hedgerows due to habitat creation and management.</li> <li>○ Beneficial significant effect on species-rich neutral grassland due to habitat creation.</li> <li>○ Adverse significant effect on bat assemblages due to loss and fragmentation of foraging and commuting habitats.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>● Adverse significant effect on Bickenhall Wood ancient woodland due to vehicular related nitrogen deposition causing habitat degradation.</li> </ul>	<ul style="list-style-type: none"> <li>● Watercourses</li> <li>● Orchid assemblage</li> <li>● Bats including all for Annex II species</li> <li>● Hazel dormouse (<i>Muscardinus avellanarius</i>)</li> <li>● Breeding birds and wintering birds</li> <li>● Barn owls</li> <li>● Great crested newts (GCN) (<i>Triturus cristatus</i>)</li> <li>● Otters (<i>Lutra lutra</i>)</li> <li>● Water voles (<i>Arvicola amphibius</i>)</li> <li>● Brown hairstreak butterfly (<i>Thecla betulae</i>)</li> <li>● Badgers (<i>Meles meles</i>)</li> <li>● Reptiles</li> <li>● Terrestrial invertebrates</li> <li>● Fish</li> <li>● Aquatic macroinvertebrates</li> <li>● Section 41 species of principal importance</li> </ul>
<p>Geology and soils</p>	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>○ A permanent adverse moderate effect has been identified to off-site residential site users, as a result of contamination from historical landfills. Further investigations and risk assessments would be required to identify the requirement for remedial/mitigation measures. These further assessments are to be undertaken on completion of planned site investigation.</li> <li>○ The construction of the proposed scheme would result in significant, temporary and permanent very large adverse effect on best and most versatile agricultural land in grade 2 and subgrade 3a, and a significant large adverse effect of subgrade 3b agricultural land.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>● No likely significant effects identified.</li> </ul>	<ul style="list-style-type: none"> <li>○ The other development identified which are within the geology and soils ZoI, are in the majority residential developments which brings in additional potential highly sensitive human receptors. The industrial land use classes associated with the Horlicks and Nexus 25 developments would also introduce human health receptors, although these are of lower sensitivity.</li> <li>○ The redevelopment of the Horlicks site could also potentially create additional potential land contamination pathways, during its construction phase. Ultimately, development of the Horlick’s site would remove potential contamination sources as it is expected that relevant planning conditions will be applied, requiring remediation of potential contamination.</li> </ul>

Environmental factor	Summary of preliminary significant effects (as reported in environmental factor chapter)	Key receptors provisionally identified as being potentially affected by 'other developments'
Material assets and waste	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>No likely significant effects anticipated.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>No likely significant effects anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>Capacity of waste management infrastructure (including waste treatment facilities and landfill sites) in the county of Somerset due to the volume of estimated waste arising from the proposed scheme.</li> </ul>
Noise and vibration	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Based on reasonable 'worst-case' assumptions for typical road construction activities, temporary direct significant adverse noise effects have been identified at 345 residential and non-residential noise sensitive receptors located within the study area.</li> <li>A quantitative vibration assessment has not been undertaken for the PEI Report however, significant vibration effects are possible up to 100m from vibratory works including piling and compaction works.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>439 residential and non-residential noise sensitive receptors (NSR) are assessed as being subject to direct permanent likely significant adverse effects where there is an increase in noise levels with the proposed scheme. These NSR are situated in Henlade, Thornfalcon, Mattocks Tree Green, West Hatch, Hatch Beauchamp, Hatch Green, Ashill, Rapps and Horton Cross.</li> <li>374 NSR are assessed as being subject to indirect permanent likely significant adverse effects. This is because of changes in road traffic noise associated with non-scheme roads. These NSR are situated in North Curry, Meare Green, Curload, Burrowbridge, Curry Mallet, Broadway and Horton.</li> <li>113 NSR would experience a noise reduction which are assessed as being subject to direct permanent likely significant beneficial effects, located in Ruishton, Henlade, Thornfalcon, Mattock's Tree Green, Hatch Green and Ashill.</li> <li>211 NSR are assessed as being subject to indirect permanent likely significant beneficial effects, located in Orchard Portman, Staple Fitzpaine, Buckland St Mary and Horton.</li> </ul>	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>Residential and non-residential noise receptors situated within 300m of the other developments and within 300m of the proposed construction works.</li> <li>Residential and non-residential noise receptors situated within 100m of the other developments and within 100m of the proposed construction works.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Residential and non-residential noise receptors affected by cumulative traffic changes from the proposed scheme and other developments. <i>[Note: other developments are included in the traffic modelling and therefore noise effects are picked up in the noise assessment as reported in Chapter 11 Noise and vibration.]</i></li> </ul>

Environmental factor	Summary of preliminary significant effects (as reported in environmental factor chapter)	Key receptors provisionally identified as being potentially affected by 'other developments'
Population and human health [17]	<p><b>Construction</b></p> <p><i>Land use and accessibility:</i></p> <ul style="list-style-type: none"> <li>• Three private properties will experience permanent large adverse impacts during construction due to demolition. A further six private properties will experience temporary moderate adverse effects through the introduction of severance or discernible changes in environmental quality.</li> <li>• There are no demolitions resulting in large adverse effects for either community assets or businesses.</li> <li>• There is one very large adverse effects, one temporary large adverse, and four moderate adverse effects on community assets as a result of access changes or discernible changes in environmental quality.</li> <li>• There are moderate adverse effects to 20 businesses as a result of access changes or discernible changes in environmental quality.</li> <li>• Slight adverse effects will be experienced by all walker, cyclists, and horse riders as a result of construction activities.</li> </ul> <p><i>Agricultural land holdings:</i></p> <ul style="list-style-type: none"> <li>• 23 agricultural land holdings will experience significant adverse temporary effects, with 16 agricultural land holdings experiencing significant adverse permanent effects once construction is complete.</li> </ul> <p><i>Health:</i></p> <ul style="list-style-type: none"> <li>• Neutral health outcomes identified for all health determinants except for air quality which is assessed as negative within all wards.</li> </ul> <p><b>Operation</b></p> <p><i>Land use and accessibility:</i></p> <ul style="list-style-type: none"> <li>• Four private properties are anticipated to experience permanent moderate adverse effects due to severance or substantial environmental changes.</li> </ul>	<p><i>Land use and accessibility:</i></p> <ul style="list-style-type: none"> <li>• Land and access assets.</li> </ul> <p><i>Agricultural land holdings:</i></p> <ul style="list-style-type: none"> <li>• One agricultural land holding (Summerfield Estate) would also be affected by the Nexus 25 development.</li> </ul> <p><i>Health:</i></p> <ul style="list-style-type: none"> <li>• Residential properties across all wards in relation to air quality during construction.</li> </ul>

Environmental factor	Summary of preliminary significant effects (as reported in environmental factor chapter)	Key receptors provisionally identified as being potentially affected by 'other developments'
	<ul style="list-style-type: none"> <li>• There will be slight beneficial effects to all community assets as a result of improved accessibility from the overall reduction in the number of vehicles passing through communities.</li> <li>• There will be slight beneficial effects to all business receptors as a result of improved journey time reliability and safety.</li> <li>• There is one large adverse impact to one bridleway where the route has been stopped up, with a further 15 routes experiencing moderate adverse effects as a result of longer journey times as a result of the diversions.</li> </ul> <p><i>Agricultural land holdings</i></p> <ul style="list-style-type: none"> <li>• No significant operational effects.</li> </ul> <p><i>Health:</i></p> <ul style="list-style-type: none"> <li>• Positive health outcomes identified for all wards in relation to transport and connectivity, air quality and employment and training.</li> <li>• Positive health outcome for North Curry and Stoke St Gregory ward in relation to noise (all other wards neutral health outcome in relation to noise).</li> <li>• Neutral health outcomes are identified across all wards in relation to the remaining health determinants.</li> </ul>	
Road drainage and the water environment	<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>• No likely significant effects identified.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• No likely significant effects identified based on the preliminary assessment provided in the PEI Report.</li> <li>• The potential impact of the proposed scheme on pollution risk to water receptors will be determined using HEWRAT and reported in the ES.</li> <li>• The potential impacts of the proposed scheme on flood risk (for Black Brook Tributaries 1-3, River Tone Tributary 1, West Sedgemoor Main Drain, Fivehead River Main Channels 1 and 2, Venner's Water, River Ding and Tributaries 1 and 2 and</li> </ul>	<ul style="list-style-type: none"> <li>• The 'other developments' identified within the road drainage and water environment Zol that have the potential to result in cumulative effects on the following road drainage and water environment receptors, comprising: <ul style="list-style-type: none"> <li>○ Surface water flow path at Ashill</li> <li>○ River Isle</li> <li>○ River Ding</li> <li>○ Flood risk receptors in Kenny (residential properties and Wood Road)</li> </ul> </li> </ul>

Environmental factor	Summary of preliminary significant effects (as reported in environmental factor chapter)	Key receptors provisionally identified as being potentially affected by 'other developments'
	Back Stream) will be assessed in the ES utilising hydraulic modelling.	
Climate	<ul style="list-style-type: none"> <li>Based on the preliminary assessment presented in this PEI Report, no significant effects in relation to GHG emissions or vulnerability of the proposed scheme to climate change are predicted during the construction and operation phases.</li> </ul>	<ul style="list-style-type: none"> <li>Not applicable.</li> </ul>

**Identification of other developments to be assessed**

- 15.5.2 For each identified 'other development', consideration has been made as to the likelihood that any impacts from the development could occur at the same time as the proposed scheme or affect similar receptors or resources. Appendix 15.1 Consideration of cumulative effects presents the list of other developments identified along with confirmation and justification for those screened out of the assessment.
- 15.5.3 The long list of developments is given in Appendix 15.1 Consideration of cumulative effects. The number of developments to be considered within each environmental factor has been condensed between stage 1 and stage 2 assessments using the criteria listed in Table 15-3.
- 15.5.4 Table 15-8 provides the shortlist of development projects used for this CEA and Figure 15.2 Location of other developments shows the location of each development.

**Table 15-8 Preliminary short listed 'other developments' with the potential to result in cumulative impacts (for assessment in the CEA)**

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
68	A303 Sparkford to Ilchester Dualling NSIP (PINS)	18.5 A303 Sparkford to Ilchester Dualling	Application by Highways England for an Order Granting Development Consent for the A303 Sparkford to Ilchester Dualling	Scheme approved. End date of construction 2023-24. Although construction programme scheduled for 2024 completion, scheme left in CEA as a worst-case scenario as the programme would likely be delayed due to the nature of the scheme.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN). <b>Health</b> (within study ward)
51	34/16/0014 – subject to approval (SWTDC)	3.6 Land at Staplegrove (East), Taunton, Somerset	Outline permission (with all matters reserved except for access) for the erection of up to 915 residential units, a primary school, 1 ha of employment land, local centre, open space including allotments and sports pitches, green infrastructure, landscaping, woodland planting, sustainable drainage systems and associated works; including provision of an internal spine road to connect A358 Staplegrove Road to Kingston Road on land at Staplegrove (East), Taunton, Somerset.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
52	34/16/0007 (SWTDC)	4 Land at Staplegrove (West), Taunton, Somerset	Outline permission (with all matters reserved except for access) for a residential-led, mixed use urban extension to include up to 713 dwellings, 1 ha of employment land comprising use classes B1(a) (up to a maximum of 2500sqm), B1(b), B1(c), B2, B8 together with green infrastructure, landscaping, play areas, sustainable drainage systems (SUDS) and associated works. An internal spine road is proposed to connect the A358 Staplegrove Road	Phasing is based on delivery of the Spine Road. No timescales provided.	<b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only); and <b>Material</b>

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
			and Taunton Road at land at Staplegrove (West), Taunton, Somerset		<b>Assets &amp; Waste</b> (3.1 miles [5km]).
53	42/14/0069 (SWTDC)	5 Land at comeytrowe / trull	Outline planning application with all matters reserved (except points of access) for a residential and mixed use urban extension at comeytrowe/trull to include up to 2000 dwellings, up to 5.25 hectares of employment land, 2.2 hectares of land for a primary school, a mixed use local centre, and a 300 space 'park and bus' facility on land at comeytrowe/trull amended and additional information received 04 September 2015.	Under construction – delivery expected over the next 10 years.	<b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
70	Nexus 25 LDO (SWTDC)	0.05 Located at J25 of the M5	Development of Strategic Employment Site 'Nexus 25' (25ha). 6 Plot development proposal with B1(a), B1(b), B2, B8 and ancillary uses.	No timescales defined for delivery. The Adopted Nexus 25 LDO includes the aim for 'To facilitate the delivery of a new high quality strategic employment site for Taunton at M5 junction 25 – aiming for first phase occupiers on site by late 2018', however, there have been some delays to development. From aerial photography, construction of the road slipway off M5 junction 25 appears to be already underway, although there are no buildings as yet.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Water Environment</b> (0.6 miles [1km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]); <b>Climate Change</b> (footprint of Proposed Scheme).

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
37	38/20/0285 – subject to approval (SWTDC)	3 59-63 High Street, Taunton	Redevelopment of site with re-configuration of ground floor commercial use and the erection of a third and fourth floor with conversion into a total of 62 No. apartments (60 additional) over 4 floors at 59-63 High Street, Taunton	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
86	48/21/0033 – subject to approval (SWTDC)	2 156 Bridgwater Road, Monkton Heathfield, TA2 8BP	Application for outline planning with all matters reserved, except for access, for the demolition of employment buildings and erection of 40 No. dwellings with associated parking, cycle storage, refuse storage and private/communal amenity space at AMP Access.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
15	16/02874/FUL – subject to approval (SSDC)	7.7 Land Adjoining Holbear Forton Road Chard, Somerset TA20 2HS	Proposed residential development with associated access and infrastructure. Development of up to 263 units.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); and <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only).
57	18/04057/OUT – subject to approval	5.7 Land East Of Mount Hindrance Farm	Outline application for mixed development comprising residential development of up to 295 dwellings, provision of a floodlit full size football pitch, unlit full size training pitch and community	Construction start date subject to approval. To be reviewed prior to	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
	(SSDC)	Mount Hindrance Lane Chard Somerset	sports pitch with associated multi use clubhouse, spectator facilities and vehicular parking area; hub for local neighbourhood facilities and other community uses, public open space, landscaping, drainage and other facilities; associated vehicular and pedestrian accesses, land regrading, associated infrastructure and engineering works	the production of the ES.	are a qualifying feature of the European site only); and <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only).
60	16/05500/OUT – subject to approval (SSDC)	0.9 Land South West of Canal Way Ilminster Somerset	Outline application for residential development for up to 400 dwellings with associated access.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
20	17/03409/OUT (SSDC)	0.4 Lamb Inn Horton Cross, Ilminster, Somerset, TA19 9PY	Erection of 24 bed residential home and formation of new vehicular access (outline application)	Construction programme unspecified. Works have not started.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
21	17/03800/OUT 20/03697/REM (SSDC)	0.01 Land Os 3727 Part Windmill Hill Lane, Ashill, Ilminster, Somerset, TA19 9PA	Erection of 25 dwellings and formation of access (outline application)	Construction programme unspecified. Works have not started.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Water Environment</b> (0.6 miles [1km]).

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
					[1km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]); <b>Climate Change</b> (footprint of proposed scheme).
24	19/03418/FUL – subject to approval (SSDC)	0.01 Stewley Cross Caravan Park Wood Road Ashill Ilminster TA19 9NP	Erection of 10 No. dwellings with garages and ancillary parking.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Water Environment</b> (0.6 miles [1km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
28	20/03697/REM – subject to approval (SSDC)	0.2 Land Os 3727 Part Windmill Hill Lane Ashill Ilminster Somerset TA19 9PA	Application for approval of appearance, landscaping and scale ('the reserved matters'), landscaping (condition 4), ecological mitigation (condition 5), access details (condition 9), cycle and footpath links (condition 16) and foul and surface water drainage (condition 20) pursuant to outline planning permission ref. 17/03800/OUT for the erection of 25 dwellings and formation of access	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Construction noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Water Environment</b> (0.6 miles [1km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
32	19/03505/FUL – subject to approval (SSDC)	2 Land Os 3875 Part St Peters Close Ilton	The erection of 15 dwellings, formation of new access and associated works.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
		Ilminster Somerset TA19 9ET			European site only); <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
61	18/00082/FUL – subject to approval (SSDC)	1.6 Land South West Of Canal Way Ilminster Somerset	Erection of 144 No. dwelling houses with open space, landscaping and other associated works. Formation of access.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
62	19/00012/OUT – subject to approval (SSDC)	0.08 Horlicks Farms And Dairies Ltd, Station Road, Ilminster Somerset, TA19 9PR	Outline planning application for the erection of flexible class B1 (B1a or B1b) building (or buildings) and up to 150 No. dwellings on the land to the north of Station Road; and for class B1(C), B2, B8, D1, A3, A4 , A5 or Motor Dealership uses on the land to the South of Station Road; and details of accesses off of Station Road together with other road infrastructure, engineering works, landscaping all to facilitate phased redevelopment	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Water Environment</b> (0.6 miles [1km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]); <b>Climate Change</b> (footprint of Proposed Scheme).
13	19/01219/FUL (SSDC)	6.4	Proposed offices, warehousing, research and development buildings, totalling 13,308 m <sup>2</sup> net floorspace.	Construction programme	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
		Land At Crewkerne Road Chard TA20 1HA		unspecified. Works have not started.	and wading birds only where they are a qualifying feature of the European site only); and <b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only).
66	20/00405/REM 17/04328/OUT (SSDC)	0.3 Land West Of School Lane Ashill Ilminster Somerset, TA19 9PB	Erection of 10 dwellings and associated works including the formation of 2 No. accesses (outline)	Construction programme unspecified. Works have not started.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Water Environment</b> (0.6 miles [1km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
67	19/03070/FUL – subject to approval (SSDC)	1 Land Rear Of The Bell Inn Broadway Road Broadway Ilminster Somerset, TA19 9RG	The erection of 25 No. dwellings along with associated vehicular access and landscaping	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Water Environment</b> (0.6 miles [1km]); and <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
23	19/02812/OUT – subject to approval (SSDC)	<0.02 The Builders Yard Wood Road Ashill	Outline application with all matters reserved save for access for the erection of 2No. dwellings	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]);

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
		Ilminster Somerset, TA19 9NP			[10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
25	20/01902/PIP (SSDC)	<0.02 Total Butler Ashill Ilminster Somerset TA19 9NQ	Permission in principle for the demolition of former office building previously used in association with fuel storage and distribution business and erection of 6 No. dwellings.	Construction programme unspecified. Works have not started.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
26	20/03456/FUL – subject to approval (SSDC)	<0.02 The Builders Yard, Wood Road Ashill, Ilminster, TA19 9NP	Erection of two detached dwelling houses.	Construction start date subject to approval. To be reviewed prior to the production of the ES.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Cultural Heritage</b> (0.6 miles [1km]); <b>Landscape &amp; Visual</b> (1.2 miles [2km]); <b>Biodiversity</b> (6.2 miles [10km]); <b>Geology &amp; Soils</b> (0.16 miles [250m]); <b>Noise &amp; Vibration</b> (0.4 miles [600m]); <b>Population &amp; Human Health</b> (3.1 miles [5km]); <b>Material Assets &amp; Waste</b> (3.1 miles [5km]).
58	21/00393/NMA 19/00074/FUL (SSDC)	6.1 Chard, TA20 1LS	The erection of 142 dwellings together with associated infrastructure including access/highway improvements, drainage and attenuation, play area, open space and landscaping.	Construction programme unspecified. Works have not started.	<b>Air Quality</b> (within 0.1 miles [200m] of the ARN); <b>Biodiversity</b> (6.2 miles [10km] – bats, wildfowl and wading birds only where they are a qualifying feature of the European site only); and

ID	Application reference and local planning authority	Approximate distance (km) from proposed scheme and location	Proposal summary	Proposed programme of construction, operation and decommissioning	Relevant environmental factor (development is within respective Zol)
					<b>Population &amp; Human Health</b> (3.1 miles [5km] – cyclists, recreational walkers and horse riders only).

## Significance of cumulative effects

15.5.5 DMRB LA 104 *Environmental assessment and monitoring* notes that cumulative effects should be assessed when the conclusions of individual environmental factor assessments have been reached and reported. Therefore, cumulative effects are not reported in this PEI Report, but will be assessed and reported in the ES by considering whether:

- there would be any change in magnitude of the significant effects from the proposed scheme, as identified within the environmental factor assessments, taking into consideration any impacts from the other developments. For example, a *slight adverse significant effect becoming a large adverse significant effect*; or
- the impacts of the proposed scheme on key receptors potentially affected by 'other developments', as identified in Table 15-7, in combination with any impacts of the other developments would trigger a significant effect where the impacts of the proposed scheme in isolation would not, i.e. a *non-significant effect becoming a significant effect*.

15.5.6 Where available, the relevant ES for each development will be assessed.

## 15.6 Monitoring

15.6.1 If the assessment of cumulative effects identifies any likely new significant effects, or any requirement for additional mitigation above the measures that will be identified and proposed within the ES and stated in the Environmental Management Plan (EMP), then appropriate monitoring will be identified.

## 15.7 Summary

15.7.1 In line with DMRB LA 104 *Environmental assessment and monitoring*, cumulative effects will be assessed based on the conclusions of individual environmental factor assessments.

15.7.2 For this PEI Report, a full CEA and combined effects assessment has not been undertaken as the proposed scheme environmental assessments are still being undertaken at this stage. Therefore, this chapter presents the methodology and short list of 'other developments' to be assessed, which will be assessed and reported in the ES.

15.7.3 The CEA will identify any significant cumulative or combined effects which would result in any new or different significant effects to those identified in each environmental factor chapter of the ES. It will also identify any requirement for mitigation measures further to those set out in the individual environmental factor chapters and EMP.

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

## References

- [1] Highways England, “DMRB: LA 104 Environmental Assessment and Monitoring,” HE, 2020.
- [2] European Union, “DIRECTIVE 2014/52/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment,” EU, 2014.
- [3] Secretary of State, “Infrastructure Planning (Environmental Impact Assessment) Regulations 2017,” HMSO, London, 2017.
- [4] Department for Transport, “National Policy Statement for National,” December 2014. [Online]. Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/387223/npsnn-web.pdf#:~:text=The%20National%20Networks%20National%20Policy%20Statement%20%28NN%20NPS%29%2C,the%20national%20road%20and%20rail%20networks%20in%20.](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf#:~:text=The%20National%20Networks%20National%20Policy%20Statement%20%28NN%20NPS%29%2C,the%20national%20road%20and%20rail%20networks%20in%20.) [Accessed 07 June 2021].
- [5] Planning Inspectorate, “Advice Note Seventeen: Cumulative Effects Assessment,” August 2019. [Online]. Available: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf>. [Accessed 07 June 2021].
- [6] *Where other projects are expected to be completed before construction of the proposed scheme and the effects of those projects are fully determined, effects arising from them are considered as part of the baseline or future baseline and will be considered.*
- [7] *(1) Applications which are still to be determined at the time of undertaking the assessment are not shortlisted for assessment in the CEA due to uncertainty and limited detailed information available..*
- [8] *No projects of this type have been identified within 5km of the proposed scheme..*
- [9] *No projects of this type have been identified within 5km of the proposed scheme..*
- [10] *In line with the DMRB methodology, only adopted planning policy has been included in the CEA..*
- [11] *Roads projects are limited to those which require planning permission or development consent and does not include maintenance of the existing road network, which is typically carried out under permitted development rights..*
- [12] *Publicly available published sources such as planning applications on local authority websites, published local authority plans, data published on the Planning Inspectorate website and Transport and Works Act (TWA) applications published by the Department.*

- [13] Planning Inspectorate, "Welcome to National Infrastructure Planning," PINS, 2021. [Online]. Available: <https://infrastructure.planninginspectorate.gov.uk/>. [Accessed 07 June 2021].
- [14] Department for Transport, "Transport and Works Act (TWA) applications and decisions," DfT, 2021. [Online]. Available: <https://www.gov.uk/government/collections/twa-inspector-reports-and-decision-letters#2020-twa-decisions-and-applications>. [Accessed 07 June 2021].
- [15] Somerset and West Taunton District Council, "Adopted Local Plans," Somerset and West Taunton District Council, 2021. [Online]. Available: <https://www.somersetwestandtaunton.gov.uk/planning-policy/adopted-local-plans/>. [Accessed 07 June 2021].
- [16] South Somerset District Council, "Local Plan: South Somerset Local Plan 2006-2028," SSSDC, 05 March 2015. [Online]. Available: <https://www.southsomerset.gov.uk/your-council/your-council-plan-and-strategies/planning-policy/local-plan/>. [Accessed 07 June 2021].
- [17] *The human health assessment only allows for adverse or beneficial effects, rather than.*
- [18] Highways England, "Design Manual for Roads and Bridges (DMRB) LA 104 Environmental Assessment and Monitoring," 2019. [Online]. Available: <http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section2/la104.pdf>.
- [19] The Planning Inspectorate, "Cumulative Effects Assessment, Advice note seventeen: Cumulative effects assessment relative to nationally significant infrastructure projects," August 2019. [Online]. Available: Available: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note17V4.pdf>.
- [20] *3 Where other projects are expected to be completed before construction of the proposed scheme and the effects of those projects are fully determined, effects arising from them are considered as part of the baseline or future baseline and will be considered.*
- [21] *Applications which are still to be determined at the time of undertaking the assessment are not shortlisted for assessment in the CEA due to uncertainty and limited detailed information available..*
- [22] Department for Transport, "Transport and Works Act (TWA) applications and decisions.," [Online]. Available: <https://www.gov.uk/government/collections/twa-inspector-reports-and-decisionletters#2020-twa-decisions-and-applications>.
- [23] Planning Inspectorate, "National Infrastructure Planning," [Online]. Available: <https://infrastructure.planninginspectorate.gov.uk/>.
- [24] *Where other projects are expected to be completed before construction of the proposed scheme and the effects of those projects are fully determined, effects arising from them are considered as part of the baseline or future baseline and will be considered.*

# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 16  
Summary

HE551508-ARP-EGN-ZZ-RP-LE-000021

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## 16 Summary

### 16.1 Summary of preliminary effects

- 16.1.1 Based on the preliminary assessment, the scale and location of the proposed scheme means that several different aspects of the environment would potentially be affected. Some of these effects would occur during construction, such as the loss of land, vegetation and wildlife habitat, and the generation of dust and noise.
- 16.1.2 Other impacts would occur during operation, such as noise from traffic, changes to travel conditions and the provision of new landscaping and ecological habitats from the landscape and ecological mitigation proposals.
- 16.1.3 The previous technical chapters (5-14) present the preliminary assessments for the individual EIA topics. Each assessment provides a preliminary assessment of the likely significant effects and Table 16-1 provides a high-level summary of these effects.
- 16.1.4 A summary of the assessment set out in this Preliminary Environmental Information (PEI) Report can be found in the Non-Technical Summary (NTS).
- 16.1.5 The ongoing EIA will consider these effects and assess their significance, taking into account proposed mitigation measures. This will be presented in the Environmental Statement (ES) prepared to accompany the Development Consent Order (DCO) application.

**Table 16-1 Summary of preliminary assessment of likely significant environmental effects**

Factor	Preliminary assessment of likely significant environmental effects	
	Construction stage	Operational stage
Air quality	<ul style="list-style-type: none"> <li>Temporary adverse effect due to dust emissions from construction activity on sensitive receptors within 200 metres (m) of the proposed scheme.</li> </ul>	<ul style="list-style-type: none"> <li>No likely significant adverse effects on local air quality concentrations predicted at human receptors.</li> <li>Permanent beneficial effects on local human receptors in the existing Henlade Air Quality Management Area (AQMA) due to relieving congestion and moving the road away from receptors.</li> <li>The changes in nitrogen (N) deposition at ecological sites cannot be considered to be insignificant as defined in DMRB LA 105 <i>Air quality</i>. Please see the summary of significant environmental effects for Biodiversity for the conclusion of significance.</li> </ul>
Cultural heritage	<ul style="list-style-type: none"> <li>Likely permanent significant adverse direct effect on buried archaeological remains.</li> <li>Likely permanent adverse effect on the setting of the listed Musgrave Farmhouse.</li> <li>Likely permanent adverse effect on the setting of the listed Ashe Farmhouse.</li> <li>Likely permanent adverse effect on the setting of the listed Ruishton House.</li> <li>Likely permanent adverse direct effect on the listed Road bridge at NGR ST 2815 2249.</li> <li>Likely permanent adverse direct effect on Hatch Park, Hatch Beauchamp.</li> <li>Likely permanent adverse direct effect on Jordans Park, Ashill.</li> <li>Likely permanent adverse direct effect on HLCA_003, Ancient and post-medieval fields, Somerset Hills.</li> </ul>	<ul style="list-style-type: none"> <li>Ashe Farmhouse (NHLE: 1060367). Given the current rural setting of the farmhouse, the increase in noise levels during operation is likely to constitute a moderate adverse operational effect.</li> <li>The Thatch (NHLE: 10603668). Given the current rural setting of the farmhouse, the increase in noise levels during operation is likely to constitute a moderate adverse operational effect.</li> </ul>
Landscape	<ul style="list-style-type: none"> <li>During construction there are likely to be significant effects on the: <ul style="list-style-type: none"> <li>Vale of Taunton Deane LLCA (large adverse); and</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Significant landscape effects will remain due to the offline sections of the proposed scheme within the existing rural landscape and nature of proposed earthworks, junctions and structures for:</li> </ul>

Factor	Preliminary assessment of likely significant environmental effects	
	Construction stage	Operational stage
	<ul style="list-style-type: none"> <li>○ North Curry Sandstone Ridge LLCA (moderate adverse).</li> <li>● The significant effects on representative viewpoints during construction are:                             <ul style="list-style-type: none"> <li>○ Two very large adverse (viewpoints 1 and 4);</li> <li>○ 10 large adverse (viewpoints 2, 5, 7, 9, 13, 18, 22, 26, 27, and 32); and</li> <li>○ Nine moderate adverse (viewpoints 6, 10, 14, 20, 23, 24, 25, 31, and 45).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>○ Vale of Taunton Deane LLCA (large adverse year 1, moderate adverse year 15); and</li> <li>○ North Curry Sandstone Ridge LLCA (moderate adverse year 1 and year 15).</li> <li>● The significant effects on representative viewpoints during year 1 are:                             <ul style="list-style-type: none"> <li>○ One very large adverse (viewpoint 4);</li> <li>○ 10 large adverse (viewpoints 1, 2, 7, 9, 13, 18, 22, 26, 27, and 32); and</li> <li>○ Nine moderate adverse (viewpoints 5, 6, 14, 20, 23, 24, 25, 31, and 45).</li> </ul> </li> <li>● The significant effects on representative viewpoints during year 15 are:                             <ul style="list-style-type: none"> <li>○ One large adverse (viewpoint 1); and</li> <li>○ Five moderate adverse (viewpoints 2, 4, 18, 27, and 32).</li> </ul> </li> </ul>
Biodiversity	<ul style="list-style-type: none"> <li>● Adverse significant effects on Road Verges West of Hatch Beauchamp Local Wildlife Site (LWS), Jordans Park LWS and River Rag LWS due to direct habitat loss within these designated sites.</li> <li>● Adverse significant effect on Bickenhall Wood and Saltfield Copse LWS ancient woodlands due to direct habitat loss.</li> <li>● Adverse significant effect on veteran trees due to the loss of up to three veteran trees.</li> <li>● Adverse significant effect on semi-natural broadleaved woodland due to habitat loss.</li> <li>● Beneficial significant effect on semi-natural broadleaved woodland due to habitat creation.</li> <li>● Adverse significant effect on species-rich hedgerows due to habitat loss.</li> </ul>	<ul style="list-style-type: none"> <li>● Adverse significant effect on Bickenhall Wood ancient woodland due to vehicular related nitrogen deposition causing potential for habitat degradation.</li> </ul>

Factor	Preliminary assessment of likely significant environmental effects	
	Construction stage	Operational stage
	<ul style="list-style-type: none"> <li>Beneficial significant effect on species-rich hedgerows due to habitat creation and management.</li> <li>Beneficial significant effect on species-rich neutral grassland due to habitat creation.</li> <li>Adverse significant effect on bat assemblages due to loss and fragmentation of foraging and commuting habitats.</li> </ul>	
Geology and soils	<ul style="list-style-type: none"> <li>Direct temporary and permanent very large adverse effect on best and most versatile (BMV) agricultural land.</li> <li>Temporary and permanent large adverse effect of Subgrade 3b agricultural land.</li> <li>A potential significant construction effect related to contamination from historical landfills and off-site residential users prior to mitigation would produce a moderate adverse permanent effect. Mitigation will be designed during the EIA once further information is gathered.</li> </ul>	<ul style="list-style-type: none"> <li>No likely significant operational effects</li> </ul>
Material assets and waste	<ul style="list-style-type: none"> <li>No likely significant construction stage effects anticipated</li> </ul>	<ul style="list-style-type: none"> <li>No likely significant operational stage effects anticipated</li> </ul>
Noise and vibration	<ul style="list-style-type: none"> <li>Temporary adverse significant noise effects from construction activities have been identified at approximately 345 residential and non-residential noise sensitive receptors within the study area.</li> </ul>	<ul style="list-style-type: none"> <li>Direct permanent beneficial significant noise effects have been identified at 113 residential properties.</li> <li>Direct permanent adverse significant noise effects have been identified at 439 residential properties.</li> <li>Indirect permanent beneficial significant noise effects have been identified at 211 residential properties.</li> <li>Indirect permanent adverse significant noise effects have been identified at 374 residential properties.</li> </ul>
Population and health	<ul style="list-style-type: none"> <li>Three private properties will experience permanent large adverse impacts during construction due to demolition. A further six private properties will experience temporary moderate adverse effects through the introduction of severance or discernible changes in environmental quality.</li> <li>There are no demolitions resulting in large adverse effects for either community assets or businesses.</li> </ul>	<ul style="list-style-type: none"> <li>Four private properties are anticipated to experience permanent moderate adverse effects due to severance or substantial environmental changes.</li> <li>There will be slight beneficial effects to all community assets as a result of improved accessibility from the overall reduction in the number of vehicles passing through communities.</li> </ul>

Factor	Preliminary assessment of likely significant environmental effects	
	Construction stage	Operational stage
	<ul style="list-style-type: none"> <li>• There is one very large adverse effect, one temporary large adverse, and four moderate adverse effects on community assets as a result of access changes or discernible changes in environmental quality.</li> <li>• There are moderate adverse effects to 20 businesses as a result of access changes or discernible changes in environmental quality.</li> <li>• 23 agricultural land holdings will experience significant adverse temporary effects, with 16 agricultural land holdings experiencing significant adverse permanent effects once construction is complete.</li> <li>• Slight adverse effects will be experienced by all walker, cyclists, and horse riders as a result of construction activities.</li> <li>• Neutral health outcomes for all health determinants except for air quality which is negative across all wards.</li> </ul>	<ul style="list-style-type: none"> <li>• There will be slight beneficial effects to all business receptors as a result of improved journey time reliability and safety.</li> <li>• There is one large adverse impact to one bridleway where the route has been stopped up, with a further 15 routes experiencing moderate adverse effects as a result of longer journey times as a result of the diversions.</li> <li>• Positive health outcomes across all wards in relation to the health determinants of transport and connectivity, air quality, and employment and training.</li> <li>• Positive health outcome for noise determinant in North Curry and Stoke St Gregory ward.</li> <li>• Neutral health outcomes in relation to other assessed health outcomes (i.e., open space and nature, noise, landscape, and sources of pollution).</li> </ul>
Road drainage and water environment	<ul style="list-style-type: none"> <li>• No potential significant effects identified on surface water and groundwater receptors due to the implementation of appropriate mitigation measures during construction.</li> </ul>	<ul style="list-style-type: none"> <li>• No potential significant effects identified on surface water and groundwater receptors in the PEI Report.</li> <li>• The potential impact of the proposed scheme on pollution risk to water receptors will be determined using HEWRAT and reported in the ES.</li> <li>• The potential impacts of the proposed scheme on flood risk (for Black Brook Tributaries 1-3, River Tone Tributary 1, West Sedgemoor Main Drain, Fivehead River Main Channels 1 and 2, Venner's Water, River Ding and Tributaries 1 and 2 and Back Stream) will be assessed in the ES utilising hydraulic modelling.</li> </ul>
Climate change	<ul style="list-style-type: none"> <li>• Vulnerability to climate change                             <ul style="list-style-type: none"> <li>○ No potential significant effects anticipated for receptors identified in the PEI Report due to the implementation of appropriate design and mitigation measures during construction.</li> </ul> </li> <li>• Greenhouse gas (GHG) emissions</li> </ul>	<ul style="list-style-type: none"> <li>• Vulnerability to climate change                             <ul style="list-style-type: none"> <li>○ No potential significant effects anticipated for receptors identified in the PEI Report due to the implementation of appropriate design and mitigation measures during operation.</li> </ul> </li> <li>• GHG emissions</li> </ul>

Factor	Preliminary assessment of likely significant environmental effects	
	Construction stage	Operational stage
	<ul style="list-style-type: none"> <li>Based on the preliminary assessment presented in this PEI Report, no significant effects in relation to GHG emissions are predicted during the construction and operation phases. This is due to the consideration that in isolation the proposed scheme would not have a material impact on the ability of the UK government to meet its carbon reduction targets.</li> </ul>	<ul style="list-style-type: none"> <li>Based on the preliminary assessment presented in this PEI Report, no significant effects in relation to GHG emissions are predicted during the construction and operation phases. This is due to the consideration that in isolation the proposed scheme would not have a material impact on the ability of the UK government to meet its carbon reduction targets.</li> </ul>

## Abbreviations List

*Please refer to PEI Report Chapter 17 Abbreviations.*

## Glossary

*Please refer to PEI Report Chapter 18 Glossary.*

# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 17  
Abbreviations

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## 17 Abbreviations

Table 17-1 Table of abbreviations

Abbreviation	In full
µg	Microgram
µg/m <sup>3</sup>	Micrograms (one-millionth of a gram) per cubic meter air
°C	Degrees Celsius
%	Percentage
3D	Three dimensional
AADT	Annual Average Daily Traffic
AIA	Agricultural Impact Assessment
AIEMA	Associate member of the Institute of Environmental Management and Assessment
ALC	Agricultural Land Classification
AM	<i>Ante meridiem</i> (before noon)
AMAA	Ancient Monuments and Archaeological Areas Act
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Areas
AQO	Air Quality Objective
AQS	Air Quality Strategy
ARN	Affected Road Network
ARS	Active Roost Sites
ASoBRA	Accredited Risk Assessor of the Society of Brownfield Risk Assessment
ASPT	Average Score Per Taxon
AST	Appraisal Summary Table
AVR	Accurate Visual Representation
AW	Ancient woodland
AWI	Ancient Woodland Inventory
AWIS	Ancient Woodland Inventory Site
BA	Bachelor's degree in arts
BAP	Biodiversity Action Plan
B&B	Bed and Breakfast
BCR	Benefit cost ratio
BES	Framework Standard for Responsible Sourcing (BES 6001)
BEIS	(Department for) Business, Energy & Industrial Strategy
BGS	British Geological Society
BMV	Best Most Versatile Agricultural Land
BNL	Basic Noise Level
BoCC	Birds of Conservation Concern
BPM	Best Practicable Means
BNG	Biodiversity Net Gain
BRE	Building Research Establishment

<b>Abbreviation</b>	<b>In full</b>
BS	British Standard
BSc	Bachelor's degree in science
BT	British Telecom
C.WEM	Chartered Water and Environmental Manager
CAMS	Catchment Abstraction Management Strategy
CCI	Community Conservation Index
CCT	Correlated Colour Temperature
CDM	Construction Design and Management
CDW	Construction and Demolition Waste
CEA	Cumulative Effects Assessment
CEcol	Chartered Ecologist
CEMP	Construction Environmental Management Plan
CEnv	Chartered Environmentalist
CEP	Circular Economy Package
CERC	Cambridge Environmental Research Consultants
CGeol	Chartered Geologist
Ch(#)	Chainage
CH <sub>4</sub>	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
ClfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CIWM	Chartered Institution of Wastes Management
CL:AIRE	Contaminated Land: Applications in Real Environments
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
COMAH	Control of Major Accident Hazards Regulations 2015
ComMA	Combined Modelling and Appraisal
COPD	Chronic obstructive pulmonary disease
COSHH	Control of Substances Hazardous to Health Regulations
COVID	Coronavirus (COVID-19)
CPRE	Campaign to Protect Rural England
CRTN	Calculation of Road Traffic Noise
cSAC	Candidate Special Area of Conservation
CSi	Chartered Scientist
CSM	Common Standards Monitoring
CSM	Conceptual site models
CSZ	Core Sustenance Zone
CTMP	Construction Traffic Management Plan
Cu	Copper
CWS	County Wildlife Sites
dB	Decibel
dB(A)	Decibel A-weighted
DCO	Development Consent Order

Abbreviation	In full
DDA	Disability Discrimination Act
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DF1	Design fix 1
DF2	Design fix 2
DF3	Design fix 3
DfT	Department for Transport
dia	Diameter
DM	Do-Minimum (scenario)
DMRB	Design Manual for Roads and Bridges
DS	Do-Something (scenario)
DSM	Digital Surface Model
EA	Environment Agency
EAR	Environmental Assessment Report
EAST	Early Assessment and Sifting Tool
EC	European Commission
ECC	Exeter City Council
ECoW	Ecological Clerk of Works
eDNA	Environmental DNA
EDDC	East Devon District Council
EEA	European Economic Area
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EOC	Environmental oversee consultant
EPS	European Protected Species
EQS	Environmental Quality Standards
ES	Environmental Statement
ESCR	Earth Science Conservation Review
EU	European Union
EV	Electric vehicle
EWC	European Waste Catalogue
EWDF	Environment and Wellbeing Designated Funds
FCD	Field Capacity Days
FCD	Filter Carrier Drain
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
FRMP	Flood Risk Management Plan
FSC	Forest Stewardship Council
GCB	Ground Clay Brick
GCN	Great Crested Newt
GCR	Geological Conservation Review
GHG	Greenhouse Gas

<b>Abbreviation</b>	<b>In full</b>
GIS	Geographical Information Systems
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GN	Guidance Note
GPA	Good Practice Advice
GPP	Guidance for Pollution Prevention
GQRA	Generic Quantitative Risk Assessment
GWD	Groundwater Directive (2006/118/EC)
GWDTE	Groundwater Dependent Terrestrial Ecosystem
GWR	Great Western Railway
h:v	Horizontal:vertical ratio
ha	Hectares
HAA	Heavy anti-aircraft
HCA	Homes and Communities Agency
HDA	Health Development Agency
HDV	Heavy Duty Vehicle
HE	Highways England
HER	Historic Environment Records
HEWRAT	Highways England Water Risk Assessment Tool
HFC	Hydrofluorocarbon
HLCA	Historic Landscape Character Areas
HMC	Habitat Modification Class
HMRC	HM Revenue and Customs
HMSO	Her Majesty's Stationery Office
Hons	Honors
HQA	Habitat Quality Assessment
HRA	Habitats Regulations Assessment
HS2	High Speed Rail 2
HSI	Habitat suitability index
IAQM	Institute of Air Quality Management
ICCI	In-Combination Climate Change Impact
ID	Identification
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
ILP	Institution of Lighting Professionals
IMD	Index of Multiple Deprivation
INNS	Invasive Non-Native Species
IPCC	Intergovernmental Panel on Climate Change
IROPI	Imperative Reasons of Overriding Public Interest
ITS	Intelligent Transportation System
Jct	Junction
JNCC	Joint Nature Conservation Committee
km	Kilometre
KSI	Killed or seriously injured

<b>Abbreviation</b>	<b>In full</b>
ktCO <sub>2</sub> e	Kilo-tonnes of carbon dioxide equivalents
LAA	Local Aggregate Assessment
LAA	Light anti-aircraft
L <sub>A10,18h</sub>	The arithmetic mean noise level in dB(A) exceeded for 10% of each hour over the period 06:00 - 24:00 hours
L <sub>Aeq,t</sub>	Equivalent continuous A-weighted sound pressure level in dB determined over time period T (time)
L <sub>Aeq,8h</sub>	An averaged 8-hr equivalent continuous A-weighted sound pressure level, measured in dB(A)
L <sub>Aeq,16h</sub>	Equivalent continuous sound level in dB(A) that, over the period 07:00-23:00 hours
L <sub>night</sub>	noise level at dwellings between the hours of 23:00 and 07:00.
LAQM	Local Air Quality Management
LCA	Landscape Character Area
LCRM	Land Contamination: Risk Management (guidance)
LED	Light-emitting diode
LEMP	Landscape and Ecology Management Plan
LGS	Locally Important Geological and Geomorphological Sites
LI	Landscape Institute
LIFE	Lotic-invertebrate Index for Flow Evaluation
LLCA	Local landscape character area
LLFA	Lead Local Flood Authority
LLP	Limited Liability Partnership
LNCS	Local Nature Conservation Sites
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Levels
LOD	Limit of Detection
LoD	Limit of Deviation
LRV	Local Road Verges
LSOA	Lower Super Output Areas
LULUCF	Land use, land-use change, and forestry
LV	Limit Value
LVIA	Landscape and Visual Assessment
LWS	Local Wildlife Site
m	Metre
M	Million
m <sup>2</sup>	Square metre
m <sup>3</sup>	Cubic metre
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside
MCIEEM	Member of the Chartered institute of Ecology and Environmental Management
MCifA	Member of the Chartered Institute for Archaeologists
MCIWM	Member of the Chartered Institution of Wastes Management

Abbreviation	In full
MCZ	Marine Conservation Zone
MDDC	Mid Devon District Council
Met Office	Meteorological Office
MIAQM	Member of the Institute of Air Quality Management
MIEnvSc	Member of the Institute of Environmental Sciences
MIOA	Member of the Institute of Acoustics
MMP	Materials Management Plan
mAOD	Metres Above Ordnance Datum
MPA	Marine Protected Area
MPA	Mineral Planning Authority
MRSB	Member of the Royal Society of Biology
MRSS	Maintenance and Repair Strategy Statement
MSA	Mineral Safeguarding Area
MtCO <sub>2</sub> e	Million tonnes of carbon dioxide equivalent
N	Nitrogen
N	North
N/A	Not available / Not applicable
N <sub>2</sub> O	Nitrous Oxide
NAQS	National Air Quality Strategy
NCA	National Character Area
NCN	National Cycle Network
NE	Natural England
NERC	Natural Environment and Rural Communities Act 2006
NEWP	Natural Environment White Paper
NFS	North facing slips
NFU	National Farmers Union
NGR	National Grid Reference
NHLE	National Heritage List for England
NIA	Noise Important Areas
NICE	National Institute for Health and Care Excellence
NIR	Noise Insulation Regulations
NNNPS	National Networks National Policy Statement
NNR	National Nature Reserve
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
NPPF	National Planning Policy Framework (2019)
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NPSNN	National Policy Statement for National Networks
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptor
NT	National Trust
NTAXA	Number of Scoring Taxa

Abbreviation	In full
NTS	Non-Technical Summary
NVC	National Vegetation Classification (Survey)
NVMP	Noise and Vibration Management Plan
OBS	Observed Breeding Sites
OPRA	Other Route with Public Access
OME	Order of Magnitude Estimate
ONS	Office for National Statistics
OS	Ordnance Survey
PAS	Publicly Available Specification
PCAG	Parish council area group
PCF	Project Control Framework
PCL	Potential contaminant linkage
PCM	Pollution Climate Mapping Model
PEA	Preliminary Ecological Appraisal
PEFC	Programme for The Endorsement of Forest Certification
PEI Report	Preliminary Environmental Information Report
PEIR	Preliminary Environmental Information Report
PFC	Perfluorocarbon
PFS	Petrol filling station
PGDip	Postgraduate diploma
PIA	Personal Injury Accident
PIEMA	Practitioner Member of the Institute of Environmental Management and Assessment
PINS	Planning Inspectorate
PM	Particulate Matter
PM	<i>Post meridiem</i> (after noon)
PM <sub>10</sub>	Particulate Matter 10 micrometres or less in diameter
PM <sub>2.5</sub>	Particulate Matter 2.5 micrometres of less in diameter
PNS	Potential Nest Site
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PPG	Pollution Prevention Guidelines
PPS	Planning Policy Statement
PPV	Peak Particle Velocity
PRA	Preferred route announcement
PRA	Preliminary Risk Assessment
PRoW	Public Rights of Way
pSAC	Possible Special Areas of Conservation
PSI	Proportion of Sediment-sensitive Invertebrates
pSPA	Potential Special Protection Area
PSSR	Preliminary Sources Study Report
RAMSAR	Site listed under the RAMSAR Convention
RBMP	River Basin Management Plan

<b>Abbreviation</b>	<b>In full</b>
RCP	Representative Concentration Pathway
RCP8.5	Representative Concentration Pathways 8.5
RCS	River Corridor Survey
REAC	Register of Environmental Actions and Commitments
RHS	River Habitat Survey
RIGS	Regionally Important Geological and Geomorphological Sites
RIS	Road Investment Strategy
RMA	Reserved Matters Application
RNAS	Royal Naval Air Service / Station
RoFSW	Risk of Flooding from Surface Water
RP	Road Period
RSPB	Royal Society for the Protection of Birds
RTPI	Royal Town Planning Institute
SAC	Special Area of Conservation
SAR	Standard admission ratio
SCC	Somerset County Council
SCI	Sites of Community Importance
SEB	Statutory Environmental Bodies
SERC	Somerset Environmental Records Centre
SES	Safety Engineering and Standards
SF <sub>6</sub>	Sulphur hexafluoride
SFRA	Strategic Flood Risk Assessment
SI	Site investigation
SINC	Site of Importance for Nature Conservation
SLNIC	Site of Local Nature Conservation Importance
SMR	Standard mortality ratio
SNRHW	Stable Non-Reactive Hazardous Wastes
SOAEL	Significant Observed Adverse Effect Levels
SoCC	Statement of Community Consultation
SoS	Secretary of State
SPA	Special Protection Area
SPI	Species of Principal Importance
SPZ	Source Protection Zone
SRMP	Soil Resource and Management Plan
SRN	Strategic Road Network
SSDC	South Somerset District Council
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWAWP	South West Aggregates Working Party
SWMP	Site Waste Management Plan
SWT	Somerset Wildlife Trust
SWTC	Somerset West and Taunton Council
TAG	Transport Analysis Guidance

Abbreviation	In full
TBC	To be confirmed
tCO <sub>2</sub> e	Tonnes of carbon dioxide equivalent
TG	Technical guidance
TGN	Technical Guidance Note
TL	Taxa to species level
TMP	Traffic Management Plan
TRA	Traffic Reliability Area
TRL	Transport Research Laboratory
TRS	Temporary Rest Site
TRS	Temporary Roost Site
TSCS	Thin surface course system
TWAO	Transport and Works Act Order
TWG	Technical Working Group
UK	United Kingdom
UKCP09	United Kingdom Climate Projections 2009
UKCP18	United Kingdom Climate Projections 2018
UNESCO	United Nations Educational, Scientific and Cultural Organization
UXO	Unexploded Ordnance
VDV	Vibration Dose Value
VMS	Variable Message Sign
WCA	Wildlife and Countryside Act 1981 (as amended)
WCH	Walkers Cyclists and Horse Riders
WFD	Water Framework Directive (2000/60/EC)
WHPT	Walley Hawkes Paisley Trigg
WHO	World Health Organization
WHS	World Heritage Site
WRAP	Waste and Resources Action Programme
WSI	Written Scheme of Investigation
yr	Year
Zn	Zinc
Zol	Zone of Influence
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Chapter 18  
Glossary

HE551508-ARP-EGN-ZZ-RP-LE-000023

09/09/21

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## 18 Glossary

Table 18-1 Glossary table

Glossary term	Description
Abnormal load routes	Over the years a network of routes for heavy and high loads has been maintained by the Government department responsible for the trunk road network. Highways England currently maintains a system called ESDAL (Electronic Service Delivery for Abnormal Loads) for management of heavy and high loads in England.
Above ordnance datum (AOD)	Above ordnance datum (AOD) is a vertical measurement used by ordnance survey as the basis for deriving altitudes on maps, usually by comparison with the mean sea level.
Accurate Visual Representations (AVR)	A static or moving image which shows the location of a proposed development as accurately as possible; it may also illustrate the degree to which the development will be visible, its detailed form or the proposed use of materials. AVRs are produced by accurately combining images of the proposed building with a representation of its context.
Adverse (environmental) effect	A detrimental or negative effect to an environmental resource or receptor.
Affected Road Network (ARN)	Defined in Design Manual for Roads and Bridges (DMRB) LA 105 – <i>Air Quality</i> [1] as those roads within the traffic reliability area which in the proposed scheme opening year meet specific criteria set out in the DMRB LA 105.
Air Quality Management Area (AQMA)	An Air Quality Management Area (AQMA) is declared for an area where the local air quality is unlikely to meet the Government's national air quality objectives.
Air Quality Plan	Documents setting out the UK's plan for reducing roadside nitrogen dioxide (NO <sub>2</sub> ) concentrations.
Ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near (LA <sub>Feq,T</sub> ).
Amenity	A pleasant or advantageous aspect of the environment.
Annual average daily traffic (AADT)	Annual average daily traffic (AADT) is the total volume of vehicle traffic on a highway or road for a year divided by 365 days.
Aquifer	An aquifer is an underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (gravel, sand, or silt).
Area of Outstanding Natural Beauty (AONB)	An Area of Outstanding Natural Beauty (AONB) is land protected by the Countryside and Rights of Way Act 2000 [2] (CROW Act). It protects the land designated to conserve and enhance its natural beauty.
Artificial ground	Artificial ground is a term used by the BGS for those areas where the ground surface has been significantly modified by human activity and includes areas of made ground, worked ground, landscaped and infilled ground.
Baseline	A description of the current state of the environment without implementation of the project.
Beneficial (environmental) effect	An advantageous or positive effect to an environmental resource or receptor.
Biodiversity	The diversity, or variety of plants and animals and other living things in a particular area of region. It encompasses landscape diversity, ecosystem diversity, species diversity and genetic diversity.
Biodiversity action plan (BAP)	A biodiversity action plan (BAP) is an internationally recognised program addressing threatened species and habitats and is designed to protect and

Glossary term	Description
	restore biological systems. BAPs can be implemented at the local, regional and national scales.
Biodiversity net gain (BNG) / loss	Biodiversity net gain is an approach to development that leaves biodiversity in a better state than before. A negative BNG score shows a net loss of biodiversity (i.e. development that leaves biodiversity in a worse state than before).
Bund	A barrier, dam or earth mound used to contain or exclude water (or other liquids), or to provide noise attenuation. Can either refer to a bund made from earthworks material, sand, etc. or a metal/concrete structure surrounding, for example, a fuel tank.
Carbon	Carbon is used as short hand to refer to the basket of six greenhouse gases (GHGs) recognised under the Kyoto Protocol. GHGs are converted to carbon dioxide equivalents (CO <sub>2</sub> e) based on their global warming potential per unit as compared to one unit of carbon dioxide (CO <sub>2</sub> ).
Carbon dioxide (CO <sub>2</sub> )	Carbon dioxide (CO <sub>2</sub> ) is a naturally occurring gas comprising 0.04% of the atmosphere. The burning of fossil fuels releases carbon dioxide fixed by plants many millions of years ago, and this has increased its concentration in the atmosphere by some 12% over the past century. It contributes about 60 per cent of the potential global warming effect of manmade emissions of greenhouse gases.
Chainage (Ch)	The term 'chainage' is used in surveying to refer to a distance measured in metres along a line, such as the centre line of a road.
Circular Economy	A circular economy is an economic model designed to minimise resource input, as well as waste and emission production. Circular economy aims to reach the maximum efficiency in the use of finite resources, the gradual transition to renewable resources, and recovery of the materials and products at the end of their useful life.
Climate	The composite or generally prevailing weather conditions of a region, as temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the year, averaged over a series of years.
Climate change	A change in global or regional climate patterns.
Climate change adaptation	Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change.
Climate change allowance	Climate change allowances are predictions of anticipated change for: <ul style="list-style-type: none"> <li>• peak river flow</li> <li>• peak rainfall intensity</li> <li>• sea level rise</li> <li>• offshore wind speed and extreme wave height</li> </ul> The Environment Agency has provided guidance [3] on how to incorporate climate change allowances into flood risk assessments.
Climate change resilience	Climate resilience is the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate change.
Conservation	Conservation is the care and protection of resources (in this case natural resources; e.g. flora or fauna) so that they can persist for future generations.
Consultation Report	The Consultation Report is a report giving details of the consultation activity carried out by the A358 at the Pre-Application stage, in particular: <ul style="list-style-type: none"> <li>• what has been done to comply with the Planning Act 2008, including, s42 (consultation with prescribed consultees), s47 (consultation with the community), and s48 (publicity)</li> <li>• details of any relevant responses</li> </ul>

Glossary term	Description
	<ul style="list-style-type: none"> <li>the account taken of any relevant responses during the preparation of the application</li> </ul>
Controlled waters	<p>These are fully defined in section 104 of the Water Resources Act 1991 [4]. Controlled waters include, in summary:</p> <ul style="list-style-type: none"> <li>relevant territorial waters which extend seaward for three miles from the low-tide limit from which the territorial sea adjacent to England and Wales is measured</li> <li>coastal waters from the low-tide limit to the high-tide limit or fresh-water limit of a river or watercourse</li> <li>inland freshwaters: <ul style="list-style-type: none"> <li>natural and artificial lakes, ponds, reservoirs, rivers or watercourses above the fresh-water limit</li> <li>natural and artificial underground rivers and watercourses</li> <li>surface water sewers, ditches and soakaways that discharge to surface or groundwater</li> <li>it also includes those that may be currently dry</li> </ul> </li> <li>groundwaters – any waters contained in underground strata.</li> </ul>
Cultural heritage resource	<p>A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions because of its heritage interest. [5]</p>
Cumulative effects	<p>Impacts that result from incremental changes caused by other present or reasonably foreseeable actions together with the project.</p> <p>NOTE: For the purpose of this guidance, a cumulative impact can arise as the result of the:</p> <ul style="list-style-type: none"> <li>combined impact of a number of different environmental factors-specific impacts from a single project on a single receptor/resource</li> <li>combined impact of a number of different projects within the vicinity (in combination with the environmental impact assessment project) on a single receptor/resource</li> </ul>
Decibel (dB)	<p>A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds <math>s_1</math> and <math>s_2</math> is given by <math>20 \log_{10} (s_1 / s_2)</math>. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is <math>20\mu\text{Pa}</math>.</p>
Definitive Map (PC)	<p>A definitive map is a map prepared by a surveying authority which is a legal record of the public's rights of way in one of four categories (footpath, bridleway, restricted byway or byway open to all traffic). If a way is shown on the map, then that is legal, or conclusive, evidence that the public had those rights along the way at the relevant date of the map (and has them still, unless there has been a legally authorised change). But the reverse is not true. So the showing of a way as a footpath does not prove that there are not, for example, additional unrecorded rights for horse-riders to use the way. Nor is the fact that a way is omitted from the definitive map proof that the public has no rights over it [6].</p>
Department for Environment and Rural Affairs (Defra)	<p>UK government department responsible for safeguarding the natural environment, supporting the food and farming industry, and sustaining a thriving rural economy.</p>
Design fix 1 (DF1)	<p>The initial design fix that forms the basis of the initial red line boundary and issued to prepare the Environmental Scoping Report. Other works such as land referencing and cost estimates also commence following DF1.</p>
Design fix 2 (DF2)	<p>The design freeze to form the red line boundary, preliminary design, and the PEI Report that will be used for the statutory consultation.</p>

Glossary term	Description
Design fix 3 (DF3)	The design freeze that incorporates changes from the public consultation. It will allow the final red line boundary to be drawn and form the basis of DCO application and the ES.
Design Manual for Roads and Bridges (DMRB)	The Design Manual for Roads and Bridges (DMRB) [7] contains information about current standards relating to the design, assessment and operation of motorway and all-purpose trunk roads in the UK.
Design speed	The design speed is a criterion used to determine geometric features of a new road design based on the anticipated vehicle speeds on the road.
Designated Environmentally Sensitive Sites	The Environmentally Sensitive Areas were introduced in 1987 to offer incentives to encourage farmers to adopt agricultural practices which would safeguard and enhance parts of the country of particularly high landscape, wildlife or historic value. The proposed scheme has now closed to new applicants. Defra introduced a new Environmental Stewardship Scheme on 3 March 2005 which supersedes (with enhancements) the Environmentally Sensitive Areas and Countryside Stewardship Schemes. There are 22 ESAs in England, covering some 10% of agricultural land [8].
Designated heritage resource	World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Parks and Gardens, Registered Battlefield or Conservation Area designed under relevant legislation. [9]
Designer	The organisation commissioned to undertake the various stages of proposed scheme preparation and supervision of construction. This includes specialist subconsultants brought in to advise on specific areas of assessment and mitigation.
Detailed assessment	Method applied to gain an in-depth appreciation of the beneficial and adverse consequences of the project and to inform project decisions. Detailed Assessments are likely to require detailed field surveys and/or quantified modelling techniques.
Development Consent Order (DCO)	A Development Consent Order (DCO) is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects. This includes energy, transport, water and waste projects.
Do-Minimum (DM)	<p>The 'Do-Minimum' forecast scenario in the Opening/Design Year is the base road and traffic network against which alternative improvements can be assessed. In many cases, the definition of the 'Do-Minimum' is straight forward; it is simply the 'Do-Nothing' scenario. However, one or more of the following four cases may arise, in which the 'Do-Minimum' differs from the 'Do-Nothing':</p> <ul style="list-style-type: none"> <li>• The case where works will be carried out regardless of whether or not the 'Do-Something' proposed scheme is built.</li> <li>• The case where the existing network may be improved to form a 'Do-Minimum' proposed scheme which can be tested as an alternative to carrying out major Do-Something improvements.</li> <li>• The case where traffic conditions can be improved without significant capital expenditure.</li> <li>• The case where the area covered by the modelled network includes road proposals other than the one under immediate consideration.</li> </ul>
Do-Nothing (DN)	The 'Do-Nothing' forecasting scenario is simply the existing network without modification in the Opening/Design Year.
Do-Something (DS)	The 'Do-Something' forecast scenario is the road proposal under consideration in the Opening/Design Year.
Drainage basin	A drainage basin is any area of land where precipitation collects and drains off into a common outlet, such as into a river, bay, or other body of water. The drainage basin includes all the surface water from rain runoff, snowmelt, hail, sleet and nearby streams that run downslope towards the shared outlet, as well as the groundwater underneath the earth's surface.

Glossary term	Description
Ecological resources	The term ecological resources means all flora and fauna and the habitats that support them, excluding such biota as pets, livestock, and agricultural and horticultural crops.
Effect	Term used to express the result/consequence of an impact (expressed as the 'significance of effect').
Effluent discharge	Effluent discharge is liquid waste, other than waste from kitchens or toilets, surface water or domestic sewage.
EIA	See ' <i>Environmental Impact Assessment (EIA)</i> '.
EIA Quality Mark	The EIA Quality Mark is a stamp of quality awarded by IEMA to successful registrants. It is based around a set of commitments, which registrants agree to comply with. The Institute of Environmental Management and Assessment (IEMA) operates the EIA Quality Mark and undertakes an independent review of an organisation's compliance with its EIA commitments both during the application process and once registered through an annual review process.
EIA Regulations	The <i>Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017</i> (SI 2017/572) [10], which requires an Environmental Statement (ES) to be submitted with the DCO application that presents an assessment of the likely significant environmental impacts arising from the proposed scheme.
EIA Scoping	The process of considering the information required for reaching a (reasoned) conclusion on the likely significant effects of a project on the environment.
EIA Scoping Opinion	A written opinion of the relevant consenting authority, following a request from the applicant, as to the information to be provided in the Environmental Statement.
Embedded mitigation	Design measures which are integrated into a project for the purpose of minimising and/or preventing adverse environmental effects.
Emission	A material that is expelled or released to the environment. Usually applied to gaseous or odorous discharges to the atmosphere.
Enhancement	A measure that is over and above what is required to mitigate the adverse effects of a project.
Environment Agency	The Environment Agency is responsible for environmental protection and regulation in England and plays a central role in implementing the government's environmental strategy. The Environment Agency is the main body responsible for managing the regulation of major industry and waste, treatment of contaminated land, water quality and resources, fisheries, inland river, estuary and harbour navigations, and conservation and ecology. They are also responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.
Environment Agency Recorded Pollution Incidents	A record of pollution incidents to water, land and air held by the Environment Agency.
Environmental Impact Assessment (EIA)	DMRB LA101 – Introduction to environmental assessment [11] defines EIA as: <i>“Statutory process consisting of:</i> 1) <i>preparation of an Environmental Statement;</i> 2) <i>consultation;</i> 3) <i>examination by the competent authority of the information contained within the Environmental Statement;</i> 4) <i>the reasoned (justified or evidenced) conclusion by the competent authority on the significant effects of the project on the environment; and</i> 5) <i>the reasoned (justified or evidenced) decision by the competent authority to grant or refuse development consent”</i>

Glossary term	Description
Environmental Management Plan (EMP)	An Environmental Management Plan (EMP) provides the framework for recording environmental risks, commitments and other environmental constraints and clearly identifies the structures and processes that will be used to manage and control these aspects. The EMP also seeks to ensure compliance with relevant environmental legislation, government policy objectives and scheme specific environmental objectives. It also provides the mechanism for monitoring, reviewing and auditing environmental performance and compliance.
Environmental Masterplan	An EMP at outline stage which will later be refined and expanded into a full EMP as more information becomes available and there is more certainty in terms of the proposed layout, construction methods, programme and the likely environmental effects.
Environmental Statement (ES)	A statutory report produced by the developer including: <ol style="list-style-type: none"> <li>1) a description of the project</li> <li>2) a description of the likely significant effects of the project on the environment</li> <li>3) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment</li> <li>4) a description of the reasonable alternatives</li> <li>5) a non-technical summary</li> <li>6) any additional information relevant to the characteristics of a project</li> </ol>
Essential mitigation	Mitigation critical for the delivery of a project which can be acquired through statutory powers.
European [designated] site (or Natura 2000 site)	The term 'European site' is being used in the UK to refer to what were previously known as 'Natura' sites. This recognises that Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) protect species and habitats shared across Europe and were originally designated under European legislation. In the UK, Ramsar sites are also included in this designation.
Fisheries	A place where fish are reared for commercial purposes.
Flood Risk Assessment (FRA)	An assessment of the likelihood of flooding in a particular area so that development needs and mitigation measures can be carefully considered.
Flood Zone	Flood Zone definitions are set out in the national Planning Policy Guidance (PPG): <ul style="list-style-type: none"> <li>• Flood Zone 1 – land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (&lt;0.1%).</li> <li>• Flood Zone 2 – land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.</li> <li>• Flood Zone 3 – land assessed as having a 1 in 100 or greater annual probability of river flooding (&gt;1%), or a 1 in 200 or greater annual probability of flooding from the sea (&gt;0.5%) in any year.</li> </ul>
Floodplain	An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.
Future baseline scenario	An outline of the likely evolution of the current state of the environment without implementation of the project.
Geopark	A geopark is a unified area that advances the protection and use of geological heritage in a sustainable way and promotes the economic well-being of the people who live there. There are global geoparks and national geoparks.
Grade I Listed Building	A listed building that is of exceptional interest.

Glossary term	Description
Grade II Listed Building	A listed building that is of special interest.
Grade II* Listed Building	A listed building that is of particular importance and of more than special interest.
Greenhouse gas (GHG)	A gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon dioxide (CO <sub>2</sub> ) and chlorofluorocarbons are examples of greenhouse gases (GHG).
Ground borne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground.
Groundwater	Groundwater is the water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations.
Groundwater dependent terrestrial ecosystems (GWDTE)	Groundwater dependent terrestrial ecosystems (GWDTE) are wetlands such as springs, flushes and fens which are fed by groundwater rather than rainfall or surface runoff. They are particularly sensitive to hydrological and ecological changes caused by development.
H++	High-end climate change scenarios which are typically extreme climate change scenarios on the margins or outside of the 10th to 90th percentile range presented in the 2009 UK climate change projections (UKCP09). For example, an estimate of sea level rise and river flood flow change beyond the likely range but within physical plausibility.
Hard standing	Ground improvement by the use of compacted stone or other materials which facilitates increased surface loading from vehicles or other plant.
Hazardous waste	Waste which displays one or more of the hazardous properties listed in Annex III of the Waste Framework Directive.
Heavy Duty Vehicles (HDV)	As HGVs with the inclusion of buses and coaches.
Heavy Goods Vehicles (HGV)	Vehicles over 3.5 tonnes and includes rigid and articulate lorries.
Heritage Asset	A building, area or scene which makes a positive contribution of special architectural, historic or environmental interest.
Historic England	The public body that looks after England's historic environment. Championing historic places and helping people understand their value and care for them.
Hydromorphology	Hydromorphology considers the physical character and water content of water bodies. Good hydromorphological conditions support aquatic ecosystems (i.e. hydromorphological elements such as water flow and substrate provide physical habitat for biota such as fish, invertebrates and aquatic macrophytes).
Impact	The change or action. Either beneficial or adverse.
Institute of Environmental Management and Assessment (IEMA)	The Institute of Environmental Management and Assessment (IEMA) is the professional body for everyone working, studying or interested in environment and sustainability. They provide resources, tools, knowledge and research sharing to meet the real world needs of our members.
In-situ	In the natural, original or appropriate position.
Inert materials	Inert material is material which is neither chemically or biologically reactive and will not decompose. Examples of this are sand, drywall, and concrete. This has particular relevance to landfills as inert materials typically require lower disposal fees than biodegradable waste or hazardous waste.
Internal Drainage Board (IDB)	Each internal drainage board (IDB) is a public body that manage water levels in an area, known as an internal drainage district, where there is a special need for drainage. IDBs undertake works to reduce flood risk to people and property, and manage water levels for agricultural and environmental needs within their district.

Glossary term	Description
Lead Local Flood Authority (LLFA)	Lead Local Flood Authorities (LLFA) are county councils and unitary authorities. They lead in managing local flood risks (i.e. risks of flooding from surface water, ground water and ordinary (smaller) watercourses).
Limits of deviation (LOD)	Limits of Deviation (LOD) are the limits within which the draft DCO will authorise the A358 to be constructed.
Listed building	A building which is considered by the Secretary of State (for Culture, Media and Sport) to be of special architectural or historic interest in accordance with the regime set out in The Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990 [12].
Local authorities	An administrative body in local government. The proposed scheme is situated within three authority boundaries: Somerset County Council (SCC); South Somerset District Council (SSDC); and Somerset West and Taunton Council (SWTC).
Local Authority Pollution Prevention Controls	<p>Local authorities who regulate businesses are usually district or borough councils. If an area has only one council (a unitary council) then that's the regulator. The Port Health Authority may be the regulator in port areas.</p> <p>This guidance helps local authorities:</p> <ul style="list-style-type: none"> <li>• follow statutory guidance under regulation 64 of the Environmental Permitting (England and Wales) Regulations 2016 [13] (EPR)</li> <li>• understand the EPR's main functions, procedures and terminology [14]</li> </ul>
Local Development Framework	A local development framework is the spatial planning strategy introduced in England (and Wales) by the Planning and Compulsory Purchase Act 2004 [15] and given detail in Planning Policy Statements. Maintaining the framework is primarily the responsibility of local councils.
Locally Important Geological and Geomorphological Sites (LGS)	Locally Important Geological and Geomorphological Sites (LGS) exhibit important geological and geomorphological features and range from sarsen stones, rock outcrops to geological faces in active quarries.
Lowest Observed Adverse Effect Level (LOAEL)	This the level of noise above which adverse effects on health and quality of life can be detected.
Made ground	An area of land that has been man-made, generally through the reclamation of marshes, lakes, or shorelines. An artificial fill is used, consisting of materials, refuse, etc.
Main river	Main rivers are usually larger rivers and streams. The Environment Agency carries out maintenance, improvement or construction work on main rivers to manage flood risk.
Material resources	Material resources include primary raw materials, such as aggregates and minerals, and manufactured construction products which include recycled and secondary aggregates. Many material resources originate offsite, purchased as construction products, and some arise onsite such as excavated soils or recycled road planings.
Materials Management Plan (MMP)	A Materials Management Plan (MMP) is a mechanism by which those who are developing a site can comply with Environment Agency regulations for excavated ground materials.
Mitigation measure	Measure aiming at preventing/reducing an adverse environmental effect.
National Air Quality Strategy (NAQS)	<p>The Air Quality Strategy intends to provide a clear framework for improving air quality through:</p> <ul style="list-style-type: none"> <li>• a clear and simple policy framework</li> <li>• realistic but challenging objectives</li> <li>• regulation and financial incentives to help achieve the objectives</li> <li>• analysis of costs and benefits</li> </ul>

Glossary term	Description
	<ul style="list-style-type: none"> <li>• monitoring and research to increase our understanding</li> <li>• information to raise public awareness</li> </ul> <p>The Air Quality Strategy proposals aim to protect health and the environment without imposing unacceptable economic or social costs. They form an essential part of the Government's strategy for sustainable development, which has four main aims:</p> <ul style="list-style-type: none"> <li>• social progress which meets the needs of everyone</li> <li>• effective protection of the environment</li> <li>• prudent use of natural resources</li> <li>• maintenance of high and stable levels of economic growth and employment</li> </ul>
National Character Area (NCA)	A National Character Area (NCA) is a natural subdivision of England based on a combination of landscape, biodiversity, geodiversity and economic activity; defined by Natural England. There are 159 National Character Areas and they follow natural, rather than administrative, boundaries.
National Cycle Network (NCN)	The National Cycle Network (NCN) is a series of safe, traffic-free paths and quiet on-road cycling and walking routes that connect to every major town and city.
National Parks (NP)	Protected areas because of their beautiful countryside, wildlife and cultural heritage.
National Planning Policy Framework (NPPF)	The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England, replacing the previous system of topic-specific Planning Policy Guidance Notes (PPG) and Planning Policy Statements (PPS).
National Policy Statement for National Networks (NPSNN)	The <i>National Policy Statement for National Networks</i> (NPSNN) sets out the need for, and government's policies to deliver development of, NSIPs on the national road network in England and sets out the primary basis for making decisions of development consent for NSIPs in England.
National Policy Statements (NPS)	National Policy Statements (NPS) are of primary importance to the decision-making process when DCO applications are being examined. Section 104 of the Planning Act 2008 (as amended) [16] states that: <i>"(2) In deciding the application the Secretary of State must have regard to –</i> <i>(a) any national policy statement which has effect in relation to development of the description to which the application relates (a "relevant national policy statement") ...</i> <i>(3) The Secretary of State must decide the application in accordance with any relevant national policy statement, except to the extent that one or more of subsections (4) to (8) applies."</i>
National Pond Survey	This is a national scheme to develop a classification of ponds in Britain based on the composition of their plant and macroinvertebrate communities.
Nationally Significant Infrastructure Project (NSIP)	Any infrastructure project that is deemed, according to the criteria set in the Planning Act 2008 (as amended) to be nationally significant. Such projects are authorised through a statutory process that requires an application for a DCO, rather than a conventional planning application or the traditional model through the publication of Statutory Orders and the holding of Public Inquiries.
Natura site (or 'European site')	The term 'European site' is being used to refer to what were previously known as 'Natura' sites. This recognises that Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) protect species and habitats shared across Europe and were originally designated under European legislation.
Natural England	Natural England are responsible for: <ul style="list-style-type: none"> <li>• helping land managers and farmers protect wildlife and landscapes</li> <li>• advising on the protection of the marine environment in inshore waters (0 to 12 nautical miles)</li> <li>• improving public access to the coastline</li> </ul>

Glossary term	Description
	<ul style="list-style-type: none"> <li>• managing 140 National Nature Reserves and supporting National Trails</li> <li>• providing planning advice and wildlife licences through the planning system</li> <li>• managing programmes that help restore or recreate wildlife habitats</li> <li>• conserving and enhancing the landscape</li> <li>• providing evidence to help make decisions affecting the natural environment</li> </ul>
Nature Conservancy	The Nature Conservancy is the leading conservation organisation working around the world to protect ecologically important lands and waters for nature and people.
Nearside	Represents the left side of a road vehicle.
Noise Important Areas (NIA)	These areas provide a framework for the local management of the Noise Important Areas (NIA).
Non-hazardous waste	Waste that is not covered under Article 2 (c) of the Landfill Directive (1999/31/EC) [17], i.e. neither classed as hazardous nor as inert.
Non-statutory consultee	Non-statutory consultees are organisations and bodies (e.g. National Trust), identified in national planning policy, who should be consulted on relevant applications.
NOx	Oxides of Nitrogen – which encompasses all nitrogen species although mainly NO and NO <sub>2</sub> .
Offside	Represents the right side of a road vehicle.
Ordinary watercourse	An ordinary watercourse is a watercourse that is not part of a main river. It includes rivers, streams, land and roadside ditches, drains, cuts, culverts, dykes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991 [18]) and passages, through which water flows.
Outline Construction Environmental Management Plan (oCEMP)	A Construction Environmental Management Plan (CEMP) at outline stage which will later be refined and expanded into a full CEMP as more information becomes available and there is more certainty in terms of the proposed layout, construction methods, programme and the likely environmental effects.
Paris Agreement (Climate)	The Paris Agreement, Paris climate accord or Paris climate agreement, is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020.
Parish Council	A parish council is a civil local authority found in England and is the lowest tier of local government. They are elected corporate bodies, have variable tax raising powers, and are responsible for areas known as civil parishes, serving in total 16 million people.
PCF (Project Control Framework) Stages	<p>The PCF, as defined by Highways England, provides a defined lifecycle with a clear start and end point, broken into phases and stages structured around key milestones. PCF Stages comprise:</p> <ul style="list-style-type: none"> <li>• PCF Stage 0 – Strategy, shaping and prioritisation</li> <li>• PCF Stage 1 – Option identification</li> <li>• PCF Stage 2 – Option selection</li> <li>• PCF Stage 3 – Preliminary design</li> <li>• PCF Stage 4 – Statutory procedures and powers</li> <li>• PCF Stage 5 – Construction preparation</li> <li>• PCF Stage 6 – Construction, commissioning and handover</li> <li>• PCF Stage 7 – Closeout</li> </ul>

Glossary term	Description
Peat	A build-up of organic material in waterlogged areas, producing marshes, fens, mires, blanket and raised bogs. Accumulation is due to inhibited decay in anaerobic conditions.
Planning Inspectorate (PINS)	On 1 April 2012, under the Localism Act 2011 [19], the Planning Inspectorate (PINS) became the agency responsible for operating the planning process for nationally significant infrastructure projects (NSIP).
Planning Practice Guidance (PPG)	A web-based resource that came into force in 2014 and is periodically updated. It seeks to consolidate existing technical guidance into a consolidated online format and provides further detail on the policies contained within the NPPF.
PM <sub>10</sub>	Particulate matter with a diameter of 10 microns (μ) or less.
PM <sub>2.5</sub>	Particulate matter with a diameter of 2.5 microns (μ) or less.
Pollutant	A substance that pollutes something, especially water or the atmosphere.
Pollution pathway	The pollution pathway determines how pollution travels from the pollution source to a receptor.
Pollution Prevention Guidelines (PPG)	Practical advice and guidance for the prevention of pollution during construction and demolition projects. The guidance explains what is required by law and describes good practice measures to reduce the risks of a pollution incident. The guidance was withdrawn in 2015.
Potable water	Water that is safe to drink/consume.
Preliminary Environmental Information (PEI) Report	The PEI Report (this document) has been prepared in compliance with the EIA Regulations to enable the local community, any other interested person and stakeholders to understand the environmental effects of the proposed scheme and enable an informed response to the consultation. The document sets out how each environmental topic area is being assessed, the potential environmental effects of the proposed scheme based on the information available at the time, and measures proposed to avoid or reduce such effects. This is to support consultees in developing an informed view of the likely significant environmental effects of the proposed scheme, and allow them to provide additional information for inclusion in the EIA.
Proposed scheme	The proposed upgrade of the A358 to dual carriageway between Southfields Roundabout on the A303 and the M5 at Taunton (as described in PEI Report Chapter 2).
Protected species	Fauna and flora that is legally protected by environmental regulations. This covers (but is not limited to) disturbance, killing or displacement of individuals.
Public Rights of Way (PRoW)	A way over which the public have a right to pass and repass. The route may be used on foot, on (or leading) a horse, on a pedal cycle or with a motor vehicle, depending on its status. Although the land may be owned by a private individual, the public may still gain access across that land along a specific route.
Receptor (sensitive)	A component of the natural, created, or built environment such as human being, water, air, a building, or a plant that is affected by an impact.
Regionally Important Geological and Geomorphological Sites (RIGS)	Regionally important geological and geomorphological sites (RIGS) (also known as regionally important geological sites or, especially in Wales, regionally important geodiversity sites) are locally designated sites of local, national and regional importance for geodiversity (geology and geomorphology) in the UK.
Registered Park and Garden	The Historic England 'Register of Parks and Gardens of Special Historic Interest in England', established in 1983, currently identifies over 1,600 sites assessed to be of particular significance.
Residual effects	Those effects of the proposed scheme that cannot be mitigated following implementation of mitigation proposals.
Resource	A defined but generally collective environmental feature usually associated with soil, water, air, climatic factors, landscape, material assets, including the

Glossary term	Description
	architectural and archaeological heritage that has potential to be affected by a project.
River basin	A river basin is an area of land drained by a river and its tributaries.
Road Investment Strategy (RIS)	The Road Investment Strategy outlines a long-term programme for England's motorways and major roads supported by stable funding needed to plan ahead.
Roost	A place where birds regularly settle or congregate to rest at night, or where bats congregate to rest in the day.
Scheduled Monument	A scheduled monument is a historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Culture, Media and Sport under the regime set out in the Ancient Monuments and Archaeological Areas Act 1979 [20].
Scheme Assessment Report	The main aims of the assessment reporting process are to permit consideration of the likely environmental, economic and traffic effects of alternative proposals, and to allow the public and statutory bodies to comment on proposals taking account of their environmental, economic and traffic implications.
Scoped In/Out	A term used in EIA, referring to whether a technical topic is included ('scoped in') or not ('scoped out') in the EIA – often presented as a discrete chapter in the ES if scoped in.
Setting	The surroundings in which a cultural heritage resource is experienced. [5]
Significant Observed Adverse Effect Level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.
Simple Assessment	Initial, brief assessment activity based on the assembly of data and information that is readily available, to fulfil one of the following functions: <ul style="list-style-type: none"> <li>• to address unknown aspects in the Scoping assessment level</li> <li>• to reach an understanding of the likely environmental effects to inform the final design and assessment</li> <li>• to reach an understanding of the likely environmental effects that identifies the need for a Detailed Assessment</li> </ul>
Site of Importance for Nature Conservation (SINC)	Sites of Importance for Nature Conservation (SINC) are designations used by local authorities in the United Kingdom for sites of substantive local nature conservation and geological value. The Department for Environment, Food and Rural Affairs has recommended the generic term 'local site', which is divided into 'local wildlife site' and 'local geological site'.
Site of Special Scientific Interest (SSSI)	A Site of Special Scientific Interest (SSSI) is a conservation designation denoting a protected area in the UK, designated due to special interest in its flora, fauna, geological or physiographical features. They are protected by law to conserve their wildlife or geology.
Site Waste Management Plan (SWMP)	Site Waste Management Plans (SWMP) encourage the effective management of materials and ensure waste is considered at all stages of a project – from design through to completion. Although no longer a regulatory requirement in England, SWMPs are still considered to be good practice.
Source protection zone (SPZ)	Source Protection Zones (SPZ) are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.
Special Area of Conservation (SAC)	A Special Area of Conservation (SAC) is a site designated under the Habitats Directive. These sites, together with Special Protection Areas (or SPA), are called Natura sites (or European sites) and they are internationally important for threatened habitats and species.

Glossary term	Description
Special Protection Area (SPA)	A special protection area is a designation under the European Union (EU) Directive on the Conservation of Wild Birds [21]. Under the Directive, Member States of the EU have a duty to safeguard the habitats of migratory birds and certain particularly threatened birds. These sites, together with Special Area of Conservation (SAC), are called Natura sites (or European sites) and they are internationally important for threatened habitats and species.
Specific noise level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ( $LA_{eq,T}$ ).
Stakeholder	A person or organisation with an interest or concern in something (in this case, the proposed scheme).
Statement of Common Ground (SoCG)	A written statement prepared jointly by the applicant and another party or parties, setting out any matters on which they agree. In some cases, statements of common ground will also identify areas where agreement has not been reached.
Statutory consultees	Groups or bodies that, by law, must be consulted as part of the DCO application process for EIA development.
Statutory environmental bodies (SEB)	Statutory environmental bodies (SEB) comprise the Environment Agency, Natural England and Historic England.
Strategic road network (SRN)	The strategic road network (SRN) is arguably the biggest and most important piece of infrastructure in the country. Its 4,300 miles of motorways and major A-roads at the core of the national transport system.
Study area	Defined area surrounding the site in which is collected and analysed in order to set the site into its context. This varies as stated within each technical assessment.
Surface water	Water that collects on the surface of the ground.
Topography	The natural and man-made features of an area collectively.
Transboundary effects	Regulation 32 of the EIA Regulations outlines a requirement to consider the likely significant effects of a proposed development on the environment of another European Economic Area (EEA) State.
Tributary	A river or stream flowing into a larger river or lake.
UK Climate Projections (UKCP)	The UK Climate Projections (UKCP) [22] provides future climate projections for land and marine regions as well as observed (past) climate data for the UK.
Unexploded ordnance (UXO)	Unexploded ordnance (UXO), unexploded bombs, or explosive remnants of war are explosive weapons that did not explode when they were employed and still pose a risk of detonation, sometimes many decades after they were used or discarded.
Vibration	The periodic movements of structures transferred by ground and parts of the building, due to events such as train pass-by, piling, blasting or use of heavy machinery.
Waste	Waste is defined in Article 3(1) of the European Waste Framework Directive 2008/98/EC (OJL 312/3) [23] as any substance or object which the holder discards or intends or is required to discard. The term 'holder' is defined under article 3(6) as 'the waste producer or the natural or legal person who is in possession of the waste'. The waste 'producer' is defined under article 3(5) as 'anyone whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of the waste'. Waste can be further classified as hazardous, non-hazardous or inert.
Waste facility	A facility where the main purpose of the facility is the treatment or disposal of waste.

Glossary term	Description
Waste hierarchy	The 'waste hierarchy' ranks waste management options according to what is best for the environment. It gives top priority to preventing waste in the first place. When waste is created, it gives priority to preparing it for re-use, then recycling, then recovery, and last of all disposal (e.g. landfill).
Waste infrastructure	The structures, systems and facilities for waste management within an area.
Waste Plan	The Somerset Waste Plan (adopted 2013) [24] provides further information in support of the implementation of waste planning policy.
Water Framework Directive (WFD)	The Water Framework Directive 2000/60/EC [25] is an EU directive which commits European Union member states to achieve good qualitative and quantitative status of all water bodies by 2015. It is a framework in the sense that it prescribes steps to reach the common goal rather than adopting the more traditional limit value approach.
Water quality	Water quality refers to the chemical, physical, and biological characteristics of water based on the standards of its usage.
WFD status	The WFD classification scheme for water quality includes five status classes: high, good, moderate, poor and bad. 'High status' is defined as the biological, chemical and morphological conditions associated with no, or very low, human pressure.
World Health Organisation (WHO)	The World Health Organization (WHO) is a specialised agency of the United Nations that is concerned with international public health.
Worst-case (scenario)	The definition of a 'worst-case' varies by the field to which it is being applied, however ultimately it is the most unfavourable foreseen scenario. Often assessments use a worst-case scenario.
Zone of influence (Zoi)	The zone of influence is the area over which (e.g.) ecological features may be subject to significant effects. This area may differ for different receptors.
Zone of Theoretical Visibility (ZTV)	This is the zone from which the proposed scheme is theoretically visible over 'bare earth.'
Zone of Visual Influence (ZVI)	The area within which a project may be visible and may influence the quality of views. The 'zone of visual influence' (ZVI) approximately covers all land from which the proposed scheme is visible. It is limited by topographic features such as hill and valleys and by visual barriers such as woodland and buildings.

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