

# A417 Missing Link

## Preliminary Environmental Information Report

Chapter 12 Population and Human Health

28 September 2020

## Table of Contents

	Pages
12 Population and human health	1
12.1 Introduction	1
12.2 Competent expert advice	2
12.3 Legislative and policy framework	2
12.4 Assessment methodology	7
12.5 Assessment assumptions and limitations	21
12.6 Study area	22
12.7 Baseline conditions	24
12.8 Potential impacts	49
12.9 Design, mitigation and enhancement measures	50
12.10 Assessment of effects	51
12.11 Monitoring	93
12.12 Summary	93
End Notes & References	96

### Table of Figures

Figure 12.1 Incident rates on the existing A417	48
---	----

### Table of Tables

Table 12-1 Relevant NPSNN policies for population and human health assessment	2
Table 12-2 Legislation and policy	5
Table 12-3 Receptor sensitivity for land use and accessibility	10
Table 12-4 Magnitude of impact for land use and accessibility	14
Table 12-5 Significance of impacts for land use and accessibility	16
Table 12-6 Health determinants relevant to the scheme	18
Table 12-7 Vulnerable and disadvantaged groups and their relevance to the assessment	19
Table 12-8 Human health outcome categories	20
Table 12-9 Study areas	23
Table 12-10 ONS Household Projections 2016-based to 2041	24
Table 12-11 Private properties	25
Table 12-12 Community facilities and services	28
Table 12-13 Development land and businesses	31
Table 12-14 Agricultural land holdings	35
Table 12-15 Existing PRow that interact with the scheme	40
Table 12-16 Broad age structure	45
Table 12-17 Employment by industry (%)	46
Table 12-18 Sensitivity of community to changes in health determinants	48
Table 12-19 Effects on residential properties – construction	52
Table 12-20 Effects on residential properties – operation	53
Table 12-21 Effects on community assets during construction	56

Table 12-22	Businesses during construction	61
Table 12-23	Land holdings and land take	68
Table 12-24	Assessment of effects PRow	78
Table 12-25	PRow mitigation and enhancements	81
Table 12-26	Summary of significance during construction and operation – land use and accessibility <sup>94</sup>	
Table 12-27	Summary assessment of human health outcomes	95

## 12 Population and human health

### 12.1 Introduction

- 12.1.1 This Chapter of the Preliminary Environmental Information (PEI) report provides an assessment of the potential construction and operational effects of the A417 Missing Link scheme (the scheme) on population and human health.
- 12.1.2 The Chapter follows the standard set out in Design Manual for Roads and Bridges ("DMRB") LA 112 Population and Human Health<sup>1</sup> (formerly part 6 Land Use, part 8 Pedestrians, Cyclists, Equestrians and Community Effects and part 9 Vehicle Travellers), and LA 104 Environmental Assessment and Monitoring<sup>2</sup>. These standards 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.
- 12.1.3 This Chapter has therefore been undertaken in accordance with LA 112 as the relevant standard for assessment.
- 12.1.4 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 scheme (baseline) and presents the assessment of effects on identified receptors during both construction and operation of the scheme. Following this, the design, mitigation and residual effects of the scheme are discussed, along with the limitations of the assessment where necessary.
- 12.1.5 In order to assist the reader and due to the broad scope of the population and human health topic, this Chapter is structured under the following impact areas (receptor groups)<sup>3</sup>:
1. **Land-use and accessibility**, including;
    - private property and housing;
    - community land and assets;
    - development land and businesses;
    - agricultural land holdings; and
    - walkers, cyclists and horse riders [including disabled users] (WCH).
  2. **Human health**, including;
    - health profiles of affected communities;
    - health determinants (e.g. noise or air pollution); and
    - likely health outcomes.
- 12.1.6 It is important to acknowledge that since the scoping stage of the scheme and the publication of the earlier PEI report published in September 2019, the standards for undertaking assessment of potential effects on population and human health has been superseded. The latest standards have been taken into account in this updated PEI report in support of supplementary public consultation.
- 12.1.7 Whilst DMRB includes WCH it does not specifically mention disabled users. For the purposes of this assessment disabled users have been considered as part of WCH, and The Disabled Ramblers have been engaged in relation to the WCH proposals.

## 12.2 Competent expert advice

- 12.2.1 The Population and human health lead and lead author for the assessment of land-use and accessibility is a Chartered Town Planner who holds a BSc in City and Regional Planning and an MSc in Regeneration Studies. He has undertaken and contributed to similar assessments on a number of large scale infrastructure projects including the A30 Chiverton to Carland Cross project on behalf of Highways England, the M4 Corridor around Newport proposals and A40 Improvement Projects on behalf of the Welsh Government.
- 12.2.2 The co-author responsible for assessing human health is a Chartered Environmentalist who holds a BSc in Environmental Biology and an MSc in Environmental Assessment and Management. She is currently working towards a Master of Public Health and has recently completed similar assessment work on A30 Chiverton to Carland Cross project on behalf of Highways England and A40 Improvement Projects on behalf of the Welsh Government.
- 12.2.3 Full details of relevant project experience is provided in PEI report Appendix 1.2 Competent expert evidence.

## 12.3 Legislative and policy framework

- 12.3.1 As discussed in Chapter 1 Introduction, the primary basis for deciding whether or not to grant a Development Consent Order (DCO) on the national road and rail network in England is the National Policy Statement for National Networks (NPSNN). NPSNN sets out policies to guide how highways DCO applications would be decided and how the effects of national networks infrastructure should be considered. 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 policies for population and human health assessment**

<b>Relevant NPSNN paragraph reference</b>	<b>Requirement of the National Policy Statement for National Networks (NPSNN)</b>	<b>Where in the PEI report is information provided to address this policy.</b>
Chapter 2 – The Need for Development	Paragraph 2.1 recognises that <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 scheme are to create a network which has sufficient capacity and provides for future demands. See Chapter 1.
	Paragraph 2.6 outlines <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> .	The scheme is identified within the JCS Infrastructure Delivery Plan (IDP) as a key piece of infrastructure in order to support economic and population growth within the JCS area. See 12.7 of this Chapter.

Relevant NPSNN paragraph reference	Requirement of the National Policy Statement for National Networks (NPSNN)	Where in the PEI report is information provided to address this policy.
	Paragraphs 2.12 to 2.27 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.	The effects of the scheme on overall connectivity and economic growth is considered broadly with reference to development land and businesses in section 12.7 and 12.10 of this Chapter.
Chapter 3 – Wider Government Policy on the national networks	Paragraph 3.3 states <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 12.9 and 12.10 of this Chapter.  Opportunities for wider benefits have also been considered, particularly in relation to the Walking Cycling Horse riding (WCH) / PRoW network.
	Paragraph 3.17 recognises the potential opportunity for pedestrians and cyclists, stating <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 12.10 with detailed proposals outlined in draft Public Rights of Way Management Plan (Appendix 12.2) which seeks to better connect and enhance the WCH network in the area surrounding the scheme.
	Severance is covered in paragraph 3.22 which outlines <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 ensure continued accessibility. This is particularly considered in relation to Agricultural Land Holdings and WCH at section 12.10.

Relevant NPSNN paragraph reference	Requirement of the National Policy Statement for National Networks (NPSNN)	Where in the PEI report is information provided to address this policy.
Chapter 5 – Generic Impacts	Paragraph 5.162 recognises that “Access to <i>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 benefits</i> ”.	The potential effects on community land and assets (including recreation space, common land and open access land) is presented in section 12.10.
	<p>In relation to the assessment, paragraphs 5.165 to 5.172 outline expectations in relation to land use including open space, green infrastructure and Green Belt. Of relevance to this assessment, it requires the application to:</p> <ul style="list-style-type: none"> <li>- <i>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.</i></li> <li>- <i>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.</i></li> </ul>	The potential effects on community land and assets (including recreation space, common land and open access land) is presented in section 12.10.
	Paragraph 5.184 highlights “ <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 12.10 of this Chapter. Opportunities to improve access and connectivity across the PRoW network is presented in the draft PRoW Management Plan (Appendix 12.2).

12.3.2 The following section of this Chapter 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 as set out below.

12.3.3 This section does not provide a review of the legislation and policy support for the scheme itself. This would be provided within a separate planning statement (case for the scheme) that accompanies the application for a DCO.



**Table 12-2 Legislation and policy**

Relevant document	Application to the scheme
Countryside and Rights of Way Act 2000	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.
The National Parks and Access to the Countryside Act 1949	The Act sets out the protection for national trails (including the Cotswold Way National Trail) and the mechanism by which they can be diverted.
Road Investment Strategy 2: 2020 – 2025 (2020)	The Strategy includes the A417 Air Balloon as a committed project for Road Period (RP) 2 which runs between financial years 2020/21 to 2024/25.
Revised National Planning Policy Framework (2019)	The NPPF seeks a transport system in favour of sustainable modes and 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 Planning Practice Guidance (PPG) – Open Space, Sports and recreation facilities, public rights of way and local green space (2014)	The Guidance states that existing open space should be taken into account when considering development proposals.
Government White Paper: Healthy Lives, Healthy People (2010)	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.
Highways England Cycling Strategy	The Cycling Strategy sets out how the planned roads improvements programme will 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	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 every day journeys as easy as possible.



Relevant document	Application to the scheme
<p>Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (JCS) 2011-2031 December 2017 and Gloucester Local Plan (1983) – saved policies</p>	<p>The Joint Core Strategy (JCS) was adopted by Gloucester City Council, Cheltenham Borough Council, and Tewkesbury Borough Council as a co-ordinated strategic development plan up to 2031. The relevant policies include:</p> <ul style="list-style-type: none"> <li>• Policy SD1: Employment – Except Retail Development;</li> <li>• Policy SD2: Retail and City/Town Centres;</li> <li>• Policy SD10: Residential Development;</li> <li>• Policy SD14: Health and Environmental Quality;</li> <li>• Policy INF1: Transport Network; and</li> <li>• Policy INF4: Social and Community Infrastructure.</li> </ul> <p>They are now taking forward a review and an Issues and Options consultation took place between November 2018 and January 2019. Further information would be made available in due course.</p> <p>None of the policies from the 1983 Local Plan are considered relevant. The A417 Air Balloon (Missing Link) scheme is identified as a key priority through the JCS infrastructure delivery plan.</p>
<p>Second Stage Deposit City of Gloucester Local Plan (2002)</p>	<p>As the Second Stage Deposit is not an adopted plan, the policies contained within it could not be superseded by the adoption of the Joint Core Strategy. The relevant policies that are considered to be a material consideration and have significant weight in the decision-making process: Policy BE.2 Views and Skyline and Policy E.4 Protecting Employment Land.</p>
<p>Cotswold District Local Plan 2011-2031 (2018)</p>	<p>Adopted policies which relate to population and human health include:</p> <ul style="list-style-type: none"> <li>• Cotswolds Area of Outstanding Natural Beauty (EN5)</li> <li>• Social and Community Infrastructure (INF2)</li> <li>• Sustainable Transport (INF3)</li> <li>• Highway Safety (INF4)</li> </ul>
<p>Tewkesbury Borough Local Plan 2011-2031 (2019)</p>	<p>The Borough Plan was submitted to the Secretary of State for Ministry of Housing, Communities and Local Government on 18 May 2020 for examination. Those policies pertinent to population and human health will continue to be reviewed as the Plan progresses through examination.</p>
<p>Local Transport Plan (LTP) for Gloucestershire (2015-2031)</p>	<p>The Local Transport Plan's overarching objectives are to:</p> <ul style="list-style-type: none"> <li>• support sustainable economic growth;</li> <li>• enable community connectivity;</li> <li>• conserve the environment; and</li> <li>• Improve community health and wellbeing.</li> </ul> <p>Expected outcomes include improved network resilience, journey time reliability, a thriving economy, financial stability, reduced isolation and better active travel.</p> <p>The LTP review 2019/20 consultation period closed on 26<sup>th</sup> March 2020 and following consideration of the consultation responses and updated LTP for the period 2015-2041 will be adopted by the Council.</p>

Relevant document	Application to the scheme
Strategic Economic Plan (SEP) and Gloucestershire Economic Growth Capital Investment Pipeline (CIP) 2018	<p>The SEP for <i>Gloucestershire</i> outlines how the ambition is to grow the local economy by an average of 4.8% GVA per annum by 2022.</p> <p>The SEP Update 2018 identifies the A417 as the 'Missing Link' and a weakness as a <i>capacity</i> constraint within the region. The Highways England Missing Link project is identified as a part of the required transport infrastructure to deliver the SEP.</p> <p>The CIP is a strategy central to the Local Enterprise Partnership GFirst. It is reviewed, refreshed and updated on a regular basis, to take account of emerging economic investment, strategic infrastructure requirements, resource <i>needs</i> and potential funding opportunities.</p>
Cotswolds AONB Management Plan 2018-2023	<p>The purposes of the AONB are to: "<i>conserve and enhance the natural beauty of the Cotswolds AONB; and increase the understanding and enjoyment of the special qualities of the Cotswolds AONB.</i>"</p> <p>The AONB's Vision is to be "<i>a distinctive, unique, accessible living landscape treasured for its diversity which is recognised by all for its wide-open views, dry stone walls, intimate valleys, flower rich grasslands, ancient woodlands, dark skies, tranquillity, archaeology, historic and cultural heritage and distinctive Cotswold stone architecture.</i>" To achieve their Purpose and 'Vision' the AONB have set out a number of 'Outcomes' which cover key topics such as Landscape and Geology, Local Distinctiveness, Tranquillity, Dark Skies, and Access and Recreation, with associated policies. The relevant Policies for this Chapter are listed below:</p> <ul style="list-style-type: none"> <li>• Policy UE2: Access and Recreation - Of specific relevance to this assessment, Policy UE2 seeks to ensure that a safe, accessible, waymarked and connected Public Rights of Way (PRoW) network is maintained, enhanced and promoted across the AONB. The policy also has similar aims for common land and other open access land and seeks that where appropriate more such land is provided.</li> <li>• Policy UE3: Health and Well-being - Of specific relevance to this assessment, Policy UE3 seeks to ensure that opportunities to improve health and well-being in the AONB are created, improved and promoted. This includes the provision of walking, cycling and riding routes where appropriate.</li> </ul>

## 12.4 Assessment methodology

### Assessment methodology for land use and accessibility elements

- 12.4.1 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. As the standard for assessment, the methodology below is taken from LA 112 population and human health. The assessment has been undertaken within this framework with professional judgement also applied only when required. Where this is the case, this is clearly explained within the assessment.
- 12.4.2 Certain elements of the assessment methodology have been developed in accordance with the following wider DMRB standards, where this provides an appropriate approach:
- LA 101 [Ref 4.N] Introduction to environmental assessment;

- LA 102 [Ref 7.N] Screening projects for Environmental Impact Assessment (EIA);
- LA 103 [Ref 6.N] Scoping projects for environmental assessment; and
- LA 104 [Ref 3.N] Environmental assessment and monitoring.

12.4.3 As is cross referenced in LA 112 population and human health, consultation with authorities likely to be concerned by the project shall be undertaken in accordance with LA 104 and this standard has therefore been followed in relation to consultation.

#### Baseline data gathering

12.4.4 The baseline in relation to land use and accessibility has been developed through utilising the following methods:

- data collection (commencing at the screening/scoping stage and developed with greater detail if further assessment is required);
- spatial data mapping; and
- consultation (where required to inform assessment conclusions).

12.4.5 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/access affected by the scheme; and
  - the location of residential development land and number of units that would be affected by the scheme.
- community land and assets:
  - the location of community land (e.g. common land, village greens, open green space, allotments, sports pitches etc) and amount of land which would be required/access affected by the scheme;
  - the location of community assets (e.g. village halls, healthcare facilities, education facilities, religious facilities etc.) and number of assets from which land would be required/access affected by the scheme;
  - the level of existing accessibility restrictions/severance to community land and assets within the study area; and
  - 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/access affected by the scheme;
  - the location of land allocated for development by local authorities and the number of future jobs that would be affected by the scheme;
  - land not allocated by local authorities which is subject to planning application(s) supporting future jobs; and
  - the level of existing accessibility restrictions/severance to development land and businesses within the study area.
- agricultural land holdings:
  - the type, location and number of agricultural holdings at risk of demolition or from which land would be required/access affected by the scheme;

- the level of existing severance/accessibility restrictions to agricultural land holdings within the study area; and
  - the frequency of use of the agricultural holdings/assets within the study area.
  - WCH:
    - the type, location and extent of WCH provision (e.g. public rights of way) within the study area; and
    - the frequency of use of the WCH provision within the study area.
- 12.4.6 Where 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.
- 12.4.7 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 scheme.
- 12.4.8 In line with the LA 112 standard, it is considered that data collection and surveys undertaken to inform this assessment are proportionate and appropriate given the scheme, local environment and potential effects.
- 12.4.9 Baseline conditions are identified and reported in section 12.6.

#### Receptor value (sensitivity)

- 12.4.10 Where possible, environmental value/sensitivity has been applied as set out in Table 3.11 of LA 112 and replicated in Table 12-3.
- 12.4.11 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 of value descriptions.
- 12.4.12 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 12-3 Receptor sensitivity for land use and accessibility**

Receptor sensitivity	Criteria
<b>Very high</b>	<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); and/or</li> <li>• existing housing and land allocated for housing (e.g. strategic housing sites) covering &gt;5ha 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); and</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 &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; and</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; and</li> <li>• rights of way for WCH crossing roads at grade with &gt;16,000 vehicles per day.</li> </ul>

Receptor sensitivity	Criteria
<b>High</b>	<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); and/or</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); and</li> <li>• the land and assets are used by the majority (<math>\geq 50\%</math>) 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; and</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; and/or</li> <li>• rights of way for WCH crossing roads at grade with &gt;8,000 - 16,000 vehicles per day.</li> </ul>

Receptor sensitivity	Criteria
<b>Medium</b>	<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 (ONS data); and/or</li> <li>• existing housing and land allocated for housing (e.g. strategic housing sites) covering &lt;1ha and/or &lt;30 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 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); and</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 &lt;1ha.</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; and</li> <li>• access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly).</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• public rights of way 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; and/or</li> <li>• rights of way for WCH crossing roads at grade with &gt;4000 – 8000 vehicles per day.</li> </ul>
<b>Low</b>	<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 Disability Discrimination Act (DDA) [Ref 2.N] 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); and</li> <li>• the land and assets are used by the minority (&gt;=50%) of the community.</li> </ul>



Receptor sensitivity	Criteria
	<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; and</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; and/or</li> <li>rights of way for WCH crossing roads at grade with &lt;4000 vehicles per day.</li> </ul>
<b>Negligible</b>	<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 (&gt;=50%) 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>

12.4.13 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 is explained.

12.4.14 When considering development land and businesses, 'employment sites' are taken to include any receptors that employ people.

#### Magnitude of impact

12.4.15 Magnitude criteria have been applied as set out in Table 3.12 of LA 112 and as listed in Table 12-4.

**Table 12-4 Magnitude of impact for land use and accessibility**

<b>Magnitude of impact</b>	<b>Typical description</b>
<b>Major</b>	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <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; and/or</li> <li>• introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision.</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• &gt;500m increase (adverse)/decrease (beneficial) in WCH journey length.</li> </ul>
<b>Moderate</b>	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <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; and/or</li> <li>• introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision.</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• &gt;250m - 500m increase (adverse) or decrease (beneficial) in WCH journey length.</li> </ul>
<b>Minor</b>	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <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; and/or</li> <li>• introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• &gt;50m - 250m increase (adverse) or decrease (beneficial) in WCH journey length.</li> </ul>
<b>Negligible</b>	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <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; and/or</li> <li>• very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision.</li> </ul> <p>WCH:</p> <ul style="list-style-type: none"> <li>• &lt;50m increase (adverse) or decrease (beneficial) in WCH journey length.</li> </ul>
<b>No change</b>	<p>No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction.</p>

- 12.4.16 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. Given the importance of other factors such as these in assessing the magnitude of change, these are described and applied within the assessment at section 12.10.
- 12.4.17 For the purposes of this assessment, only those receptors situated within the DCO boundary are expected to experience direct effects. This approach helps 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 scheme alignment) are considered.
- 12.4.18 For receptors situated outside of the DCO boundary, much of the assessment explores potential indirect and amenity effects, including impacts on access and ongoing use of a receptor.
- 12.4.19 In considering significance, the assessment also makes distinction between temporary and permanent impacts with temporary effects during construction considered to have a reduced impact 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 given its temporary nature.

#### Assessment of significance

- 12.4.20 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 LA 104. 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 etc) affected by a project. It is noted that significant effects typically comprise effects after consideration of mitigation.
- 12.4.21 For the purposes of this assessment, the significance of impacts has been applied as per Table 12-5.
- 12.4.22 Significant effects are those where significance is deemed to be 'moderate' or greater, overall.
- 12.4.23 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 12-5 Significance of impacts for land use and accessibility**

		<b>Magnitude of impact</b>				
		<b>No change</b>	<b>Negligible</b>	<b>Minor</b>	<b>Moderate</b>	<b>Major</b>
<b>Environmental value</b>	<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

### Design and mitigation

12.4.24 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; and
- 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; and
- 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.

12.4.25 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 is provided in the separate Consultation Report that supports the DCO application.

12.4.26 WCH design, assessment and provision is being undertaken in accordance with HD 42 walking, cycling and horse-riding assessment and review. The Walking, Cycling and Horse-riding (WCH) Review Report will be submitted as part of the Environmental Statement in support of the DCO application.

### Environmental enhancement

12.4.27 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

12.4.28 As part of the assessment, land use effects have been assessed during construction and for the first year of operation (future year scenario).

12.4.29 After the first year of operation, effects on land use are assumed to be associated with routine maintenance operations are unlikely to be significant.

### **Assessment methodology for human health elements**

12.4.30 The assessment of human health is a multidisciplinary process designed to identify and assess the potential health outcomes (both adverse and beneficial) 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.

12.4.31 This section sets out the scope of the human health assessment and the specific methodology that has been followed including the study population (including vulnerable and disadvantaged groups), information and data sources that were consulted, assessment criteria and assessment outcomes.

12.4.32 There is currently no statutory guidance for assessing the wider effects of projects on human health. For the purpose of this assessment the LA 112 standard has been followed.

12.4.33 The assessment approach has been qualitative except where informed by quantitative findings from the PEI report chapters. The assessment has been informed by and builds on the assessment undertaken in the PEI report chapters including air quality, noise, population, material assets and climate change.

### Baseline data gathering

12.4.34 Baseline data has been collated from a range of sources to provide an overview of the following:

- the existing population;
- existing health profile;
- socioeconomic conditions in the local community; and
- the local physical environment.

12.4.35 This gathering of baseline data has been coordinated with other workstreams within the PEI report such as socio-economic issues and the air and noise and vibration assessments.

12.4.36 The data reviewed has included, but has not been limited to:

- Public Health England publications such as Cotswold Health Profile, 2018<sup>4</sup> and Tewkesbury Health Profile 2018<sup>5</sup>;
- Gloucestershire Health and Wellbeing Board website<sup>6</sup>;
- Nomis Labour Market Statistics<sup>7</sup>; and
- Office for National Statistics, Census 2011 data<sup>8</sup>.

12.4.37 Baseline conditions are identified and reported in section 12.7.

#### Determinants of human health

12.4.38 Health and well-being, or 'health outcomes' can be influenced by environmental, social, economic and fixed factors (i.e. age, genetics and gender), which are collectively known as '*health determinants*'.

12.4.39 Social, environmental and economic health determinants listed in Table 12-6, have been used for the identification of health impacts relevant to construction and/or operation of the scheme. Related issues which are considered against each of these determinants are also listed. These health determinants have been identified based on reference to the guidance documents listed in this section together with an appreciation of the scheme and study area.

**Table 12-6 Health determinants relevant to the scheme**

Health determinant	Related issues
<b>Lifestyle/social and community determinants</b>	
Healthcare services and other community facilities	Equitable access Facilities that promote health and wellbeing
Transport and connectivity	Congestion Provision for active travel Equitable access
Open space and nature	Opportunities for exercise Equitable access
<b>Environmental determinants</b>	
Ambient Air quality	Changes in local environmental conditions
Noise environment (ambient noise and areas sensitive to noise)	
Landscape amenity (including light)	
Sources of pollution (e.g. contamination, odour)	
<b>Economic determinants</b>	
Employment and economy	Access to work, training and education

#### Definition of community in relation to human health

12.4.40 This health assessment considers the health and well-being status and current health issues of all people within the local community. However, vulnerable and/or disadvantaged groups can often experience health impacts more acutely than other groups within communities and are therefore more sensitive.

12.4.41 Table 12-7 identifies which vulnerable groups are considered to have high relevance to the scheme and are therefore considered within the assessment; where the assessment identifies that these vulnerable groups are likely to experience more health effects as a result of the scheme, this is identified. The identification of these vulnerable groups is based on a review of the population profile of the local communities within the wards listed above (see Appendix 12.1 for the relevant community health and wellbeing profile). A short justification for what relevance has been given to each vulnerable group is also provided in Table 12-7.

12.4.42 Consideration of vulnerable groups systematically considers inequalities within the population and assesses the extent and distribution of them. These groups can, for example, include older people, children and young people, those who suffer from chronic conditions, or those who are geographically isolated. Whilst this assessment is not an equality assessment, it does consider protected characteristic groups as defined by the Equality Act (2010) where these are considered to be vulnerable groups.

**Table 12-7 Vulnerable and disadvantaged groups and their relevance to the assessment**

<b>Vulnerable and disadvantaged groups</b>	<b>Sensitivity (high/medium/low)</b>	<b>Reason for assigned sensitivity in the context of the scheme</b>
Children and young people	Medium	The % of under 16-year olds in study area (14.7%) is below that of the national average (19.1).
Older people	High	The % of over 65-year olds in the study area (24.9%) is higher than the national average (18%).
People on low income	Low	Economic deprivation in the study area is significantly better than the national average (although there are still pockets of deprivation).
Economically inactive	Low	Economic inactivity in the study area is approximately 5% lower than the national average (25.6% compared to 30.1% England).
Unemployed/workless	Low	The % of people in the study area who are unemployed (Job seekers allowance claimants) (0.4%) or are long term (>1 year) unemployed (0%) is significantly lower than the national average (1.9% and 3.6% respectively).
People who are unable to work due to ill health.	Medium	Within Badgeworth ward there are significantly more people with limiting long term illness (21.3%) than the national average (17.6%) but there is no significant difference in Ermin ward (16.4%).
People living in areas known to exhibit poor economic and/or health indicators	Low	The study area is not within an area that is economically deprived or showing ill health.
People living in isolated/over-populated areas	Medium	The study area is not over-populated but does have some isolated properties along the route.
People unable to access services and facilities	Low	The communities within the study area are not in areas that are likely to have access issues.

#### Literature review – linking health outcomes to health impacts

12.4.43 A literature review was undertaken to establish the evidence for links between the health determinants and potential health outcomes. The literature review for each of the health determinants is included in Appendix 12.1.

12.4.44 Several types of literature have been used to inform the health assessment, including research reports as well as literature reviews and primary research



studies. 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; and
- public health reports and research papers from a range of sources, including:
  - Public Health England;
  - WHO;
  - National Institute for Health and Care Excellence (NICE); and
  - Health Development Agency (HDA).

#### Assessing human health effects

12.4.45 There is no established or widely accepted framework for assessing the ‘significance’ of human health effects related to a development proposal. The health significance of an environmental impact is typically a function of the ‘magnitude’ and ‘duration’ of the change to health determinants, the extent of the population exposed to this change and the sensitivity of the people (receptors or population) who would experience the effect.

12.4.46 Assessment is made as to whether the effect on health determinants is:

- direct or indirect;
- positive or negative; and
- permanent or temporary.

12.4.47 Based on an understanding of the health profile of the communities within the study area (obtained through baseline data collection) a value is assigned to the sensitivity of the population/community to changes in any of the health determinants. Based on the requirements of LA 112 the sensitivity of the population is reported as:

- low;
- medium; or
- high

12.4.48 Changes to health determinants, as a result of the scheme, in combination with the sensitivity of the population/community to these changes, would result in changes in health outcomes. These health outcomes are recorded as described in Table 12-8.

**Table 12-8 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

## Stakeholder engagement

- 12.4.49 A significant amount of engagement has also been undertaken focused on informing the assessment of population and human health, in particular with landowners including those with businesses and farm holdings, as well as stakeholders with an interest in WCH. This has helped inform decision making on the scheme to date, taking into account identified needs and opportunities.
- 12.4.50 A WCH Technical Working Group (TWG) was set up which has helped to collect and check evidence and discuss options, and has facilitated detailed discussions in relation to the draft Public Rights of Way Management Plan (Appendix 12.2).

## 12.5 Assessment assumptions and limitations

- 12.5.1 The assessment relies, in part, on data and information provided by third parties (e.g. Gloucestershire Council and landowners) which are the most up to date records, available at the time of the assessment.
- 12.5.2 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.
- 12.5.3 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).
- 12.5.4 Given the majority of potential impacts are likely to be indirect (with receptors outside of the 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 scheme.
- 12.5.5 A review of development land and businesses has been informed by a desktop exercise and site visit to the study area, to help identify receptors. The list may not be exhaustive.
- 12.5.6 Information on community facilities has been primarily obtained from desk-based research alongside site-based review.
- 12.5.7 Land ownership information has been collected using land registry data is updated by the project team on an ongoing basis based on information gathered from site visits, landowner discussions etc. This PEI report has utilised the information available at the time of this assessment.
- 12.5.8 Effects on property prices have not been considered as part of the assessment, given they are not planning matters within the scope of considerations for the DCO application.
- 12.5.9 Socio-economic baseline data has largely been based on outputs from the 2011 Census, which despite being around eight 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.
- 12.5.10 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.

- 12.5.11 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.
- 12.5.12 Any reference to traffic flows and travel conditions rely on the outputs of the traffic model produced for the scheme that are being updated and would be published within a Combined Modelling and Appraisal (ComMA) report to support the DCO application.
- 12.5.13 Literature and baseline data used in the study has been limited to readily available public and published sources.
- 12.5.14 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.

## 12.6 Study area

- 12.6.1 LA 112 population and human health sets out that:

*The study area shall be based on the construction footprint/project boundary (including compounds and temporary land take) plus a 500m area surrounding the project boundary.*

*Where likely effects are identified outside 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.*

- 12.6.2 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 scheme (DCO boundary), and indirect effects which could be experienced over a wider area.
- 12.6.3 For the land use and accessibility receptors, the 500m study area has been applied and is considered appropriate to consider both direct and indirect effects.
- 12.6.4 Specifically, in relation to WCH and the Public Rights of Way (PRoW) network, whilst the baseline and assessment considers all PRoW and recreational routes within 500m of the 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 scheme and recognising that such effects would typically be temporary in nature given the transient nature of users of the network.
- 12.6.5 A more focussed assessment has also been undertaken when considering community land and agricultural land holdings as effects relate to land take and direct impacts on these receptors only. This has therefore focussed on areas within the DCO boundary of the scheme where land is required either permanently or temporarily in order to deliver the scheme. PEI Report Figure 12.1 Study area shows the 500m extent in the scheme's context and also includes a 250m extent for context.

- 12.6.6 PEI Report Figure 12.1 also shows the DCO boundary as the area within which direct effects from the scheme would be predicted to occur.
- 12.6.7 Receptors outside of this area would be considered in the context of indirect effects only (e.g. effects from construction traffic, noise etc.).
- 12.6.8 General consideration of health effects covers the population that lives within the wards through which the scheme passes. Therefore, the majority of data has been obtained at the level of wards that surround the scheme, including:
- Badgeworth to the west (in Tewkesbury District); and
  - Ermin to the east (in Cotswold District).
- 12.6.9 Where data is not available at this local level, data has been used from the wider Gloucestershire authority area.
- 12.6.10 In relation to quantification of air quality and noise effects, reference has been made to the air and noise assessments that have been prepared for the 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.
- 12.6.11 In summary, the study areas considered for each of the impact areas that are taken into account within this Chapter are summarised in Table 12-9.

**Table 12-9 Study areas**

<b>Impact area</b>	<b>Study area for Indirect or amenity effects</b>	<b>Study area for direct effects</b>
<b>Land-use and accessibility</b>		
<b>Private property and housing</b>	Receptors located within 500m of the DCO boundary.	Receptors located within the DCO boundary.
<b>Community land and assets</b>	Receptors located within 500m of the DCO boundary.	Receptors (assets and/or community land) located within the DCO boundary.
<b>Development land and businesses</b>	Receptors located within 500m of the DCO boundary.	Receptors located within the DCO boundary.
<b>Agricultural land holdings</b>	Receptors located within 500m of the DCO boundary.	Receptors located within the DCO boundary where land-take is required.
<b>Walkers, cyclists and horse riders (WCH)</b>	Existing and proposed routes located within 500m of the DCO boundary.	The existing A417 and existing and proposed routes passing within the DCO boundary, both during construction and operation.
<b>Human health</b>		
<b>Affected communities</b>	The local wards of Ermin, Badgeworth or within the larger District area of Tewkesbury.	

## 12.7 Baseline conditions

### Current baseline

12.7.1 The baseline conditions for the scheme at the time of this PEI Report are presented below and report on the following elements:

- land-use and accessibility, including;
  - private property and housing;
  - community land and assets;
  - development land and businesses;
  - agricultural land holdings; and
  - walkers, cyclists and horse riders (WCH) including all groups of non-motorised travellers.
- human health, including;
  - health profiles of affected communities;
  - health determinants (e.g. noise or air pollution); and
  - likely health outcomes.

### Land-use and accessibility

#### Private property and housing

12.7.2 In determining the sensitivity of private property and housing, LA 112 utilises household projections as a key dataset, as well as considering existing housing / land allocated for housing.

12.7.3 The 2016-based household projections to 2041 for the local authority areas of Cotswold District Council and Tewkesbury Borough Council has been summarised in Table 12-10.

**Table 12-10 ONS Household Projections 2016-based to 2041**

Geography	2016	2041	Total Change	% Change
Cotswold DC	38,000	43,000	5,000	14%
Tewkesbury BC	38,000	46,000	8,000	22%
Total	76,000	89,000	13,000	17%

12.7.4 This data shows an average percentage change in household growth in the region of 17%, which when considered against LA 112 would give a high sensitivity for private property and housing.

12.7.5 However, LA 112 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 scheme 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 and it is therefore considered that on balance, applying a medium sensitivity to the private property and housing receptor group is appropriate.

12.7.6 Outside of the study area, North Brockworth is identified as a Strategic Allocation within the Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (2017)<sup>9</sup> and is a key location to help meet the strategic need for approximately 35,175

new homes within the JCS area over the period to 2031. The allocation itself is for circa 1,500 new homes and 3 hectares of employment land, leading to substantial population increase near the scheme. Although the allocation is located outside of the study area, and would not be directly affected by the scheme the strategic nature of the site and scale of growth proposed has led to its inclusion within the baseline.

- 12.7.7 The Missing Link project is identified within the JCS Infrastructure Delivery Plan as a key piece of infrastructure which is necessary to help ‘unlock’ and deliver this site and therefore the scheme has the potential to strategically benefit this allocation.
- 12.7.8 With the exception of Brockworth, the remaining settlements within the vicinity of the scheme are local in scale and primarily form village or rural settlements with some local facilities (e.g. village hall).
- 12.7.9 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 Table 12-11. These are also shown on PEI Report Figure 12.3.

**Table 12-11 Private properties**

Receptor	Location	Latitude	Longitude	Sensitivity
Fernbank, Cold Slad Lane	North of the A417 and south of Cold Slad Lane on approximate chainage 0+540.	51.8408363	-2.1048148	Medium
Half Acre, Crickley Hill	North of Crickley Hill on approximate chainage 0+540.	51.841007	-2.1049459	Medium
Pinewood, Crickley Hill	South of A417 to north east of Crickley Hill Tractors.	51.8414776	-2.1014488	Medium
Woodside House, Crickley Hill	South of the A417 on approximate chainage 0+820.	51.8420531	-2.101363	Medium
Crickley Ridge, Crickley Hill	South of A417 on approximate chainage 1+000.	51.8420915	-2.0985616	Medium

- 12.7.10 The above properties are all located between Crickley Hill and the current Air Balloon roundabout.
- 12.7.11 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 PEI Report Figure 12.3 and show that in general properties are dispersed throughout the study area with concentrations in the west focussed around Witcombe and the new development at Bentham Green. Moving east through the study area, residential properties then tend to be located in groupings along minor roads (e.g. Dog Lane) or as individual properties/plots.
- 12.7.12 The data above shows a total of five residential properties within the DCO boundary and therefore they are more likely to experience direct effects from the scheme. Properties within the wider study area, outside of the DCO boundary and

as shown on PEI Report Figure 12.3 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 scheme.

### Community land and assets

#### **Communities**

- 12.7.13 When considering key communities, it is important to consider the region as well as the local area given the important connectivity function of the A417. The road forms part of highway connections to the larger settlements of Cheltenham (approx. 6.8km to the north), Gloucester (approx. 10km to the east) and Stroud (approx. 13.5km to the south).
- 12.7.14 Within this wider area, the following key trends are relevant:
- at the time of the 2011 Census, Gloucestershire had a population of 596,984;
  - the county's older population grew faster than the national trends and the county had a proportionately larger older population than national averages;
  - 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 473,000 usual residents aged between 16-74, of these, 72.4% were economically active;
  - the county's economic base revolved around service industries with particularly high employment in the public sector, wholesale and retailing;
  - more recent data suggests that the population in Gloucestershire was approximately 623,100 in 2016 and would continue to rise by a further 44,300 between 2016 and 2026; and
  - this growth continues earlier trends and suggests further growth in the older population within the county.
- 12.7.15 When considering the socio-economic profile of the local area, the scheme lies within both Tewkesbury Borough Council and Cotswold District Council. Data from these local authorities has therefore been gathered, alongside data for the following wards which have been selected to represent the study area as those through which the A417 Missing Link interacts:
- Badgeworth (Tewkesbury);
  - Ermin (Cotswold); and
  - Churn Valley (Cotswold).
- 12.7.16 At the time of the 2011 census, the study area had approximately 5,887 usual residents with approximately 36% of these residing within Tewkesbury to the west of the scheme and 63% residing within Cotswold's to the east of the scheme. The population within the study area in 2011 equated to around 4% of the population of Tewkesbury and Cotswolds.
- 12.7.17 The main villages located along the existing A417 Missing Link are described below with reference to the settlement hierarchy provided by Policy SD2 - Retail and City/Town Centres of the Gloucester, Cheltenham and Tewkesbury Joint Core Strategy 2011-2031.



12.7.18 The A417 Missing Link serves low numbers of residential properties and businesses in a predominantly rural location. Relevant settlements in the local area include:

- Brockworth (west);
- Whitcome (west);
- Little Whitcombe (west);
- Bentham (west);
- Birdlip (south);
- Ullenwood (north-east);
- Cowley (east);
- Stockwell (south-east); and
- Brimpsfield (south-east).

12.7.19 Settlements and facilities in the study area and area surrounding the scheme are shown on PEI Report Figure 12.3 - Community Facilities, Business and Tourism Receptors.

12.7.20 Brockworth is the largest of the settlements in the area, situated around 2.7 miles (4.5 kilometres) to the west of the Air Balloon roundabout. This is the key settlement for the local area in terms of services and facilities it provides. These include a nursery, primary school, sports facilities and a number of public houses.

#### **Community land and assets**

12.7.21 PEI Report Figure 12.3 shows the community assets located within 500m of the scheme and these are summarised in Table 12-12. This also includes recreational assets. An appropriate allocation of sensitivity is provided.

12.7.22 Community land, namely Open Access Land and Common Land is shown on PEI Report Figure 12.4.

**Table 12-12 Community facilities and services**

Receptor	Main activity	Severance	Alternative facilities	Use/frequency	Minority / Majority	Sensitivity
Saint John Chrysostom Orthodox Church	Place of Worship - nine trustees, 42 volunteers	No or limited severance or accessibility issues	Limited alternative provision at a local level within adjacent communities.	Assumed regular/weekly services	Used by the minority of the community	<b>Medium</b>
Birdlip Primary School	Education - School Capacity is 105 Number of pupils is 108	No or limited severance or accessibility issues	Limited alternatives exist at a local level within adjacent communities	Term time attendance is daily	Used by the majority of the community	<b>High</b>
National Star	Education (further education and training for people with physical and learning disabilities and acquired brain injuries)	Severance between community and asset but with existing accessibility provision	No known alternative within the local authority area	School capacity is 170 Daily attendance for college use but also has facilities used by community regularly	Used by the minority of the community	<b>Very High</b>
Birdlip Village Hall	Community facility	No or limited severance or accessibility issues	Limited alternatives exist at a local level within adjacent communities	Hall capacity 80 and facilities used by community regularly	Used by the majority of the community	<b>High</b>
Ullenwood Bharat Cricket Club	Cricket Club	No or limited severance or accessibility issues	Alternative facilities exist at a local level within adjacent communities (although capacity of these alternatives is unknown)	Weekly with assumed variations in use (weekend peak)	Used by the minority of the community	<b>Medium</b>

Receptor	Main activity	Severance	Alternative facilities	Use/frequency	Minority / Majority	Sensitivity
Birdlip and Brimpsfield Cricket Club	Cricket Club	No or limited severance or accessibility issues	Alternative facilities exist at a local level within adjacent communities (although capacity of these alternatives is unknown)	Weekly with assumed variations in use (weekend peak)	Used by the minority of the community	<b>Medium</b>
Crickley Hill Country Park	Country Park with visitor centre, café and waymarked trails	No or limited severance or accessibility issues	No known alternative within the local authority area	Daily with assumed seasonal variations (summer peak) 190,000 visitors per year	Used by the majority of the community	<b>Very High</b>
The Ermine Street Guard	Community Organisation	No or limited severance or accessibility issues	No known alternative within the local authority area	Infrequent use as a membership-based organisation who undertake events across the UK.	Used by the minority of the community	<b>Low</b>

- 12.7.23 Barrow Wake Viewpoint is a scenic viewpoint and carpark overlooking the Severn Vale. It is located approximately 1 mile (1.6 kilometres) north of the village of Birdlip and runs parallel to the existing A417. It is located on the top of the Crickley Hill and within Barrow Wake Site of Special Scientific Interest (SSSI) and also lies within the Cotswold Area of Outstanding Natural Beauty (AONB). The site was acquired by Gloucestershire Wildlife Trust from the Gloucestershire County Council in 2016 through asset transfer, and is leased to, and grazed by the National Trust.
- 12.7.24 The Barrow Wake carpark is what remains of the old A417 road that used to run directly through Birdlip. As such, it is a large elongated car parking area with space for approximately 75 vehicles. It has views towards Gloucester to the west and is surrounded on all other sides by foliage, and foliage that breaks up the spaces on the carpark. It has a height restricted gate to prevent high sided vehicle access, and there is a gate that can restrict access to the site (although this is very rarely closed).
- 12.7.25 There is a long unclassified road that leads to the Barrow Wake carpark from the B4070, this is a through road that also provides access to some local residents and businesses located at Shab Hill to the East of Barrow Wake. The old and narrowed highway then runs through the car park to join the existing A417 to the north, now unsuitable for vehicle access but is used with public access rights for walkers, cyclists and horse riders.
- 12.7.26 Concerns have been raised about anti-social behaviour at Barrow Wake by stakeholders including Birdlip Parish Council, Cotswold District Council, Gloucestershire County Council, Gloucestershire Wildlife Trust and the National Trust.
- 12.7.27 According to those stakeholders, action groups and initiatives have been set up to try and tackle the issue or move it on, but they have not been successful, these have included:
- regular patrols by police and local residents;
  - closure of the site at night;
  - signage informing users of surveillance and the impacts the Anti-Social behaviour is having on the local community; and
  - recording car registrations and sending follow-up letters to their owners.
- 12.7.28 Anecdotal evidence exists for other anti-social behaviour activities in the area, including:
- drug-taking;
  - littering (including fly-tipping);
  - sex work; and
  - theft.
- 12.7.29 It is understood from stakeholder engagement activities that number of attempts have been made previously to try to remove anti-social behaviour from Barrow Wake; all of which have been ineffective to date.
- 12.7.30 Whilst this matter is not something that Highways England can control, or is within the scope of the scheme to rectify, this scheme has sought to improve the general environment and accessibility of the area, which in turn may assist to improve natural surveillance and help address illegal use of the land.
- 12.7.31 These measures are considered within Chapter 7 (Landscape and visual effects).

12.7.32 As shown in PEI Report Figure 12.4, the scheme involves works on areas of land designated as Country Park, Open Access Land and registered Common Land. These land areas, also referred to as Special Category Land, are located primarily in the vicinity of Crickley Hill Country Park and Barrow Wake. For clarity, the County Park and Open Access Land are summarised below within the context of the definition of Open Space as “any land laid out as public garden, or used for the purposes of public recreation...<sup>10</sup>”.

#### Country Park

12.7.33 The land required for the project which is designated as a country park is in the ownership of the National Trust. As the Country Park is land used for the purposes of public recreation, it falls within the definition of Open Space.

#### Development land and businesses

12.7.34 PEI Report Figure 12.3 shows the development land and businesses located along the A417 Missing Link. These have been identified through both desk-based and site work and are summarised in Table 12-13.

12.7.35 This includes business and commercial premises, agricultural related businesses and tourism related businesses, such as holiday lets. Wider consideration of effects on agricultural land holdings is presented separately in the following sections of the baseline.

12.7.36 Data has been presented where possible from publicly available sources or stakeholder engagement, to help inform the sensitivity values, taking into account LA 112. Where able to be sourced, this includes number of jobs.

12.7.37 LA 112 relates to employment sites and site area. In all cases for this scheme, the receptors and parts thereof which relate to the business/production of good or services identified are less than 1ha in size. As such, they have been applied medium sensitivities as per the LA 112 standard.

**Table 12-13 Development land and businesses**

Receptor	Main activity	Jobs (where known)	Size of employment site	Sensitivity
Galtec	Civil Engineering/groundwork contractors	Less than 250	Less than 1ha	Medium
Bentham Lane Poultry Unit	Agricultural products	-	Less than 1ha	Medium
Witcombe Supplies	Catering	-	Less than 1ha	Medium
Pipeline Logistics	Contractor	9	Less than 1ha	Medium
Crickley Hill Tractors	Tractor dealer	5	Less than 1ha	Medium
Countryside Mobility	Mobility equipment	-	Less than 1ha	Medium
Rushwood Kennels and Cattery	Kennels and cattery	-	Less than 1ha	Medium
McCarthy Taylor Systems	Software	Less than 50	Less than 1ha	Medium
First Dance Discos	Mobile disco	Less than 10	Less than 1ha	Medium
Cotswold Way Sign Post	Cafe	-	Less than 1ha	Medium
Clavel and Hind	Brewery	Less than 10	Less than 1ha	Medium

Receptor	Main activity	Jobs (where known)	Size of employment site	Sensitivity
Watercombe Farm	Agricultural products	-	Less than 1ha	Medium
Stockwell Farm	Agricultural products	-	Less than 1ha	Medium
Brimpsfield Estate	Farm and shoot	-	Less than 1ha	Medium
Carron Lodge Ltd	Cheese	-	Less than 1ha	Medium
Mainstream Digital	Telecommunications and technology equipment	40	Less than 1ha	Medium
Three Piece Joinery	Joinery	Less than 10	Less than 1ha	Medium
Optimum Oils Limited/Optimum Industrial Limited	Automotive oils, metalworking fluids and industrial lubricants	19	Less than 1ha	Medium
Race Techniques at Birdlip Quarry	Motorcycle trials	3	Less than 1ha	Medium
Hasson Quarry Products Ltd	Quarry	-	Less than 1ha	Medium
Tarren Production	Event production and management	Less than 50	Less than 1ha	Medium
DJP Construction	Construction	-	Less than 1ha	Medium
K Bawden	Antique / Furniture Restorers	-	Less than 1ha	Medium
JS Equine	Equine Supplies	-	Less than 1ha	Medium
FeastABLE	Venue site for the National Festival of Specialist Learning	-	Less than 1ha	Medium
Star Bistro	Bistro within the National Star College	-	Less than 1ha	Medium
Field View Lane	Lodging	-	Less than 1ha	Medium
Royal George Hotel	Hotel and Inn with 34 rooms. Also caters for weddings, special occasions and meetings	-	Less than 1ha	Medium
Crickley Court Cottages	Two self-catering cottages providing seven beds for up to ten guests	-	Less than 1ha	Medium
Star Glamping	Glamping site Overall total sleep at one time: 12 people	-	Less than 1ha	Medium
The Barn	6-bedroom homestay	-	Less than 1ha	Medium
Stockwell Farm Residential Lettings	8 residential lettings	-	Less than 1ha	Medium
Air Balloon Pub	Pub and Restaurant	-	Less than 1ha	Medium
Golden Heart Inn	16 <sup>th</sup> Century Grade II Listed Country Inn with Barn available for private dining, meetings/special events Capacity 120 people	-	Less than 1ha	Medium
Bentham Country Club	5-A-Side football and sports courts	Less than 20	Less than 1ha (excluding the recreational areas)	Medium

Receptor	Main activity	Jobs (where known)	Size of employment site	Sensitivity
Costwold Hills Golf Club/Ullenwood Manor Golf Course/Star Golf	Golf course with club house	Less than 30	Less than 1ha (excluding the recreational areas)	Medium
Flyup 417 Bike Park	Mountain bike park with various trails, café and bike shop	Less than 20	Less than 1ha (excluding the recreational areas)	Medium
Little Witcombe Court	Holiday park with 24 park homes.	-	Less than 1ha	Medium

- 12.7.38 There are no development land allocations within the study area which are promoted by either the JCS or any of the Local Plans that would be affected by the scheme. The JCS does contain a strategic allocation, known as 'North Brockworth', which is located to the west of the scheme to the south of the existing A417. Policy SA1 of the JCS<sup>11</sup> identifies the site for the provision of circa 1,500 new homes and 3 hectares of employment land.
- 12.7.39 Although the allocation is located outside of the study area and would not be directly affected by the scheme the strategic nature of the site and scale of growth proposed has led to its inclusion within the baseline. The Missing Link project is identified within the JCS Infrastructure Delivery Plan as a key piece of infrastructure which is necessary to help 'unlock' and deliver this site and therefore the scheme has the potential to strategically benefit this allocation.
- 12.7.40 At the time of writing this PEI report there were no known current pending planning applications within the DCO boundary of the scheme or within proximity to the scheme.

#### Agricultural land holdings

- 12.7.41 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 scheme on this soil resource. This section of the Chapter identifies known agricultural land holdings and outlines the use of these holdings within the study area.
- 12.7.42 Landowner engagement and questionnaires have helped identify landowners who have confirmed that their land plots are used for agricultural purposes. This information may be incomplete, in light that not all questionnaires were returned and despite all reasonable efforts made to engage with all landowners not all plot owners within the study area / DCO boundary have engaged in two-way dialogue. However, the land and plots identified as being agricultural in use and partly within the red line boundary are shown on PEI Report Figure 12.5 and listed in Table 12-14.
- 12.7.43 Table 12-14 also provides information in relation to the known use of the holding and the frequency of use, which has been informed by landowner engagement where possible. In-line with LA 112, this frequency information relates to the identified use and focusses on the requirement of the holding to access between land (e.g. pasture / grazing fields) and key agricultural infrastructure (e.g. milking parlour / sheering shed).
- 12.7.44 In alignment with LA 112, where access between land holdings (land affected) and key agricultural infrastructure (e.g. barns / milking parlour) is required daily

(very frequently) the sensitivity is very high. Where accessed is required weekly (frequently) the sensitivity is high. When access is required monthly (reasonably frequent) the sensitivity is medium, and when access is required less than monthly, the sensitivity is low.



**Table 12-14 Agricultural land holdings**

Name of farm or landowner surname	Total plot area(s) (Ha)	Area (Ha) within DCO	% of plot affected	Use	Observations	Sensitivity
Alexander and Angell Limited	34.73	6.19	18%	Poultry and pig farm	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low
Brimpsfield Estate	152.08	0.00	0%	Shoot/arable/grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during harvest, but access is generally infrequent.	Low
Crickley Hill Country Park	27.24	0.20	1%	Rare breed cow grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low
Cuckoopen Barn Farm	18.56	0.99	5%	Arable	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during harvest, but access is generally infrequent.	Low
Dick	10.72	6.57	61%	Grazing or arable land	Not currently in use.	Negligible
Field	3.75	0.35	9%	Sheep grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low
Ford Fosse Farm	64.97	8.10	12%	Arable	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low

Name of farm or landowner surname	Total plot area(s)	Area (Ha) within DCO	% of plot affected	Use	Observations	Sensitivity
Garlick	27.88	6.66	24%	Grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low
Gloucestershire Wildlife Trust	33.14	0.85	3%	Grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low
Hazell	7.15	0.24	3%	Sheep grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low
Medlock	52.06	24.54	47%	Arable/grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during harvest, but access is generally infrequent.	Low
National Star Foundation	35.55	4.26	12%	Grazing/hay cut	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during hay cuts (2 per year) but access is generally infrequent.	Low
Overbury	50.19	2.94	6%	Combinable crop production and beef production	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during harvest, but access is generally infrequent.	Low
Pither Agricultural	7.19	0.00	0%	Arable and beef production	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during harvest, but access is generally infrequent.	Low

Name of farm or landowner surname	Total plot area(s)	Area (Ha) within DCO	% of plot affected	Use	Observations	Sensitivity
Rushwood Kennels	9.48	1.89	20%	Sheep grazing - small numbers	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Access between land and infrastructure required on an infrequent basis.	Low
Shab Hill Farm	32.05	20.01	62%	Arable/grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during harvest, but access is generally infrequent.	Low
Stockwell Farm	389.23	60.38	16%	Arable/grazing	Holding not dependant on the spatial relationship of land and key agricultural infrastructure. Dependency increases during harvest, but access is generally infrequent.	Low

- 12.7.45 The two entries in Table 12-14 above which read as 0ha of land take include very small areas of land required as follows:
- Brimpsfield Estate – less than 1m<sup>2</sup> required to facilitate drainage works as part of the scheme; and
  - Pither Agricultural – 27.6m<sup>2</sup> required to facilitate drainage works and a field access.
- 12.7.46 Overall, approximately 144ha of land within the DCO boundary is known to form part of an agricultural land holding. This comprises land which forms part of wider agricultural holdings that extend beyond the DCO boundary, over an area of approximately 956ha.
- 12.7.47 Overall, land take within the DCO boundary (temporary and permanent) therefore equates to 15% of the agricultural holdings effected. However, the actual proportion of the holding which would be required either temporarily or permanently as part of the scheme varies between <1% and 62% of the overall holding affected.
- 12.7.48 The effects of this land take are explored in detail as part of the assessment of effects with further consideration given to the type of land take required (e.g. temporary or permanent).
- 12.7.49 There are no known existing accessibility issues between these holdings and existing key agricultural infrastructure.
- 12.7.50 The baseline has also considered agricultural holdings within the wider 500m study area beyond any plot interfacing with the DCO boundary in order to establish potential effects on these holdings. Given their nature and access and the fact that they will not interact with the scheme, these holdings would be considered of low sensitivity.

#### Walkers, cyclists and horse riders (WCH)

- 12.7.51 This section of the baseline considers all routes in the area surrounding the 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 user groups at the Walking, Cycling and Horse-riding Technical Working Groups. For clarity, the section considers all groups of non-motorised users and is not restricted to walkers, cyclists and horse riders.
- 12.7.52 PEI Report Figure 12.2 shows Public Rights of Way (PRoW) and local routes including unclassified roads which carry public rights. This has been drawn from published data and consultation feedback.
- 12.7.53 PRoW mapping data has been provided by Gloucestershire County Council 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).
- 12.7.54 The majority of PRoW in the study area involve footpaths, whilst there are also bridleway and restricted byway connections valued by local people and visitors. The PRoW that are potentially directly affected by the scheme have been identified through examination of the definitive maps and site walkover work undertaken by the consultant team, complemented by stakeholder engagement. The scheme would affect the Cotswold Way National Trail, Gloucestershire Way

long distance path, and more than twenty footpaths, bridleways and restricted byways.

- 12.7.55 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. A WCH Technical Working Group (TWG) has helped to collect and check evidence and discuss options.
- 12.7.56 A site walkover visit was undertaken on Tuesday 18th June 2019 in order to visit and review each of the PRoW identified as being potentially impacted by the scheme.
- 12.7.57 The results of the site walkover have helped complement the stakeholder consultation work to inform an appraisal of the value of PRoW and local routes. In turn, this has helped inform the proposed approach to assessment of those routes during construction and operation in relation to the scheme.
- 12.7.58 Some of the identified routes, in particular the Cotswold National Trail and Gloucestershire Way currently cross the A417 at grade. With the road being used daily by more than 34,000 vehicles it is considered that this may suppress usage of these routes.
- 12.7.59 It is important to acknowledge that there are also other highways that WCH can use but that are not shown specifically on the definitive maps as PRoW.
- 12.7.60 Department for Transport guidance<sup>12</sup> identifies these as unclassified roads, which are local roads intended for local traffic, and the vast majority (60%) of roads in the UK fall within this category.
- 12.7.61 These 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. Within this assessment, these are considered as 'local routes' later in this section.
- 12.7.62 PRoW that intersect with the scheme are shown on PEI Report Figure 12.2 - Public Rights of Way and Local Routes and they are summarised in Table 12-15.
- 12.7.63 Alongside the findings of site walkover surveys, the Table also presents data from WCH survey counts in order to report against the sensitivity criteria within LA112.
- 12.7.64 WCH survey locations are shown in PEI Report Figure 12.2. The sensitivities presented against each PRoW identified in Table 12-15 are partly informed by the user/frequency survey results.
- 12.7.65 The WCH surveys were conducted for one weekend day in the school summer holidays with 14-hour (6am to 8pm) video surveys conducted on Saturday 2<sup>nd</sup> September 2017. Surveys at sites 8, 11 and 14 were undertaken on Sunday 10<sup>th</sup> September 2017 due to access issues. Further surveys to inform the assessment were undertaken on 31<sup>st</sup> August 2019 (6am to 8pm) to complete and complement the data provided previously. Site 24 was merged with site 22 as one camera site covered both footpaths both sides of the A417.
- 12.7.66 The sensitivities have been subject to discussion with the WCH TWG and have been agreed with Gloucestershire County Council's Public Rights of Way Manager.

**Table 12-15 Existing PRoW that interact with the scheme**

<b>PRoW</b>	<b>Location</b>	<b>Commentary</b>	<b>Sensitivity</b>
Cotswolds Way National Trail	Bath to Chipping Campden	National trail likely to be used for both commuting and recreational purposes. Surveys record show daily / frequent use and the route has limited potential for substitution. AADT data where the route crosses the A417 west of Air Balloon shows two-way flows of 36,912 in the base year (2015) and 41,094 in a do minimum scenario (2024).	Very high
Gloucestershire Way Long Distance Path	Chepstow to Tewkesbury	Well signed / promoted 'Regional Trail' likely to be used for recreation. Surveys show daily usage which is likely to be suppressed due to the at grade crossing of the A417. AADT data where the route crosses the A417 south of Air Balloon shows two-way flows of 29,532 in the base year (2015) and 32,414 in a do minimum scenario (2024).	High
Badgeworth bridleway 125	West to east, Cirencester Road to south of A417	Surfaced path along access to 417 Bike Park. Close to communities and surveys show use for recreational purposes. Alternative routes could be taken and Bridleway links into the wider PRoW network.	Medium
Badgeworth footpath 77	Links north-south from Badgeworth bridleway 125	Footpath close to communities and likely to be used for recreational purposes, linking into the wider PRoW network. Footpath appears maintained with style to join BR125 but alternative routes could be taken.	Medium
Badgeworth footpath 78	Links north-south from Badgeworth bridleway 125	Footpath close to communities and likely to be used for recreational purposes, linking into the wider PRoW network. Footpath appears maintained with style to join BR125 but alternative routes could be taken.	Medium
Badgeworth footpath 74	Links north-south from Badgeworth bridleway 125	Surveys showed this route to be overgrown and unmaintained. Alternative routes in the locality may mean this route is scarcely used.	Low
Badgeworth footpath 80	Links end of Badgeworth bridleway 125 north-south to Badgeworth footpath 81	Footpath close to communities and likely to be used for recreational purposes, linking into the wider PRoW network. Footpath runs through Bike Park with style to join BR125.	Medium
Badgeworth footpath 126	Links Badgeworth bridleway 125 east-west through Crickley Hill Farm	Surfaced path along access to 417 Bike Park. Close to communities and surveys show use for recreational purposes. Alternative routes could be taken and footpath links into the wider PRoW network.	Medium
Badgeworth footpath 84	Links Badgeworth footpath 126 to A417	Short section of footpath to the north inaccessible due to past severance. Footpath south accessible south through Bike Park and used for recreational purposes / connects into wider PRoW network.	Medium

PRoW	Location	Commentary	Sensitivity
Badgeworth bridleway 127	Links Badgeworth footpath 90 to Dog Lane	Short section of Bridleway which does not currently offer a meaningful route into the wider PRoW network.	Low
Badgeworth footpath 90	Links A417 to Haroldstone House north-south	Footpath close to communities and likely to be used for recreational purposes. Style onto the existing A417.	Medium
Badgeworth footpath 86	Links A417 to Badgeworth bridleway 87 north-south	Surveys showed this route to be overgrown and unmaintained. Route may have fallen into disuse due to past severance at its northern extent from the current A417.	Low
Badgeworth bridleway 87	Links A417 to Grove Farm north-south	Bridleway is close to communities and forms part of the wider PRoW network / is used for recreational purposes.	Medium
Badgeworth footpath 89	Links Badgeworth bridleway 87 to Cotswold Way and A417 east-west	Footpath which is close to communities and surveys show is used for recreational purposes. Footpath connects into the wider PRoW network.	Medium
Coberley footpath 51	Links Air balloon roundabout to Devil's Table east-west	Footpath which is close to communities and visitor facilities and connects with the Cotswold Way National trail and Crickley Hill Country Park. Well maintained footpath which is used for recreational purposes.	Medium
Coberley bridleway 117	Links Air balloon roundabout through Crickley Hill Country Park east-west	Bridleway is close to communities and forms part of the wider PRoW network / is used for recreational purposes. Good quality/maintained.	Medium
Coberley restricted byway 12	Links Air balloon roundabout through Crickley Hill Country Park east-west	Restricted Byway which is accessed off BR117 – does not appear to offer a meaningful route.	Low
Coberley footpath 16	Part of Gloucestershire Way	Section of promoted 'Regional Trail' likely to be used for recreation. Surveys show daily usage which is likely to be suppressed due to the at grade crossing of the A417. Route is well maintained / accessible.	High
Cowley footpath 1	Part of Gloucestershire Way	Section of promoted 'Regional Trail' likely to be used for recreation. Surveys show daily usage which is likely to be suppressed due to the at grade crossing of the A417. Route is well maintained / accessible.	High
Cowley footpath 3	Part of Gloucestershire Way	Section of promoted 'Regional Trail' likely to be used for recreation. Surveys show daily usage which is likely to be suppressed due to the at grade crossing of the A417. Route is well maintained / accessible.	High
Cowley footpath 7	Links Shab Hill Farm via track to Cowley footpath 44	Footpath which is close to communities and is likely used for recreational purposes. Footpath connects into the wider PRoW network.	Medium

<b>PRoW</b>	<b>Location</b>	<b>Commentary</b>	<b>Sensitivity</b>
Cowley footpath 44	Links north of Stockwell Farm to A417 east-west	Footpath which is close to communities and surveys show is used for recreational purposes. Footpath connects into the wider PRoW network.	Medium
Cowley restricted byway 36	Connects Stockwell Farm to Cowley restricted byway 27 east-west	Restricted byway is signed but surveys showed no clear route through field suggesting route has fallen into disuse.	Low
Cowley restricted byway 26	Provides east-west link and connection into RB36	Signed restricted byway which forms part of the wider PRoW network and surveys show is used for recreational purposes.	Medium
Cowley footpath 22	Connects Stockwell Farm to Cowley bridleway 45 east-west	Footpath which is close to communities and is likely used for recreational purposes. Footpath connects into the wider PRoW network.	Medium



12.7.67 PRow located within the study area that do not interact with the scheme have also been reviewed in order to assess the potential for effects on these routes and their users. Many of the PRow within Table 12-15 are located within 250m of the scheme and are likely to experience a direct effect as part of construction and/or operation. Those PRow within the wider 500m study area would not experience any direct effects as a result of the scheme and would therefore remain unchanged during both construction and operation.

#### Local routes

12.7.68 As previously explained, the scheme also has the potential to affect unclassified roads or ORPAs that interface with the scheme. Those that are affected by works are also shown on PEI Report Figure 12.2 - Public Rights of Way and Local Routes. There are three local routes that interface and are considered of interest in light of stakeholder engagement (see section 12.7). These are all situated in the vicinity of Shab Hill are identified on the relevant List of Streets as:

- 50852;
- 50853; and
- 50944.

12.7.69 These are not shown on the definitive maps that 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). However, it is acknowledged that they are often used by walkers, cyclists and horse riders, potentially alongside motorised vehicles, given a route's inclusion in the highway authority's list of maintainable highways means that the authority regards it as a highway with public rights.

12.7.70 Given these routes have been highlighted as important local routes all unclassified roads or ORPAs are considered to be of medium sensitivity as routes which are close to communities and are used for recreational purposes.

12.7.71 The local routes would also be shown on the Rights of Way and Access Plans submitted as part of the DCO application.

### **Human health**

#### Long-term human health conditions

12.7.72 Self-reported health status was measured in the 2011 census and within the study area 18.6% of the population reported having a limiting long-term illness or disability. This compares to the national rate of 17.6%.

12.7.73 47.6% of the population within Gloucestershire reported having very good health, whilst 12.7% reported having fair health, 3.5% reported having bad health and 1% reported having very bad health.

12.7.74 In Gloucestershire 61.5% of adults are classified as overweight or obese. This is similar to the national proportion of 62%.

12.7.75 The level of adult obesity is not significantly different to the national average of 62% child health.

12.7.76 Child health appears to be slightly better than the national average with fewer children in Year 6 (age 10-11), being classified as obese (17.8% (1,102) of children), better than the average for England of 20.1%<sup>13</sup>, although still at a level of concern.

### Life expectancy

12.7.77 Life expectancy for the Cotswold is 81.7 for men and 85 for women (compared to 79.6 nationally). In Tewkesbury life expectancy is 81.4 for men and 84.8 for women.

### Carers

12.7.78 Based on 2011 census data, in Gloucestershire 11.9% of people undertook unpaid care every week compared to 12.5 % in the wards of Ermin and Badgeworth and 10.3% in England. Of these, 20% provided unpaid care for 50+ hours per week and 10.8% provided between 20-49 hours of unpaid care<sup>14</sup>.

### Deprivation

12.7.79 Deprivation is measured by Lower Super Output Area (LSOA) rather than by ward. The Indices of Multiple Deprivation 2015 data show that Gloucestershire is now ranked 124 out of 152 local district authority areas for deprivation (where 1 is having the highest proportion of the population living in the most deprived neighbourhoods).

12.7.80 The areas that cover the wards adjacent to the scheme are not in the most deprived areas within the county. However, 14.6% of children within the study area was living in poverty in 2015. Whilst this is significantly better the 19.9% of childhood poverty nationally, it still represents 49 children within the study areas living in income deprived households. For older people (60+), this rises to 118 people within the study area living in a pension credit household. Again, this is significantly better than the national proportion of older people living in poverty.

### Air quality

12.7.81 Full baseline conditions related to air quality are found in Chapter 5 Air Quality. There are currently two Air Quality Management Areas (AQMAs) within 200m of the Affected Road Network (ARN) (study area for air quality assessment):

- Birdlip AQMA in Cotswolds District Council; and
- Cheltenham AQMA in Cheltenham Borough Council.

12.7.82 Cotswold District Council declared the Birdlip AQMA for exceedances of the annual mean NO<sub>2</sub> objective. The Birdlip AQMA lies inside the DCO boundary and includes the Air Balloon public house and the residential houses opposite known as Air Balloon cottages.

12.7.83 Cheltenham Borough Council has declared the whole of their local authority area as an AQMA. This was declared for exceedances of the annual mean NO<sub>2</sub> objective.

12.7.84 The air quality assessment identifies a total of 132 receptors within 200m of the scheme who could potentially be affected during construction as a result of changes in air quality.

### Noise

12.7.85 Full details of noise and vibration baseline is set out in Chapter 11. There are Noise Important Areas (NIA) within the study area which are areas that have been identified as being areas where noise is an existing issue – usually for residential receptors. These are shown on PEI Report Figure 12.1 and include:

- Bentham to Air Balloon roundabout - 0+000.000 to 2+100.000 (NIAs 3906, 3907, 3908 and 13915);
- Air Balloon roundabout to Cowley junction– existing alignment (NIA 3905); and
- Air Balloon roundabout to Cowley junction–re-alignment – 2+100.000 to 5+760.000 (NIA 13196).

#### Emergency hospital admissions

12.7.86 Emergency hospital admissions are hospital admissions that occur unexpectedly and urgently. Nationally, data is collected to measure admissions from coronary heart disease, stroke, heart attack and chronic obstructive pulmonary disease which can be used as an indicator for the general health of a population in terms of fitness and heart health. For the wards of Badgeworth and Ermin, emergency hospital admissions are below the national average with Standardised Admission Rates (SAR) of 79.7 for all causes (against 100 SAR nationally).

#### Mortality and causes of death

12.7.87 PHE data from 2013-2017<sup>1</sup> identifies Badgeworth ward experiencing significantly more deaths from stroke (all ages) and circulatory diseases (all ages) than the England average. Within Ermin ward there is no significant difference between average number of deaths from these illnesses compared with the England average.

12.7.88 Deaths from other diseases such as respiratory disease and cancers are not significantly different in either ward compared to the average for England.

#### Age structure

12.7.89 The age structure of the study area is largely similar to that of the wider Tewkesbury Cotswold and Gloucestershire areas. Slight differences can be seen with a slightly lower proportion of people aged between 0 and 15 and slightly higher proportion of people aged 65+.

**Table 12-16 Broad age structure**

Broad age group	Study area	Tewkesbury	Cotswold	Gloucestershire
0-15	16%	18%	17%	18%
16-64	62%	62%	61%	63%
65+	22%	20%	22%	19%

#### Travel to work

12.7.90 Census data in relation to method of travel to work suggests the majority of people travel by car or van (62%) which is comparable to the Gloucestershire average (61%). Within Tewkesbury and Cotswolds, a slightly higher proportion of people work from home (16% compared to 13% in Gloucestershire) and slightly less people commute on foot (9% compared to 11% in Gloucestershire). Approximately 3% of people were recorded as cycling to work.

<sup>1</sup> Public Health England – Local Health 2013- 2017. Available at [www. https://www.localhealth.org.uk](https://www.localhealth.org.uk)

12.7.91 Within Tewkesbury and Cotswolds, the majority of people travel less than 12 miles (20 kilometres) to work with the highest proportions travelling less than 1.2 miles (2 kilometres) (16%), between 3 and 6 miles (5 kilometres and 10 kilometres) (16%) and between 6 and 12.4 miles (10 kilometres and 20 kilometres) (15%).

#### Employment and skills

12.7.92 Data from the 2011 Census shows that 72.4% of those aged 16-74 were classed as economically active within Gloucestershire with 3.3% classed as unemployed. Data for the wards through which the scheme passes shows a slightly lower activity rate (69.2%), with a range within the wards of between 66.1% and 74.3%. However, unemployment within the study area is lower when compared to Gloucestershire with 2.0% classed as unemployed.

12.7.93 In 2011, 29.9% of the population in Gloucestershire aged 16+ were qualified to Level 4 or above. This includes degree (for example BA, BSc) or Higher Degree (for example MA, PhD, PGCE) or equivalent. This is lower than the study area as a whole with 37.7% on average achieving these qualification levels within the wards through which the scheme passes.

12.7.94 The data in Table 12-17 is taken from the Business Register and Employment Survey (2018) and shows the proportion of employment by broad industrial category. This data is presented for the Gloucestershire Area, Tewkesbury and Cotswold District Council areas and the two wards through which the scheme passes (Badgeworth and Ermin).

**Table 12-17 Employment by industry (%)**

Broad industrial category	Badgeworth Ward	Ermin Ward	Tewkesbury	Cotswold	Gloucestershire
<b>Agriculture, forestry and fishing*</b>	0.0	1.7	0.9	2.8	1.0
<b>Mining, quarrying and utilities</b>	0.3	0.0	1.1	1.4	1.6
<b>Manufacturing</b>	14.0	4.2	21.7	6.8	11.8
<b>Construction</b>	16.0	7.5	7.6	5.7	5.5
<b>Motor trades</b>	1.2	1.7	2.2	2.3	2.1
<b>Wholesale</b>	10.0	2.5	5.4	5.1	4.2
<b>Retail</b>	4.0	5.0	5.4	9.1	9.0
<b>Transport and storage</b>	4.0	1.7	4.3	2.3	3.1
<b>Accommodation and food services</b>	5.0	33.3	6.5	13.6	9.0
<b>Information and communication</b>	10.0	8.3	3.8	4.5	4.2
<b>Financial and insurance</b>	0.2	2.5	3.8	3.4	3.1
<b>Property</b>	3.0	1.7	1.3	2.8	1.7
<b>Professional, scientific * technical</b>	10.0	8.3	8.7	9.1	7.3

Broad industrial category	Badgeworth Ward	Ermin Ward	Tewkesbury	Cotswold	Gloucestershire
Business administration and support services	7.0	5.8	6.5	8.0	6.9
Public administration and defence	6.7	0.0	2.2	1.0	2.8
Education	1.3	3.3	5.4	8.0	8.3
Health	6.0	3.3	10.9	8.0	14.2
Arts, entertainment, recreation and other services	3.0	8.3	2.7	5.7	4.2

Note – Figures exclude farm agriculture (SIC subclass 01000)

12.7.95 The Business Register and Employment Survey data shows that employment within the study area is greatest in the following broad industrial categories:

- health;
- financial and insurance;
- construction;
- manufacturing; and
- accommodation and food services.

12.7.96 Of particular relevance to the scheme is employment within the construction industry, where employment in this sector is notably higher within the study area compared to the wider authority area.

#### Community safety

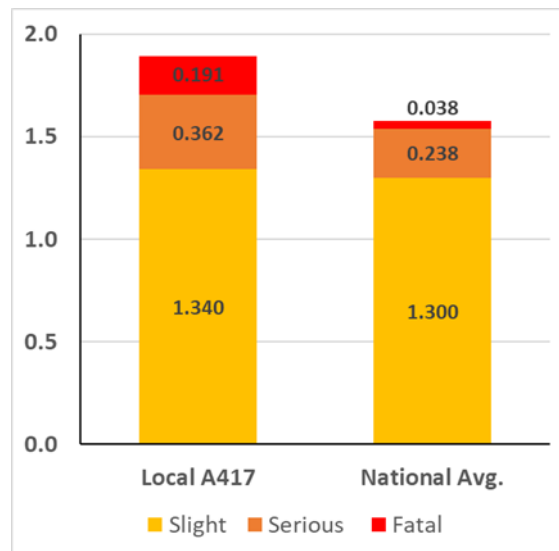
12.7.97 Relevant to this transport scheme is the safety of people taking into account incidents involving vehicles, walkers, cyclists and horse riders. Within the period May 2013 to April 2018 records indicate that, within the scheme area, there were a total of 49 Personal Injury Accidents (PIAs) on the single carriageway section of the A417 between Brockworth bypass and Cowley roundabout, resulting in:

- 10 fatalities;
- 18 seriously injured casualties; and
- a further 61 slight casualties.

12.7.98 In terms of collisions involving walkers, cyclists and horse riders over the same period, records show:

- 0 PIAs involved horse riders;
- 6 PIAs involving cyclists, of which five were classed as slight injuries and one as a serious injury; and
- 3 PIAs involving pedestrians, of which two resulted in fatalities.

12.7.99 When assessing the incident rates on the existing A417 against the national average for similar roads (single-carriageway), the data shows that rates are significantly higher, particularly for fatal and serious casualties as shown below in Figure 12-1.



**Figure 12.1 Incident rates on the existing A417**

**Community sensitivity to changes in health determinants**

12.7.100 Based on the information that has been gathered for the community health profile and baselines described in Chapters of the PEI report, a judgement has been made on how sensitive the community would be to changes in health determinants. This is based on the sensitivity criteria identified in DMRB LA112 and are listed below in Table 12-18.

**Table 12-18 Sensitivity of community to changes in health determinants**

Health determinant	Sensitivity (high/medium/low)
Healthcare services and other community facilities	Medium
Transport and connectivity	Medium
Open space and nature	Low
Air quality	Medium
Noise	Medium
Landscape and visual amenity	High
Sources of pollution	Medium
Employment and economy	Low

**Future baseline**

12.7.101 As set out in Chapter 4 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. Potential changes to population and human health receptors in the future would not be noticeable i.e. the future baseline would remain the same as set out above.

## 12.8 Potential impacts

12.8.1 This section provides an overview of potential impacts from the proposed scheme on the broad receptor groups identified within the methodology above before any mitigation or enhancement has been incorporated.

### **Land-use and accessibility**

#### *Private property and housing*

12.8.2 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; and
- Change in attribute such as noise environment or sense of tranquillity.

#### *Community land and assets*

12.8.3 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); and
- Potential effects on other land (e.g. open space land) during both construction and operation.

#### *Development land and businesses*

12.8.4 *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); and
- Loss of or impacts on land allocated or identified for employment / business growth.

#### *Agricultural land holdings*

12.8.5 This includes potential effects of the scheme on agricultural holdings which could include:

- Potential effects as a result of land take, demolition or severance/accessibility restrictions.

### *Walkers, cyclists and horse riders*

12.8.6 This includes an assessment of potential impacts arising from the scheme on walkers, cyclists and horse riders (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; and
- 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**

12.8.7 The assessment of human health considers how changes that result from the scheme would affect health determinants during both the 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; and
- access to employment and training.

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

### **Construction mitigation**

- 12.9.1 The Environmental Management Plan (EMP) that would be submitted in support of the scheme would provide a list of outline mitigation measures to be taken into account as part of the construction stage.
- 12.9.2 Once finalised the EMP would include the detail provided at Appendix 12.2, Public Rights of Way Management Plan) which is of particular relevance to this Chapter.
- 12.9.3 Where the construction works would affect access to existing tourism receptors, temporary alternative access arrangements would be provided in agreement with the receptor.
- 12.9.4 Where access is affected to private properties and businesses, temporary alternative access would be provided as appropriate, to be agreed with the landowner and/or tenant(s) as necessary.
- 12.9.5 Necessary access arrangements during construction would be detailed in a Construction Traffic Management Plan (CTMP).
- 12.9.6 Land required for construction compounds would be returned to its original use and condition as per before the works. The majority of that land would be agricultural use. Further detail is provided in Chapter 9 Geology and soils.
- 12.9.7 As such, crop loss would aim to be reduced by giving advanced warning to enable farmers to plan ahead and consideration of field drainage impacts during the design phase.



- 12.9.8 Severance during construction would be reduced through careful siting of construction compounds and lay down areas and careful planning of construction activities through consultation with the landowners and mitigated in places by new temporary and permanent accesses.
- 12.9.9 Potential indirect amenity effects relating to noise, dust and visual impacts associated with the movement of construction vehicles and 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 Liaison Officer (or similar).

### **Operational mitigation**

- 12.9.10 Landscape mitigation measures would be detailed through Chapter 7 Landscape and visual effects. 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.
- 12.9.11 The need for additional signage beyond typical highway signage, for example to tourism assets, would be discussed with Highways England and Gloucester County Council as the design process continues.
- 12.9.12 Once finalised, the EMP would incorporate the Public Rights of Way Management Plan (see Appendix 12.2) which sets out the operation mitigation for walkers, cyclists and horse riders and other users of rights of way/highway with public access. This supports the potential health benefits related to improved air quality and potential for enhanced active travel / recreational opportunities. Once operational, the scheme also offers improved highway safety.

### **Enhancement**

- 12.9.13 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 cycle paths that connect existing residential areas to each other and the provision of car parking with disabled spaces near the Golden Heart Inn which would enable people who may otherwise not visit sites, easier access to open space.
- 12.9.14 These are considered carefully and also form part of the draft Public Rights of Way Management Plan (Appendix 12.2), which sets out the proposed enhancement with new routes for walkers, cyclists and horse riders and other users of rights of way/highways with public access rights. This includes repurposing part of the existing A417 as a WCH corridor (to be known as the Air Balloon Way) and connecting it to Cold Slad and beyond with a bridleway and grade separated diversion of the National Trail via a new crossing to enhance WCH connectivity throughout the study area.
- 12.9.15 Care has been taken to ensure that any proposed PRow, such as the Air Balloon Way does not traverse the replacement common land.

## **12.10 Assessment of effects**

### **Land use and accessibility**

- 12.10.1 The following sections of this Chapter present the assessment of effects on the broad topic of land use and accessibility during both construction and operation of

the scheme. The assessment is structured around the various elements described in LA 112 to ensure compliance with Standards and align to the assessment criteria presented in section 12.5.

### Private property and housing

12.10.2 The assessment of effects on private property and housing considers the potential effects on residential properties within the vicinity of the scheme, as well potential effects on residential development land. As described in the baseline, only five residential properties are located within the DCO boundary of the scheme and are concentrated in the area between Crickley Hill and the current Air Balloon roundabout. Within this area, the topography means that the scheme narrows and space to deliver the widening is limited. The topography also means that some significant earthworks are required in this area.

### Effects on private property and housing during construction

12.10.3 The potential direct effects on residential properties during construction are explored in Table 12-19 which considers the potential effects, magnitude of this effect and subsequent significance within the DCO boundary, where there would be potential for direct effects.

**Table 12-19 Effects on residential properties – construction**

Receptor	Sensitivity	Potential effect(s)	Magnitude	Significance
Fernbank, Cold Slad Lane	Medium	A discernible change in attributes and environmental quality during construction activities in close proximity. This relates to ground stabilisation works.	Minor	Slight adverse
Half Acre, Crickley Hill	Medium	A discernible change in attributes and environmental quality during construction activities in close proximity. This relates to ground stabilisation works.	Minor	Slight adverse
Pinewood, Crickley Hill	Medium	Direct acquisition and demolition of building as a result of the construction of the mainline and Grove Farm underpass.	Major	Large adverse (not considered to be moderate because of total demolition)
Woodside House, Crickley Hill	Medium	Direct acquisition and demolition of building as a result of the construction of the mainline.	Major	Large adverse (not considered to be moderate because of total demolition)
Crickley Ridge, Crickley Hill	Medium	Partial removal of land compromising the viability of the property as a result of the construction of the scheme.	Moderate	Moderate adverse

12.10.4 It should be noted that 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.

- 12.10.5 Impacts on Fernbank and Half Acre relate to ground stabilisation works, which are not expected to have a significant effect on these properties at this stage. The impact would be temporary during construction and the works would not permanently take land from the properties.
- 12.10.6 Given the need for full demolition and land acquisition at Woodside House and Pinewood, the construction of the scheme would lead to a magnitude of impact which is major and when combined with a medium sensitivity would lead to a large adverse effect, which would be significant. This considers the requirement for full demolition of the property and acquisition of the entire land holding.
- 12.10.7 In relation to Crickley Ridge, construction of the scheme would require partial land acquisition which could compromise the viability of the property for the current owners due to the removal of paddocks. This is considered to lead to a moderate magnitude of impact which when combined with a medium sensitivity would lead to a moderate adverse effect, which would be significant. This would not prevent the property being occupied by a new owner with different needs.
- 12.10.8 In relation to private property and housing within the wider study area (500m) that would experience indirect effects during construction, effects 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. The effects during construction activities could result in a discernible change in attributes and environmental quality with a likely slight adverse impact, which when combined with a medium sensitivity of these properties would not be significant.
- 12.10.9 The construction of the scheme is not anticipated to lead to any significant effects on residential development land within the study area given there are no allocated sites or relevant planning applications within the study area.

#### **Effects on private property and housing during operation**

- 12.10.10 The potential direct effects on private property and housing during operation are explored in Table 12-20 which considers the potential effects, magnitude of this effect and subsequent significance within the DCO boundary, where there would be potential for direct effects.
- 12.10.11 Pinewood and Woodside House have been removed from this assessment, given they would be demolished as part of the construction phase.

**Table 12-20 Effects on residential properties – operation**

<b>Receptor</b>	<b>Sensitivity</b>	<b>Potential effect(s)</b>	<b>Magnitude</b>	<b>Significance</b>
Fernbank, Cold Slad Lane	Medium	The scheme would result in a discernible change in the property's attributes and quality, given the increased impact of traffic and scheme proximity.	Minor	Slight adverse
Half Acre, Crickley Hill	Medium	The scheme would result in a very minor alteration to the property's characteristics given the increased impact of traffic on the A417.	Negligible	Slight adverse (not considered to be neutral given an effect would be experienced as a result of the scheme)

Receptor	Sensitivity	Potential effect(s)	Magnitude	Significance
Crickley Ridge, Crickley Hill	Medium	The scheme would result in a discernible change in the property's attributes and quality, given redistribution of traffic and scheme proximity to the north. Access would be maintained with a private means of access.	Minor	Slight adverse

12.10.12 In relation to private property and housing within the wider study area (500m), the relative distance between the properties and the scheme would not differ significantly from the baseline situation. Any effects would be indirect, and impacts would therefore largely range from negligible to minor in magnitude, which when combined with a medium sensitivity of these properties would not be significant, leading to a slight adverse effect at worst. It is acknowledged that there would be exceptions to this where the scheme would result in the redistribution of traffic and associated amenity effects, which could result in changes to the attributes and environment of private property and housing. Instances of where this is the case include:

- Birdlip would experience a slight beneficial change in attributes and environmental quality given the A417 would be redirected east and the existing A417 would be repurposed as a restricted byway with associated landscaping.
- Cowley would experience a slight adverse change in attributes and environmental quality given the A417 would be redirected east and the new alignment would bring traffic closer to the settlement.
- Brimpsfield would experience a slight beneficial change in attributes and environmental quality given the A417 and new Cowley junction would help reduce the need for rat running through the village.

12.10.13 Detailed assessment of the indirect/amenity effects described above are considered in Chapter 5 Air Quality, Chapter 7 Landscape and Visual Effects and Chapter 11 Noise and Vibration assessments.

12.10.14 The scheme is not anticipated to lead to any significant effects on residential development land within the study area given there are no allocated sites or relevant planning applications within the study area. During operation, the scheme would generally bring accessibility benefits in the wider area given the strategic importance of this section of the A417 and the reduced congestion and improved network resilience and safety that the scheme would deliver. This would bring minor beneficial impacts for the strategic allocation at North Brockworth.

### **Community land and assets**

12.10.15 This section of the assessment considers effects the communities in the study area with a focus on assets, facilities and land.

12.10.16 For the purposes 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, we consider likely effects on communities as a whole (local population) and then community assets/facilities and land.

12.10.17 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 (e.g. Crickley Hill Country Park which

could be considered as both a community asset and visitor destination, or Ullenwood Bharat Cricket Club which could be considered as both a community asset and recreational ground).

### Communities

- 12.10.18 There are a limited number of settlements along the scheme which rely on the A417 for direct access and the majority of planned works are to be undertaken off-line in an area which is further from the main settlements when compared to the existing A417. However, it is recognised that a combination of construction effects could lead to potential effects on access to facilities or services (e.g. footpath closures, increased construction traffic on the road network etc.).
- 12.10.19 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 A417 such as Birdlip, Brimpsfield and Witcombe could be affected by the construction activities including the presence of compounds, earthworks and machinery. Noise effects would be temporary and at their worst in close proximity to the scheme alignment.
- 12.10.20 However, the current A417 does not pass directly through any of these settlements and therefore any adverse or potentially significant effects are considered to be avoidable with appropriate management measures. For example, traffic management would help 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.
- 12.10.21 With mitigation in place and given the location of the communities within the surrounding areas, it is not considered that the scheme would lead to any significant effects on communities during construction.
- 12.10.22 Given the geographic location of the scheme and the type/volume of construction skills required, it is anticipated that a proportion of the construction workforce would be 'imported' 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 scheme have a good supply of serviced and non-serviced accommodation and would likely be able to accommodate the workforce demand.
- 12.10.23 This could bring beneficial effects to the local accommodation sector during the construction programme, bringing additional trade at their quietest times of the year.
- 12.10.24 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 e.g. services<sup>15</sup>.

### Community land and assets during construction

- 12.10.25 Highways England have tried 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.
- 12.10.26 Potential effects on community assets during construction of the scheme are explored further in Table 12-21.

**Table 12-21 Effects on community assets during construction**

Receptor	Main activity	Sensitivity	Magnitude	Significance
<b>Community assets</b>				
Saint John Chrysostom Orthodox Church	Place of Worship	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity.	Slight adverse
Birdlip Primary School	Education	High	Negligible – very minor change given construction activities in the surrounding areas.	Slight adverse
National Star	Education (further education, training, personal development and residential services for people with physical and learning disabilities and acquired brain injuries).	Very High	Negligible – very minor change given construction activities in the surrounding areas and improvements to existing drainage on land owned by National Star that would not affect the receptor.	Slight adverse
Birdlip Village Hall	Community facility	High	Negligible – very minor change given construction activities in the surrounding areas.	Slight adverse
Ullenwood Bharat Cricket Club	Cricket Club	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity, with new access and improvements to existing drainage proposed.	Slight adverse
Birdlip and Brimpsfield Cricket Club	Cricket Club	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Neutral (not considered to be slight given an effect would not be experienced as a result of the scheme)



Receptor	Main activity	Sensitivity	Magnitude	Significance
Crickley Hill Country Park	Country Park with visitor centre, café and waymarked trails	Very High	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity, with minor loss of and alteration to key characteristics. Construction requires acquisition of some land which would not compromise the overall viability of the resource – assumed that access to resource would be maintained at all times.	Moderate adverse (not considered to be large because land required and access arrangements would not compromise the overall viability)
Ermine Street Guard	Community / membership based organisation	Low	Negligible – very minor change given construction activities in the surrounding areas.	Neutral ((not considered to be slight given an effect would not be experienced as a result of the scheme)

- 12.10.27 In attributing a magnitude value to receptors, the assessment has drawn on proximity to the 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.
- 12.10.28 The scheme includes for changes to access provision and includes land-take at Crickley Hill Country Park. Whilst it is not considered that these requirements would compromise overall viability or use of the facility, it is considered that the scheme would lead to a discernible change in attributes of minor magnitude, which when considered against the receptors' very high sensitivity, leads to potential moderate adverse effect, which would be significant. The CTMP would ensure access is available to the facility during construction of the scheme.
- 12.10.29 The remainder of effects on all other community and tourism/recreation receptors are indirect and relate to potential effects associated with accessibility (e.g. severance or increased access issued) and more general construction effects (e.g. noise effects).
- 12.10.30 A CTMP would identify the key areas where the works impact on the existing A417 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.
- 12.10.31 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 over and above the direct effects recorded above.
- 12.10.32 When considering potential effects on community land, the assessment focusses on the areas of Common Land and open space land (Open Access Land and Country Park) identified in PEI Report Figure 12.4. This section takes each of these in turn.

### Common Land

- 12.10.33 The compulsory acquisition of 7,392 square metres of Common Land is required to enable delivery of the scheme including in the area surrounding Barrow Wake.
- 12.10.34 In accordance with Section 131 of the Planning Act 2008, Highways England are proposing an area of replacement land in exchange for the Common Land being compulsorily acquired. The requirements for replacement land are defined in Section 131(12) as land which is:
- Not less in area than the order land (the area proposed to be acquired)
  - No less advantageous to the persons entitled to the rights of common or other rights
  - No less advantageous to the public
- 12.10.35 As shown in PEI Report Figure 12.4, the preferred location for the replacement Common Land is within a section of the repurposed A417. This land is connected to the existing Common and would be re-landscaped as part of the scheme (see Chapter 7 for further details). The land would be accessible, and the proposal would bring back Common Land that was previously de-registered for the construction of the current A417 and re-link an area of Common which currently sits to the east of the existing road and has been severed by the existing A417.
- 12.10.36 The Air Balloon Way would terminate at the Common Land and navigate cyclists and horse riders through the Barrow Wake Car Park to then re-join the repurposed A417 further north, to avoid these users on the Common. Use of drystone walls and/or other physical barriers and/ or clear signage would help demark routes for these users.
- 12.10.37 The land identified as replacement land measures in the region of 10,830m<sup>2</sup> and is therefore greater than the area to be acquired. Although the replacement land would not be provided at the time of acquisition (as the repurposing works would not take place until traffic is directed onto the new mainline), Highways England believe that the proposed replacement land meets the requirements of the Planning Act. Acquisition of the Common Land would be phased to ensure that the Common Land would only be taken at the point in the construction programme when works would be undertaken on the Common and to create the proposed replacement land.
- 12.10.38 During construction the scheme is expected to have a slight adverse effect on Common Land. The permanent land-take associated with Common Land is discussed further in the operational assessment below.

### Open Space

- 12.10.39 The Open Space land required permanently as part of the scheme is to facilitate the mainline widening (e.g. carriageway and ground stabilisation works) to the south of Crickley Hill or is associated with drainage works.
- 12.10.40 Some of the land plots affected currently have an extremely steep gradient and would be difficult to access for the purposes of recreation. Proposals within the draft PRow Management Plan (Appendix 12.2) would arguably make these areas more accessible and they would certainly be no less advantageous.
- 12.10.41 Some plots currently sit under the A417 and should have been de-registered when the current road was constructed.



- 12.10.42 Where land is required temporarily or with permanent rights, this relates to works such as construction compounds and underground longitudinal drainage works. Access rights would therefore be restricted for the duration of the construction works but would be fully re-instated over the land post construction.
- 12.10.43 Although construction would therefore lead to a temporary loss of access rights, the scheme would not lead to the permanent loss/damage of either open access land or country park, with access rights being reinstated following construction. With appropriate mitigation in relation to restoration and re-instatement, and with proposals such as the Cotswold Way crossing which make certain areas more accessible, construction of the scheme is considered to bring a slight adverse effect which would not be significant.
- 12.10.44 In line with the provisions of section 131, subsection 5 of the Planning Act, it is considered that exchange land is unnecessary in relation to the open space land affected.

#### Community land and assets during operation

- 12.10.45 During operation of the scheme it is anticipated that there would be an overall reduction in the number of vehicles passing through communities within the areas surrounding the A417. This primarily relates to the scheme addressing issues around resilience of the A417, leading to less congestion and associated use of local roads during these times.
- 12.10.46 As such, reduced delays and improved travel conditions and journey times as a result of the scheme are likely to contribute positively to accessibility to communities, facilities and services during operation, with overbridges provided as part of the proposed A417 in order to facilitate greater connectivity across the scheme. This is considered to lead to a slight beneficial effect in terms of accessibility for local communities along the scheme.
- 12.10.47 There would be limited employment benefit as result of the scheme during its operation, beyond typical maintenance arrangements. However, benefits of the 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 scheme's construction.
- 12.10.48 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.
- 12.10.49 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 scheme.
- 12.10.50 None of the identified community assets would be directly affected during operation of the scheme with impacts associated with demolition or land take having occurred during the construction stage.
- 12.10.51 During operation, the scheme is anticipated to lead to improvements in travel conditions. This would be particularly beneficial at peak times during summer months when congestion is often experienced, 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 scheme could therefore lead to slight beneficial effects on the identified receptors in terms of accessibility.

- 12.10.52 In relation to the areas of common land affected by operation of the scheme (permanent land take), areas of replacement land have been identified in the area adjacent to the existing Common Land, utilising the repurposed A417 (see PEI Report Figure 12.4). Although this land would not be available until the new section of A417 is open to traffic, it is considered that it offers a number of benefits over other land which was considered:
- the land is contiguous with the existing Common Land;
  - the land would be accessible via the repurposed A417;
  - as part of these proposals, the land would be re-landscaped; and
  - the land would bring back into Common, land which was previously de-registered to facilitate the construction of the current A417.
- 12.10.53 This replacement land includes in the region of 10,830m<sup>2</sup> of Common Land. The Common Land to be acquired is characterised as wooded, densely vegetated areas adjacent to the highway or between the Barrow Wake access road and the existing A417. In visiting the area, the land in question could be considered to be highway verge and there are no PRowS through the Common Land to be acquired and no signs of access/use.
- 12.10.54 The replacement Common Land is to be re-landscaped as part of the scheme and would be accessible on foot and it is therefore considered that the proposal would be more advantageous to those with rights over the land and to the public, offering enhanced attributes when compared to the Common Land to be acquired.
- 12.10.55 The Air Balloon Way would terminate at the Common Land and navigate cyclists and horse riders through the Barrow Wake Car Park to then re-join the repurposed A417 further north, to avoid these users on the Common. Use of drystone walls and/ or other physical barriers and/or clear signage would help demark routes for these users.
- 12.10.56 Following provision of this replacement land and during operation of the scheme, it is therefore considered there would be a slight beneficial change through the re-provision of Common Land.
- 12.10.57 The proposed replacement land strategy would be provided as part of the Statement of Case and viewed on the Special Category Land Plans to be submitted as part of the DCO application.

### **Development land and businesses**

- 12.10.58 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 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

- 12.10.59 The design of the 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 re-provision of access to ensure accessibility during construction).
- 12.10.60 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 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 scheme. Where such mitigation has been provided, a summary is given in Table 12-22 below.

- 12.10.61 The 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.
- 12.10.62 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.

**Table 12-22 Businesses during construction**

Receptor	Sensitivity	Magnitude	Significance
Galtec Civil Engineering/groundwork contractors	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Bentham Lane Poultry Unit Agricultural products	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Witcombe Supplies Catering	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Pipeline Logistics Contractor	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Crickley Hill Tractors Tractor dealer	Medium	Major – total loss of business due to proposed scheme mainline and associated earthworks.	Large adverse (not considered to be moderate given total demolition)

<b>Receptor</b>	<b>Sensitivity</b>	<b>Magnitude</b>	<b>Significance</b>
Countryside Mobility equipment	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Rushwood Kennels and Cattery	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Shab Hill junction and side road, with access maintained during construction.	Slight adverse
McCarthy Taylor Systems Software	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Shab Hill junction and side road, with access maintained during construction.	Slight adverse
First Dance Discos Mobile disco	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Cotswold Way Sign Post Café / Crickley Hill Cafe	Medium	No change given location and nature of works in surrounding area, could benefit from construction worker spend.	Neutral
Clavel and Hind Brewery	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Watercombe Farm	Medium	No change given location and nature of works in surrounding area, could benefit from construction worker spend.	Neutral
Stockwell Farm	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Stockwell Overbridge and Cowley Overbridge, with access maintained during construction.	Slight adverse

Receptor	Sensitivity	Magnitude	Significance
Brimpsfield Estate Farm and shoot	Medium	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Carron Lodge Ltd Cheese	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Shab Hill junction and side road, with access maintained during construction.	Slight adverse
Mainstream Digital Telecommunications and technology equipment	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Shab Hill junction and side road, with access maintained during construction.	Slight adverse
Three Piece Joinery	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Shab Hill junction and side road, with access maintained during construction.	Slight adverse
Optimum Oils Limited/Optimum Industrial Limited	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Shab Hill junction and side road, with access maintained during construction.	Slight adverse
Race Techniques at Birdlip Quarry Motorcycle trials	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Cowley junction and side road, with access maintained during construction.	Slight adverse
Hasson Quarry Products Ltd	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity. A new access is proposed via Cowley junction and side road, with access maintained during construction.	Slight adverse
Tarren Production	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral

Receptor	Sensitivity	Magnitude	Significance
DJP Construction	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral
K Bawden	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral
JS Equine	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral
FeastABLE	Medium	Negligible – potential for very minor change given construction activities in the surrounding area and nature of the festival.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Star Bistro	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral
Field View Lane	Medium	Negligible – very minor change given construction activities in the surrounding areas.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Royal George Hotel	Medium	Negligible – very minor change given construction activities in the surrounding areas.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Crickley Court Cottages	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity.	Slight adverse
Star Glamping	Medium	Negligible – very minor change given construction activities in the surrounding areas.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
The Barn	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity.	Slight adverse

Receptor	Sensitivity	Magnitude	Significance
Stockwell Farm Residential Lettings	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity.	Slight adverse
Air Balloon Pub	Medium	Major – direct acquisition and demolition of receptor leading to a total loss of resource.	Large adverse (not considered to be moderate given total demolition)
Golden Heart Inn	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity.	Slight adverse
Bentham Country Club	Medium	Negligible – very minor change given construction activities in the surrounding areas.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Costwold Hills Golf Club/Ullenwood Manor Golf Course/Star Golf	Medium	Negligible – very minor change given construction activities in the surrounding areas.	Slight adverse (not considered to be neutral given potential effect of construction activities / traffic on local roads)
Flyup 417 Bike Park	Medium	Minor – A discernible change in attributes and environmental quality during construction activities in close proximity, with minor loss of and alteration to key characteristics. Construction requires amendments to access and acquisition of some land which would not compromise the overall viability of the resource – scheme includes new access and replacement parking to avoid conflict between construction and operation of the receptor.	Slight adverse
Little Witcombe Court	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral

- 12.10.63 As part of the scheme's construction, there would be one direct and unavoidable effect on the Air Balloon public house, which serves tourists/visitors as well as the local population. This would lead to a significant adverse effect on this resource given the total loss as part of construction.
- 12.10.64 There would also be a direct and unavoidable effect on Crickley Hill Tractors, which would be lost to the scheme mainline and earthworks, leading to a significant adverse effect.
- 12.10.65 With appropriate mitigation, the construction of the 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 access is maintained to

business receptors and in particular that construction does not affect events such as FeastABLE held at Star College on an annual basis.

- 12.10.66 The construction of the scheme is not anticipated to lead to any significant effects on development land within the study area given there are no allocated sites or relevant planning applications within the study area.

#### Development land and businesses during operation

- 12.10.67 During the operation of the scheme and its access arrangements, it is not considered that the development land and businesses identified within the study area would experience significant adverse effects, given access would be maintained to all receptors.
- 12.10.68 In the south of the scheme, the Golden Heart Inn tenants, through the 2019 public consultation, did express concerns about loss of passing trade given their existing direct access from the A417, which would change to indirect access with the new scheme in place. Discussions between Highways England and the owners of the Golden Heart Inn have however been positive, and the potential benefits from the improved environment and access via the repurposed A417 as a key WCH corridor and trail have been welcomed.
- 12.10.69 The scheme proposes additional parking provision in the vicinity of the Golden Heart which would provide designated parking for horse boxes and other WCH users, encouraging use of the repurposed A417 and providing a commercial opportunity for the public house. In addition, access to the Golden Heart would be maintained via the proposed Cowley junction.
- 12.10.70 Given this position it is considered that the scheme could bring minor beneficial effects to the Golden Heart with opportunity for it to remain a destination public house and further promote its location on a new WCH corridor / trail.
- 12.10.71 Overall, the 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 on this section of the A417 but would also help to accommodate forecast growth in traffic moving forward. The 2019 traffic model results prepared for the scheme shows a forecast increase in two-way flows of between 25% and 27% when compared to the do minimum scenario (2024). Such an increase could lead to a potential increase in business / opportunities in the area, particularly for those based around recreation, food and accommodation which are typically more targeted at visitors or passing trade.
- 12.10.72 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. Operation of the 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**

- 12.10.73 The assessment of effects in relation to agricultural land quality is provided separately through Chapter 9 Geology and Soils.
- 12.10.74 This section of the assessment considers the potential effects of the scheme on agricultural holdings through land take, demolition or severance/accessibility restrictions. The holdings potentially affected as shown on PEI Report Figure 12.5.



- 12.10.75 In line with LA 112 the assessment is focussed on the loss of or damage to key characteristics, features or elements of the agricultural holding and potential effect of this change on viability (e.g. removal or substantial amendment to access or acquisition of land).
- 12.10.76 The availability of, access to and nature of land is considered to form the key characteristics, features or elements of an agricultural holding. As such, the potential effect on land is therefore a key part of the assessment. The land take requirements of the scheme on individual holdings are considered in Table 12-23 which details the proportion of the holding required and whether land take is permanent, temporary (e.g. for construction only), or temporary with access rights during operation. In summary, of the 17 agricultural holdings affected:
- 15 would experience some permanent land take;
  - 10 would experience some temporary land take during construction; and
  - 15 would experience temporary land take with rights over the land during operation of the scheme.
- 12.10.77 The assessment of potential significant effects is considered for both the construction phase (where temporary land take is only relevant) and operation (where permanent land take and where rights over the land are required only) and is presented in Table 12-23 below.

**Table 12-23 Land holdings and land take**

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance <sup>16</sup>
Alexander and Angell Limited	34.73	6.19	5.01	0	1.18	Low	Minor - small proportion of permanent land take that is unlikely to compromise overall viability of the holding. No change in relation to accessibility.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Brimpsfield Estate	152.08	0.00	0	0	0	Low	Negligible - Extremely small areas of land (<1m <sup>2</sup> ) required for drainage works as part of the scheme. No change in relation to accessibility.	Neutral (not considered to be slight given size and nature of the works on the holding)
Crickley Hill Country Park	27.24	0.20	0.15	0.05	0	Low	Minor - small proportion of permanent and temporary land take which is unlikely to compromise the overall viability of the holding. No change in relation to accessibility.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Cuckoopen Barn Farm	18.56	0.99	0.81	0.1	0.08	Low	Minor - small proportion of permanent and temporary land take which is unlikely to compromise the overall viability of the holding. Adequate ongoing accessibility provision.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance <sup>16</sup>
Dick	10.72	6.57	6.33	0.15	0.10	Negligible	Major - Scheme proposes loss of 60% of the holding which may compromise the overall viability. Adequate ongoing accessibility to remaining land.	Slight adverse
Field	3.75	0.35	0.12	0	0.22	Low	Negligible - land take is temporary with access rights so would not directly affect overall viability or accessibility moving forward.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Ford Fosse Farm	64.97	8.10	0.31	7.36	0.43	Low	Minor - mainly temporary land take during construction with permanent land take unlikely to affect overall viability. No change in relation to accessibility.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Garlick	27.88	6.66	6.12	0	0.54	Low	Minor - small proportion of permanent and temporary land take which is unlikely to compromise the overall viability of the holding. Adequate ongoing accessibility to remaining land.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance <sup>16</sup>
Gloucestershire Wildlife Trust	33.14	0.85	0.49	0.16	0.19	Low	Minor - small proportion of permanent and temporary land take which is unlikely to compromise the overall viability of the holding. Adequate ongoing accessibility provision.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Hazell	7.15	0.24	0.24	0	0	Low	Minor - small proportion of permanent land take which is unlikely to compromise the overall viability of the holding. Adequate ongoing accessibility provision.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Medlock	52.06	24.54	18.45	5.71	0.38	Low	Moderate - Scheme proposes loss of 35% of the holding which may compromise the overall viability. Adequate ongoing accessibility to remaining land.	Slight adverse
National Star Foundation	35.55	4.26	2.85	0.64	0.77	Low	Minor - small proportion of permanent land take which is unlikely to compromise overall viability of the holding.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance <sup>16</sup>
Overbury	50.19	2.94	1.42	0	1.52	Low	Minor - small proportion of permanent and temporary land take which is unlikely to compromise overall viability of the holding. Adequate ongoing accessibility to remaining land.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Pither Agricultural	7.19	0.00	0	0	0	Low	Negligible - Extremely small areas of land (27.6m <sup>2</sup> ) to facilitate construction access.	Neutral (not considered to be slight given size and nature of the works on the holding)
Rushwood Kennels	9.48	1.89	1.53	0.27	0.09	Low	Minor - small proportion of permanent and temporary land take which is unlikely to compromise overall viability of the holding. Adequate ongoing accessibility provision.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)
Shab Hill Farm	32.05	20.01	19.44	0.51	0.05	Low	Major - Scheme proposes loss of 61% of the holding which may compromise the overall viability.	Moderate adverse (not considered to be slight given the potential effect on the viability of the holding)

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance <sup>16</sup>
Stockwell Farm	389.23	60.38	47.78	6.59	6.01	Low	Minor - small proportion of permanent and temporary land take which is unlikely to compromise overall viability of the holding. Adequate ongoing accessibility provision.	Slight adverse (not considered to be neutral given an effect would be experienced as a result of works on the holding)

### Agricultural land holdings during construction

- 12.10.78 The scheme would lead to the temporary loss of approximately 21.54ha with an additional 11.57ha taken temporarily with future rights over it. This requirement can be summarised as follows:
- 7 holdings experiencing no temporary land take;
  - 8 holdings experiencing temporary land take less than 10% of the overall holding; and
  - 2 holdings experiencing temporary land take of between 10 and 25% of the overall holding.
- 12.10.79 In general, those holdings where temporary land take is anticipated to be higher are those where temporary construction compounds or material storage areas are proposed. Best practice construction mitigation would be employed throughout this stage of the scheme and all temporary land would be returned to the landowner in a restored state following the completion of construction activities. Further details in relation to the construction management would be found in the EMP.
- 12.10.80 Severance during construction would be limited through careful siting of construction compounds and lay down areas and planning of construction activities in consultation with the landowners. Where necessary, new temporary and permanent accesses are being provided (e.g. Stockwell Farm and Cowley Lane overbridges) and would be implemented in advance of the mainline construction works to ensure continued access to agricultural holdings. The construction stage is therefore not anticipated to lead to any significant effects on agricultural holdings in terms of access or severance issues.
- 12.10.81 In order to construct the scheme permanent land take is required which would continue to affect farm holdings during operation. Those holdings where a moderate or major magnitude is identified include Dick, Medlock and Shab Hill Farm. The scheme would require a large proportion of their agricultural holdings, which may impact on their viability in relation to the amount of land remaining to be farmed / productive. Given the current use and sensitivity of the three holdings most affected (see Table 12-14) only Shab Hill Farm is expected to experience a potential significant effect.
- 12.10.82 Given the relatively small areas of land required for other holdings during construction, as a proportion of the overall agricultural holdings, as well as the temporary nature of the works, potential effects are considered to be slight adverse given the overall viability of the holdings is unlikely to be compromised significantly.
- 12.10.83 Agricultural holdings within the wider 500m study area would experience no loss or alteration of characteristics, features, elements or accessibility during construction (no change) which when combined with their low sensitivity would lead to a neutral effect.

### Agricultural land holdings during operation

- 12.10.84 The scheme would lead to the loss of approximately 111ha of agricultural land across the 15 agricultural holdings that are affected during operation of the scheme. Of those holdings experiencing permanent land take:
- 8 holdings would experience land take which is less than 10% of the overall holding;
  - 4 holdings would experience land take between 10 and 25% of the overall holding; and
  - 1 would experience land take between 26 and 50% of the overall holding; and
  - 2 would experience land take which is in excess of 50% of the overall holding.
- 12.10.85 Potential severance effects during operation have been considered as part of the design development and the scheme includes a number of solutions that mitigate potential severance to agricultural holdings.
- 12.10.86 This includes new private means of access and a number of new overbridges which have been designed in consultation with affected landowners and would meet their long-term needs.
- 12.10.87 Overall, and given the steps taken by Highways England to avoid complete severance of land with no access, it is not considered that the scheme would lead to any significant severance effects on agricultural holdings during operation.
- 12.10.88 With temporary land take returned to the farm holding post construction, it is considered that the majority of agricultural holdings would continue to operate, particularly given mitigation measures such as new overbridges which seek to provide ongoing access between land and key infrastructure. Overall, during operation it is therefore considered that there would be neutral or slight adverse effects on agricultural holdings.
- 12.10.89 Agricultural holdings within the wider 500m study area would experience no loss or alteration of characteristics, features, elements or accessibility during operation (no change) which when combined with their low sensitivity would lead to a neutral effect.

### **Walkers, cyclists and horse riders**

#### General approach to assessment of WCH

- 12.10.90 The assessment of effects on Walkers, Cyclists and Horse riders (WCH) considers direct effects on the routes where they are crossed by the scheme and/or affected during construction (e.g. used in full or in part as construction accesses or crossed by construction routes).
- 12.10.91 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 scheme or construction works. When considering indirect amenity effects, the assessment has been completed in the context of the current baseline.
- 12.10.92 As explained as part of the baseline, the scheme also has the potential to affect unclassified roads or ORPAs that interface with the scheme. Those that are affected by works are also shown on PEI Report Figure 12.2.



- 12.10.93 There are three local routes that interface and are considered of interest in light of stakeholder engagement. These are all situated in the vicinity of Shab Hill are identified on the relevant List of Streets as:
- 50852;
  - 50853; and
  - 50944.
- 12.10.94 These highways are not shown on the definitive maps that 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). However, it is acknowledged that they are often used by walkers, cyclists and horse riders, potentially alongside motorised vehicles, given a route's inclusion in the highway authority's list of maintainable highways means that the authority regards it as a highway with public rights. These 'local routes' would be shown on the Rights of Way and Access Plans when submitted as part of the DCO application.
- 12.10.95 The draft Public Rights of Way Management Plan (Appendix 12.2) shows proposed stopping up, diversions and new routes for WCH and other users of highways and local routes with public access rights.
- 12.10.96 The scheme includes a number of elements that either ensure continued access for WCH or bring improvements in terms of current accessibility/severance, as follows:
- The Cotswold Way crossing – a structure in the region of 5m wide to provide a WCH crossing in the vicinity of Emma's Grove and connecting to Cold Slad is proposed to provide benefits including a grade separated diversion of the Cotswold Way National Trail. It would enhance the visitor experience of this important long-distance route, bringing a significant improvement on the existing situation. New sections of bridleway and restricted byway would connect into existing routes to help enhance WCH connectivity east-west and north-south. The structure could also accommodate seasonal cattle crossings from nearby agricultural holdings, as requested by local farmers.
  - The Gloucestershire Way crossing - a structure in the region of 25m wide to accommodate the Gloucestershire Way diversion and provide an improved landscape experience for users. Walkers would use the structure to connect to Cowley footpaths 1, 16 and 3 which form part of the promoted Gloucestershire Way and new / diverted routes. Other non-motorised users would use the structure to connect to unclassified roads and avoid the need to cross through the Shab Hill junction, giving users choice. Either side of the crossing, separate bridleways, side roads and footpaths would connect users onto a bridleway running over the crossing.
  - Cowley Lane overbridge – this bridge over the new A417 would provide access between Stockwell and Cowley. The bridge would include provision for WCH, helping connect into the existing PRow and unclassified roads via new steps and sections of restricted byway and footpath.
  - Stockwell Farm overbridge – this bridge over the new A417 would primarily provide a farm access track from Stockwell Farm in an east-west direction. The bridge would include provision for WCHs, helping connect into existing restricted byways and a reclassified section of footpath to help improve connectivity for WCH.

- Grove Farm underpass – this underpass would provide access to local properties and agricultural land, with provision for WCH via new sections of bridleway and footpath diversions to connect Cold Slad Lane.
- Re-purposed A417 – the existing A417 would be repurposed to provide a restricted byway connection between new car parking near the Golden Heart Inn and Barrow Wake Car Park (and beyond), proposed to be called the ‘Air Balloon Way’.

- 12.10.97 New parking near the Golden Heart Inn would help encourage redistribution of WCH activity away from the areas of SSSI and the Air Balloon Way connecting into and guiding WCH through Barrow Wake would improve natural surveillance to help create a more family friendly area.
- 12.10.98 The draft PRow Management Plan (Appendix 12.2) demonstrates a planned approach to the management of PRow during the construction and operation of the scheme, ensuring public safety while reducing disruption to users.
- 12.10.99 It seeks to manage 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 effect 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);
  - 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); and
  - provision of new crossings/routes as part of the scheme (new routes).
- 12.10.100 Each of these measures is described in further detail within the draft Public Rights of Way Management Plan (Appendix 12.2).
- 12.10.101 Permanent closures without substitute are only be proposed in the following circumstances:
- where the value of the route is not sufficient to justify re-provision or diversion as part of the scheme (for example a short length of PRow at its terminus); and
  - where the scheme and the mitigation proposals divert a route, rendering part of the current route no longer accessible.
- 12.10.102 All potential diversions and proposed new routes would also be shown on the Rights of Way and Access Plans supporting the DCO application, when submitted. That would provide the necessary powers to stop up PRow and implement diversions and new routes as necessary.
- 12.10.103 An assessment of potential effects on PRow that interact with the scheme is provided in Table 12-24 below. This considers potential direct effects and the required mitigation where necessary. However, professional judgement must also be applied when considering any likely effects during the construction and operation stages of the scheme, particularly when considering the potential changes in quality of the route, as well as variation in changes in route distance

depending on different origins and destinations served by the PRow as part of its wider connecting public access network.

- 12.10.104 In addition, and in order to provide mitigation and enhancement as part of the scheme, a number of new routes, reclassification of PRow or new access rights are proposed and would be implemented through the draft PRow Management Plan (Appendix 12.2). These new proposals are detailed in Table 12-25.

**Table 12-24 Assessment of effects PRow**

<b>PRow</b>	<b>Sensitivity</b>	<b>Effects / mitigation</b>	<b>Journey distance</b>	<b>Magnitude</b>	<b>Significance<sup>17</sup></b>
<b>Existing PRow Network</b>					
Cotswolds Way National Trail	Very high	Short section from south of Air Balloon to be stopped up with new restricted byway proposed over a new Cotswold Way crossing to also carry the National Trail over the A417 near Emma's Grove where it would re-join its existing route.	>50m-250m decrease (beneficial)	Minor	Moderate beneficial (not considered to be large given the scale of change in journey distance, although positive change for grade separated crossing compared to existing at-grade crossing)
Badgeworth bridleway 125	Medium	Section to be stopped up with no onward bridleway connections, with new Private Means of Access (PMA) to serve new attenuation basin in this area. Alternative route provided to the north of the A417 via Dog Lane and Cold Slad Lane with new bridleway connection between the two.	50m-250m decrease (adverse)	Minor	Slight adverse
Badgeworth footpath 77	Medium	Short section to be stopped up and footpath to be diverted along new PMA.	<50m decrease	Negligible	Neutral (not considered to be slight given re-provision and scale of change in journey distance)
Badgeworth footpath 78	Medium	Section to be stopped up and footpath to be diverted along new PMA.	<50m decrease	Negligible	Neutral (not considered to be slight given re-provision and scale of change in journey distance)
Badgeworth footpath 74	Low	Short section to be stopped up and footpath to be diverted along new PMA.	<50m decrease	Negligible	Neutral (not considered to be slight given re-provision and scale of change in journey distance)

PRoW	Sensitivity	Effects / mitigation	Journey distance	Magnitude	Significance <sup>17</sup>
Badgeworth footpath 80	Medium	Short section to be stopped up and footpath to be diverted along new PMA.	<50m decrease	Minor	Slight adverse
Badgeworth footpath 126	Medium	Section to be stopped up and footpath to be diverted onto new PMA.	<50m decrease	Negligible	Neutral (not considered to be slight given re-provision and scale of change in journey distance)
Badgeworth footpath 84	Medium	Short section at northern extent to be stopped up	>50m-250m decrease (beneficial)	Minor	Slight beneficial
Badgeworth bridleway 127	Low	Badgeworth bridleway 127 to continue to link into Dog Lane and proposed Cold Slad Lane.	No Change	No change	Neutral
Badgeworth footpath 90	Medium	No change proposed as part of the scheme.	No Change	No change	Neutral
Badgeworth footpath 86	Low	Short section at northern extent to be stopped up, with remaining section to become bridleway and connect into new section of bridleway to new Grove Farm underpass	<50m decrease (beneficial)	Negligible	Neutral (not considered to be slight given re-provision and scale of change in journey distance)
Badgeworth bridleway 87	Medium	Short section at northern extent to be stopped up, with slight diversion to connect into new section of bridleway to new Grove Farm underpass	>50m-250m decrease (beneficial)	Minor	Slight beneficial
Badgeworth footpath 89	Medium	Section to be stopped up, with diversion to connect to new Grove Farm underpass.	>50m-250m decrease (beneficial)	Minor	Slight beneficial
Coberley footpath 51	Medium	No change proposed as part of the scheme.	No change	No change	Neutral
Coberley bridleway 117	Medium	No change proposed as part of the scheme.	No change	No change	Neutral
Coberley restricted byway 12	Low	No change proposed as part of the scheme.	No change	No change	Neutral
Coberley footpath 16	High	Section to be stopped up, with diversion to connect to new Gloucestershire Way crossing	>50m-250m increase (adverse)	Minor	Slight adverse (not considered to be moderate given grade separated diversion onto realigned route)

<b>PRoW</b>	<b>Sensitivity</b>	<b>Effects / mitigation</b>	<b>Journey distance</b>	<b>Magnitude</b>	<b>Significance<sup>17</sup></b>
Cowley footpath 1	High	No change proposed as part of the scheme.	No Change	No Change	Neutral
Cowley footpath 3	High	Section to be stopped up, with diversion to connect to new Gloucestershire Way crossing	>50m-250m increase (adverse)	Minor	Slight adverse (not considered to be moderate given grade separated diversion onto realigned route)
Cowley footpath 7	Medium	Section to be stopped up, joining new section of unclassified road	>50m-250m decrease (beneficial)	No Change	Neutral
Cowley footpath 44	Medium	No change proposed as part of the scheme.	No change	No Change	Neutral
Cowley restricted byway 36	Low	Section to be stopped up with diversion to new Cowley overbridge.	>50m-250m increase (adverse) due to re-alignment	Minor	Slight adverse (not considered to be neutral given scale of change with diversion)
Cowley restricted byway 26	Medium	Section to be stopped up with diversion to new Cowley overbridge.	>50m-250m increase (adverse) due to re-alignment	Minor	Slight adverse
Cowley footpath 22	Medium	Section be stopped and diverted over new Stockwell Farm Overbridge.	>50m-250m increase (adverse) due to re-alignment	Negligible	Slight adverse (not considered to be neutral given scale of change with diversion)

**Table 12-25 PRow mitigation and enhancements**

<b>Proposal</b>	<b>Description</b>
New footpath	New section of footpath over PMA to divert and accommodate Badgeworth Footpaths 74, 78, 77, 80 and 84
New bridleway	New section of bridleway to connect Dog lane to Cold Slad Lane, providing greater connectivity for Badgeworth bridleway 127 and Footpath 90 and beyond including access to the new Cotswold Way crossing
Badgeworth footpath 86	Reclassification of Badgeworth footpath 86 to bridleway
New bridleway	New section of bridleway to connect reclassified Badgeworth footpath (bridleway) 86 to Badgeworth bridleway 87 and new Grove Farm underpass
New bridleway	New section of bridleway via a new Grove Farm underpass to connect Badgeworth bridleway 87 with Cold Slad Lane
New footpath	New section of footpath to connect Badgeworth bridleway 87, Grove Farm underpass and Badgeworth Footpath 89 / Cowley Footpath 24
New restricted byway	New restricted byway over new Cotswold Way crossing to connect repurposed A417 to Cold Slad Lane, accommodating the Cotswold Way National Trail
New bridleway	New bridleway to connect Leckhampton Hill to Cold Slad Lane and Cotswold Way crossing
New footpath	New footpath to connect Cold Slad Lane and the Cotswold Way crossing to Coberley Footpath 15 and the Gloucestershire Way crossing
New bridleway	New bridleway over new Gloucestershire Way crossing to accommodate the Gloucestershire Way, connecting Cowley Footpath 1, Coberley Footpath 16, Coberley Footpath 15, unclassified road 50852 and Cowley Footpath 3
New bridleway	New bridleway to connect Coberley footpath 16 south to unclassified road 50852
New restricted byway	New restricted byway to connect unclassified road 50852 with B4070
Access rights	New section of B4070 with access rights along it and with adjacent pedestrian link as part of highway
New restricted byway	New short section of restricted byway to connect B4070 with repurposed A417 and Cowley Footpath 44
New footpath	New footpath to connect Shab Hill junction with unclassified road 50853
Access rights	New section of unclassified road to connect unclassified roads 50853 and 50944, joining Cowley Footpath 7
New footpath (steps)	A new set of steps on new footpath to connect Cowley Footpath 44 onto new Cowley Lane overbridge
New restricted byway	New section of restricted byway to connect new Cowley Lane overbridge and Cowley Restricted Byway 26
Access rights	New Cowley Lane overbridge to carry public access rights, connecting unclassified roads 50855, 50853, Cowley Restricted Byway 26, Cowley Footpath 44 and Cowley Footpath 22
New restricted byway	400m of restricted byway over the new Stockwell Farm overbridge.
Cowley footpath 22	Cowley footpath 22 to be reclassified as restricted byway between Cowley Footpath 40 and the new Stockwell Farm overbridge
New restricted byway	New restricted byway between Cowley footpath 39 and new Cowley junction
Cowley footpath 21	Cowley footpath 21 to be reclassified as restricted byway
New restricted byway	New restricted byway along the repurposed A417 between new area of parking near the Golden Hear Inn (west of Stockwell Lane) and Barrow Wake Car Park (the Air Balloon Way)

New restricted byway	New restricted byway to connect Barrow Wake Car Park to repurposed A417 and new Cotswolds Way crossing near Emmas Grove
New footpath	New section of footpath to connect Air Balloon Way to Cowley Footpath 46
Access rights	To run along the Old Cirencester Road to connect to Air Balloon Way

### Walkers, cyclists and horse riders during construction

- 12.10.105 The following routes would experience effects during construction as they interact with the proposed works:
- The Cotswold Way National Trail;
  - The Gloucestershire Way (Promoted Long Distance Footpath);
  - 16 footpaths across the scheme;
  - 3 bridleways across the scheme; and
  - 3 Restricted byways across the scheme.
- 12.10.106 Construction effects are likely given the linear nature of the scheme and the construction activities required. For example, noise, dust and temporary diversions could all have an impact on users of the existing routes. However, through the draft PRow Management Plan (Appendix 12.2), it is intended to keep the majority of PRow's open via local management, early re-provision and/or use of short-term, temporary closures in order to balance the risks to the public against the potential disruption that removing such a risk would cause.
- 12.10.107 It has been assumed that pre-commencement condition surveys/inspections would be undertaken on any PRow 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.
- 12.10.108 It is also assumed that during construction, Highways England or its Contractor would also 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 Gloucestershire County Council PRow Officers for discussion when appropriate.
- 12.10.109 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.
- 12.10.110 Given that many of the effects on the PRow network relate to the 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. For example, with any new PMA to be constructed, the PRow would be re-provided on its new route along the PMA in advance of the current being stopped up, thus limited periods where access is affected to a minimum.
- 12.10.111 It is therefore anticipated that with the implementation of management and appropriate mitigation as identified in the draft PRow Management Plan (Appendix 12.2) there would be slight adverse effects on the majority of WCHs during construction of the scheme, which would not be significant.



12.10.112 For those PRow in the wider study area that do not directly interact with the 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

12.10.113 As outlined above, the scheme includes numerous proposals that seek to improve accessibility and connectivity across the PRow network within the study area. In summary this includes:

- 6 sections of proposed new footpath;
- 6 sections of proposed new bridleway;
- 7 sections of proposed new restricted byway, including the repurposed A417;
- 3 instances where proposals include reclassification of PRow in order to provide greater access rights and improve connectivity for users between the existing and proposed network (one footpath to bridleway, and two footpaths to restricted byways); and
- 4 instances where access rights are proposed to provide greater connectivity between the existing and proposed PRow.

12.10.114 All new structures proposed, as described in detail in Chapter 2 would carry public access rights and/or PRow, providing a key element of mitigation in order to reduce severance for WCH across the study area.

12.10.115 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<sup>18</sup>. 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 between Highways England, its contractor and Gloucestershire County Council;
- Highways England and its contractor would provide appropriate signage for re-provided and new PRow in agreement with Gloucestershire County Council; and
- where the scheme severs local routes, the provision of alternative routes/diversions would ensure that access across the A417 scheme is maintained at key points during operation.

12.10.116 In addition to the new crossing points and new routes, the opportunity in relation to reclassification of the existing A417 for the part referred to as the Air Balloon Way would also facilitate and allow improved conditions for walkers, cyclists and horse riders. The proposals within the draft PRow Management Plan (Appendix 12.2) and summarised in Table 12-26 aim to utilise the repurposing of the A417 to greatest benefit, connecting this route into the existing network and to new proposals such as the Grove Farm underpass, B4070 link and connections to Cold Slad and Leckhampton Hill.

- 12.10.117 In relation to the Cotswold Way, the scheme proposes to divert the route across a new WCH bridge, providing a safe and attractive route for the National Trail compared to a route which at present follows the A417 at grade for a section prior to users having to cross the A417 at grade. This diversion would potentially add journey length and time to some users and reduce journey length and time for others, recognising the various origin and destinations served by the PRoW. Given the improved environment of the route and on balance, it is therefore considered that the proposal would bring moderate beneficial effects to this PRoW and its users, which would be significant.
- 12.10.118 In relation to the Gloucestershire Way, proposals include a new WCH bridge north of the Shab Hill junction, new section of footpath to connect into the Air Balloon area and connecting sections of bridleway and highway. Although this could add journey distance and time to this route for some users, it is considered that the proposals provide sufficient mitigation for the users of the Gloucestershire Way who would also benefit from no longer having to cross the A417 at grade. Proposals provide two alternative options for people utilising this route and the new footpath to the Air Balloon area would provide a landscaped environment through which walkers would travel near Ullenwood. Overall and on balance it is considered that the proposals would bring a slight adverse effect to the existing footpaths given increase in journey distance, but in providing this route and its users with a grade separated and high quality crossing of the A417, it is considered that the scheme would bring a slight beneficial effect to the Gloucestershire Way.
- 12.10.119 Additional crossings at the Cowley and Stockwell Farm overbridges and Shab Hill junction would also mitigate severance of existing footpaths, restricted byways and highways.
- 12.10.120 This would provide favourable WCH routes between key features and facilities within the study area (e.g. Crickley Hill Country Park, Barrow Wake and the Golden Heart Inn), offering opportunities for recreational rides and circular routes.
- 12.10.121 In summary, when considering the proposed re-provision, increased access rights and extent of new provision detailed within Table 12-26 and the draft PRoW Management Plan, it is considered that the proposals bring moderate beneficial effects to the PRoW and WCH network in the study area, which would be significant to users and the local communities.

### **Assessment of effects on human health**

- 12.10.122 The assessment of human health considers each of the determinants of human health identified in Table 12-6. Findings from the literature review are firstly set out, followed by an assessment of how, as a result of the scheme, the determinants of health are likely to affect the 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.
- 12.10.123 Different vulnerabilities within the population are considered and where it is identified that health outcomes for these groups may be more affected by the scheme, this is identified along with the justification. However, generally sensitivities of the communities as a whole have been considered (as defined in Table 12-18).
- 12.10.124 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

- 12.10.125 Physical access to healthcare services would not be affected by the scheme during the construction phase, i.e. people would still be able to reach these services. The construction workers are also unlikely to increase pressure on the services since many of them are likely to stay registered with their own local practices (if working from outside the region) or already be registered locally if they themselves are from the local area. Any unforeseen incident and emergency requirements requiring local services are likely to result in negligible effects given the limited nature and duration associated with that demand.
- 12.10.126 The loss of Air Balloon public house is not likely to have an adverse effect on the health of the local community as there are other options for eating out and socialising. For example, there is the Golden Heart Inn on the existing A417, 2.1 miles (3.4 kilometres) south of Air Balloon and a Beefeater approximately 3 miles (4.8 kilometres) away in Little Witcombe (east of A417). It is therefore considered that this would be a neutral health effect.
- 12.10.127 During construction access to healthcare, leisure and tourism facilities would be affected as result of the temporary disruption from construction activities. However, it is not considered that this disruption would result in any health effects as people would still be able to access these facilities during the construction period.
- 12.10.128 There are likely to be short term and temporary increased journey time unreliability when traffic management measures are required during construction. This could increase driver stress albeit the health effects are likely to be neutral.
- 12.10.129 Overall it is considered that the construction phase of the 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 facilities and other community facilities during operation

- 12.10.130 Once the scheme has been completed it is likely that ease of access to healthcare services and other social infrastructure would be improved due to the reduced amount of travel time/reduced congestion that the A417 Missing Link would offer. This, therefore, would result in minor positive health effects, particularly for those whose access to social infrastructure 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 scheme.
- 12.10.131 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.

## Transport and connectivity

### Transport and connectivity during construction

- 12.10.132 During the construction phase accessibility to the existing road network and public transport would not be affected significantly. Where diversions to public transport routes are required, this is not predicted to affect the overall provision of the service and would not result in any health effects.
- 12.10.133 In total the scheme has the potential to affect Public Rights of Way (PRoW) which are shown on PEI Report Figure 12.2.
- 12.10.134 During construction there would be a number of impacts on these PRoW, such as diversions and disruption which would affect options available for active travel. Highways England intends to keep the majority of PRoW's open via local management, early re-provision and/or use of short-term, temporary closures to balance the risks to the public against the potential disruption that removing such a risk would cause. In addition, the draft PRoW Management Plan (Appendix 12.2) has been prepared detailing how impacts on PRoW would be managed during construction.
- 12.10.135 In all cases, it is likely that realignment or diversion of local routes is proposed, utilising new side roads, overbridges and junctions where possible to maintain access for users. This would enable local communities to maintain access to active transport options during the construction phase, albeit if inconvenienced for a short period. Any health effects resulting from impacts on PRoW during the construction phase are considered to result in a neutral health outcome.

### Transport and connectivity during operation

- 12.10.136 Once the scheme is fully operational, active travel facilities for walking, cycling and horse riding would have been improved and new routes proposed. In particular, the existing A417 south of Air Balloon roundabout would be substantially quieter once the new dual carriageway is open (being used for access to properties) and therefore provide a safer and more pleasant route for walking and cycling, in particular for residents of Birdlip. In addition, there are opportunities for improving the pedestrian facilities at the roundabout linking the A417 link road with the A436, where new routes would connect the Gloucestershire Way and the Cotswold Way National Trail.
- 12.10.137 It is considered that the changes to the A417 would not increase or decrease the number of active travel journeys which are for the purpose of commuting. This is because whilst the A417 Missing Link project would improve journey times / experience for motor vehicles, travel distances are generally longer than would be appropriate for active commuting. There could be slight increase in people travelling by walking or cycling to access services given the improved connections and environment for those trips as a result of the scheme. For example, people travelling from Cowley to access Birdlip would benefit from connections via the new Cowley junction and the Air Balloon Way, while people travelling from Leckhampton Hill to Brockworth would benefit from the new Dog Lane to Cold Slad connection.
- 12.10.138 Opportunities have been identified for improving PRoW options around the proposed A417 which would provide better and safer links across the new A417, therefore opening route options to more people (in particular vulnerable users such as children and older people). In addition, car parking is to be provided with disabled provision near the Golden Heart Inn in close proximity to the existing

A417. This is to be associated with a PRow which is segregated and tarmacked (suitable for wheelchairs and mobility scooters). Whilst many of these users may not be from within the immediate local communities considered in this health assessment, it is likely that local people would utilise the PRow network more once the connectivity and safety issues are resolved.

- 12.10.139 As result of the scheme it is not considered that active commuting would increase. However, in relation to recreational use by local communities, it is considered that this would increase therefore resulting in a long term, positive health outcome.

### **Open space and nature**

#### Open space and nature during construction

- 12.10.140 As discussed in the assessment of Transport and Connectivity effects (previous section) there would be a variety of effects on the local PRow ranging from complete closure and re-provision/redirection to temporary diversions. These would be managed via the draft PRow Management Plan (Appendix 12.2) to help ensure public safety and reduce disruption to users. It is Highway England's intention to keep the majority of PRow open via local management, early re-provision and/or use of short-term, temporary closures.
- 12.10.141 In all appropriate cases, realignment or diversion of these local routes is proposed, utilising new side roads, overbridges and junctions where possible to maintain access for users. This would enable local communities to maintain access for recreation within the affected area.
- 12.10.142 Access to open space would be maintained throughout construction where possible, although access to common land, open access land and country park would be restricted. This land take is focussed on the area located immediately west of the existing A417 in the vicinity of Barrow Wake and north of the existing A417. In addition, 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 in close proximity which could be used during construction and therefore, despite the loss of access to common land/open access land/country park, it is considered that neutral health outcomes are likely.

#### Open space and nature during operation

- 12.10.143 There are a number of opportunities that have been identified for improving the PRow facilities within the study area. These are reported above in Table 12-25.
- 12.10.144 There would be an increased area of common land following its replacement near Barrow Wake as part of the repurposed A417.
- 12.10.145 As a result of the improvements, it is anticipated that health outcomes would be long term and positive assuming more people would choose to use the facilities as a result of improvements made. It is considered that those people who are less able to travel longer distances to benefit from access to open spaces are most likely to benefit from these improvements, including young people, economically inactive, unemployed and those living in isolated areas.

## Air quality

### Air quality during construction

- 12.10.146 Chapter 5 Air Quality considers effects related to construction dust and construction traffic. During construction, potential air quality effects arising from fugitive dust emissions due to earthworks, track out and general construction activity associated with the 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. Whilst the scheme is considered to have potential for generation of construction dust, with the implementation of these mitigation measures, the air quality assessment (Chapter 5) considers impacts to be not significant. The health outcome is considered to be neutral.
- 12.10.147 For most locations of the scheme, construction traffic is not considered to pose a risk to human health.

### Air quality during operation

- 12.10.148 The scheme provides a duelled off-line section of road which allows for faster and less congested journeys along the A417. The scheme would have a less steep gradient from the top of the Crickley Ridge to Cowley. The new route would move traffic away from Birdlip and closer to Shab Hill and remove the Air Balloon roundabout.
- 12.10.149 Traffic would be moved away from receptors at the Air Balloon roundabout and hence concentrations reduce by  $14.4\mu\text{g}/\text{m}^3$  and  $13.8\mu\text{g}/\text{m}^3$ . The overall traffic on the A417 does increase but the traffic flow is improved and moves away from sensitive receptors at the roundabout.
- 12.10.150 The routing of the scheme removes the Air Balloon roundabout and diverts traffic away from the AQMA. Whilst the traffic would be significantly reduced along the existing alignment, south of the Air Balloon roundabout, the reduction in  $\text{NO}_2$  concentrations is shown to be relatively small ( $-0.2\mu\text{g}/\text{m}^3$ ). This is due to the receptors already being located away from the roadside.
- 12.10.151 Where the scheme moves traffic closer to existing receptors the total annual mean  $\text{NO}_2$  concentrations remain well below the objectives.
- 12.10.152 In the wider ARN the air quality assessment does not identify any predicted exceedances of the annual mean  $\text{NO}_2$  objective in 2024 as a result of the scheme. At locations where traffic is predicted to increase such as on the A417 south of the scheme the concentrations remain well below the objectives set out in Chapter 5 at sensitive receptor locations.
- 12.10.153 These predicted improvements in air quality around these locations is likely to result in long term, positive health outcomes for those people in residential properties within the study area. Birdlip in particular, would benefit from traffic being moved further away, as would residential properties in Ullenwood. Children, older people and those who are in poor health in particular would benefit from improvements in air quality in these areas. At the community level it is likely that health outcomes would be neutral.

## Noise

### Noise during construction

- 12.10.154 The construction works would include an area of cutting excavation in the northern part of the scheme which is likely to be the area of most prolonged works. There are three areas of proposed junction works including a grade-separated junction at Shab Hill. Away from the major cutting and junctions, the new or improved carriageway works would progress more rapidly along the scheme, and hence would be alongside any one receptor location for a shorter period.
- 12.10.155 The construction activities resulting in the highest noise levels are generally the earthworks (i.e. 'cut and fill' works). The noise levels would vary according to the location of the works relative to the receptors, but the period of these works would be approximately 18 months.
- 12.10.156 During construction it is likely that some receptors along the scheme would experience noise levels that exceed SOAEL<sup>19</sup> threshold limits (these are significance levels of noise set by Government guidance). This would not be for the full duration of works, but rather during some months. These receptors (Rx) include:
- R2 Fernbank
  - R3 (Crickley Ridge);
  - R4 (Air Balloon Cottages);
  - R5 (Birdlip radio station);
  - R6 (Rushwood Kennels);
  - R9 (Crickley Hill - footpath); and
  - R12 Shab Hill Farm
  - PRoWs within approximately 500m of major excavation works
- 12.10.157 The noise assessment concludes that these noise increases at these receptors during the construction phase would result in short-term, significant adverse effects. From a health perspective, this is likely to result in short term physiological stress for those people living in the residential properties at these identified receptor locations. Due to the relatively short period of noise exposure at this level, and the fact that residents would be fully cognisant that it would be short term only, it is considered that there would be a short-term negative health outcome as result of noise during construction.
- 12.10.158 It is also predicted that the following receptors would experience noise levels that exceed LOAEL<sup>20</sup> threshold limits (this is the Lowest Observed Adverse Effect Level) for some of the construction period:
- R7 (Stockwell Farm Barn);
  - R8 (Chestnut Cottage); and
  - R11 Keepers Cottages R14 Nothill, (representing the village of Cowley)
  - R15 Crickley Court Cottage; and
  - R17 Holly Brae
- 12.10.159 The noise assessment concludes that the construction noise increased at these receptors are minor impacts and not significant.
- 12.10.160 The noise assessment also concludes that vibration effects from construction would not be significant. For the receptors which would experience exceedances of SOAEL (R2, R4, R5 and R15) during pavement surfacing activities, this would

only be temporary and would not reach levels which would cause structural damage. Provided that residents are kept informed of when vibration is likely to occur, it is unlikely to result in any health effects.

- 12.10.161 Any health effects resulting from noise and vibration impacts at these receptors during the construction phase are considered to result in a neutral community health outcome.

#### Noise during operation

- 12.10.162 Along the section between Bentham and Air Balloon roundabout the scheme would be aligned with the existing A417. The noise assessment predicts that traffic noise levels immediately around the highway would be negligibly increased (by less than 1dB) on the southern side, affecting a number of isolated dwellings and commercial premises.
- 12.10.163 The new section of the A417 would route traffic further away from the majority of residential properties along the existing alignment, especially at Birdlip, which would reduce noise levels at these locations. The opposite would be the case at Stockwell Farm, The Barn (holiday let), Rushwood Kennels and Cattery and at McCarthy Taylor Systems (business) where there would be significant increases in noise. From a community health perspective, the reduced noise levels at Birdlip, which represents the most populated residential area within the study area of the noise assessment, is likely to result in a long-term positive health effect. At the isolated properties close to the new alignment, the health effect is likely to be long-term and negative.
- 12.10.164 There are six noise important areas (NIAs) affected by the scheme; NIA 3908 (Woodside House) would be removed as part of the scheme proposals. All these areas represent properties which are currently exposed to noise levels above the SOAEL. Of these, NIA 13915 (No.1 and 2 Air Balloon Cottages) and NIA 3905 (Castle Hill Cottage) will be subject to direct permanent likely significant beneficial effects. NIA 13196 (Laurel Cottage) would be subject to a negligible noise decrease.
- 12.10.165 With the proposed mitigation (see noise chapter), NIA 3906 (Crickley Court Cottages) and NIA 3907 (Fernbank) would be subject to direct permanent likely significant beneficial effects.
- 12.10.166 The varying effect of changes to noise amenity across the entirety of the scheme can be considered positive and negative, and as such on balance, to have a neutral health outcome across the study area in relation to noise.

### **Landscape and visual amenity**

#### Landscape and visual amenity during construction

- 12.10.167 Chapter 7 Landscape and Visual Effects 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; and
  - on-site plant, such as:
    - demolition plant and excavators for site clearance;



- articulated dump trucks, excavators up to 35T capacity, dozers and rollers for bulk earthworks; and
  - 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; and
    - lighting of construction site compounds.
- 12.10.168 The majority of construction activities would take place between 2023 and 2025 and is considered 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. The LVIA identifies a temporary significant adverse effect on the AONB special qualities within 3km study area special qualities within 3km study area.
- 12.10.169 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.

#### Landscape and visual amenity during operation

- 12.10.170 Chapter 7 Landscape and Visual Effects identifies the sources of landscape and visual effects during operation as:
- the presence of the widened road, change of vertical and horizontal alignment south of Crickley Hill;
  - altered road access arrangements to accommodate the new road infrastructure;
  - the Cotswolds Way Crossing linking the National Trail Crickley Hill and Barrow Wake providing a traffic free WCH route over the proposed scheme;
  - the presence of replacement or enhancement vegetation, particularly along the southern side of the A417 between Brockworth bypass and Air Balloon roundabout;
  - Bat underpass at Ch1+100.
  - loss of the Air Balloon pub and associated grounds;
  - deep section of road cutting across the escarpment and through Shab Hill, creating exposed rock faces to accommodate six lanes of traffic;
  - the realigned A436 between Shab Hill and Air Balloon roundabout and the rerouting of the B4070 between Shab Hill, Barrow Wake and Birdlip;
  - the Gloucestershire Way Crossing linking the long distance footpath over the proposed scheme, providing a traffic free route for walkers, cyclists and horse riders, and a safe route for wildlife.
  - ‘greened’ overbridges at Cowley and Stockwell;
  - changes in the layout of Cowley roundabout, including the downgrading of the rural lane to residential access only and WCH route;
  - upgrading of farm/property access tracks or points of egress;
  - loss of trees and vegetation resulting in changes to landscape character and views;
  - the presence of attenuation ponds, cascade ponds, filtration strips, bioswales drainage channels and culverts associated with the drainage proposals, particularly where these are typical engineered solutions e.g. regular shaped

ponds, slope angle and location on steep gradients and any associated earthworks, culverts or other features;

- change of surfacing and additional planting along the proposed detrunked section of the existing A417 between the minor road to Stockwell and Barrow Wake;
- changes to existing field pattern, including the removal, relocation or new field boundaries;
- new sections of drystone walling or hedgerow boundaries, planting of hedgerow trees or the change of land cover or agricultural practice resulting from the proposed landscape, heritage or ecological mitigation or enhancements; and
- changes to land cover from arable to rough/calcareous grassland or tree and woodland planting. Vegetation re-establishment would vary in timescale with calcareous grassland and scrub taking up to two to three years post construction, with trees taking around 15 years to reach a height, form and canopy size which would provide visual screening and filtering of views.

12.10.171 Once the scheme is operational, it is considered that the section that would be contained within a cutting would result in a neutral health outcome related to landscape and visual amenity. This is because it would not be possible to see the road within views that look across the cutting and therefore is unlikely to have any effect.

12.10.172 Where the route passes through the landscape, this is generally likely to result in a loss of visual amenity in these areas. However, due to the decommissioning of the existing A417, the improved visual amenity that would result in this section of the route the effect of changes to landscape and visual amenity across the entirety of the scheme can be considered positive. When considered alongside the identified low sensitivity of the community to change in landscape and visual amenity, and the fact that the adverse effects identified in Chapter 7 Landscape and Visual Effects related to temporary visitors to the areas and not residents, on balance changes would result in a neutral health outcome.

## **Sources of pollution**

### Pollution during construction

12.10.173 Chapter 9 Geology and Soils looks at the potential for contamination during construction and concludes that with appropriate and standard mitigation in place, there would not be any significant risk of contamination. 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

12.10.174 Chapter 9 Geology and Soils identifies localised significant effects on controlled waters which would require further action to reduce the impact to not significant. Provided that these mitigation measures are followed, population health outcomes are unlikely to be affected as a result, i.e. a neutral outcome.

## **Employment and economy**

### Employment and economy during construction

12.10.175 During construction it is anticipated that employment would be generated that would remain fairly constant over the construction programme. Given the location

of the scheme, it is anticipated that a proportion of the construction workforce would be 'imported' into the area and therefore made up of workers travelling from outside the area and staying locally.

- 12.10.176 Given that the majority of the workforce would be from outside 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.
- 12.10.177 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 Gloucestershire, but nonetheless is not an insignificant level of spend in the local area, with a small beneficial health outcome expected during construction as a result of this increased boost to the local economy.
- 12.10.178 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.
- 12.10.179 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 scheme's construction phase.

#### Employment and economy during operation

- 12.10.180 During operation the scheme would not result in any direct employment benefits beyond typical maintenance arrangements. However, two of the scheme objectives are to '*support economic growth*' and to '*improve connectivity and community cohesion*'.
- 12.10.181 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 scheme would result in long term, positive health outcomes, even within a population of low sensitivity to economic change.

## **12.11 Monitoring**

- 12.11.1 Beyond the recommendations for monitoring made in other relevant assessments, there are no significant adverse effects related to this assessment identified either during construction or operational stages of the scheme that would require monitoring.

## **12.12 Summary**

### **Preliminary construction assessment**

- 12.12.1 This section provides a summary of the potential effects of the scheme on the various receptor groups. This is provided for both land use and accessibility and human health separately.

- 12.12.2 Mitigation for potential adverse effects has been identified where necessary and as appropriate for temporary/short-term construction activities.
- 12.12.3 Table 12-26 summarises the overall assessment of significance of identified effects for the topics discussed in this section.
- 12.12.4 In summary, there would be potential significant effects on property and land which is lost as part of the scheme. All other receptors would experience temporary neutral or slight effects during construction, which are not considered to be significant.

### **Preliminary operational assessment**

- 12.12.5 This section provides a summary of the potential effects of the scheme on the various receptor groups. This is provided for both land use and accessibility and human health separately.
- 12.12.6 Mitigation for potential adverse effects has been identified where necessary and as appropriate for the long-term operation of the scheme.
- 12.12.7 Table 12-26 summarises the overall assessment of significance of identified effects for the topics discussed in this section.
- 12.12.8 In summary, there would be permanent slight adverse impacts on property that would experience greater traffic impacts with the scheme in place, which are not considered to be significant. There would be neutral or permanent slight beneficial impacts on all other receptors given the benefits to residents, communities and businesses with the scheme in place. The proposals for WCH and rights of way would likely result in a permanent moderate beneficial effect, which would be significant.

**Table 12-26 Summary of significance during construction and operation – land use and accessibility**

<b>Land use and accessibility category</b>	<b>Significance of effect during construction</b>	<b>Significance of effect during operation</b>
Private property and housing	Permanent Large Adverse – Woodside House Permanent Large Adverse – Pinewood Permanent Moderate Adverse – Crickley Ridge Temporary Slight Adverse – all other receptors	Slight Adverse – Crickley Ridge, Fernbank and Half Acre Permanent Slight Adverse – properties within close proximity and community of Cowley Permanent Slight Beneficial – communities of Birdlip and Brimpsfield
Community land and assets	Temporary Moderate Adverse – Crickley Hill Country Park Temporary Neutral or Slight Adverse – all other community receptors Slight Adverse – Community Land (Common Land & Open Space Land)	Permanent Slight Beneficial – all receptors Permanent Slight Beneficial – Community land (Common Land & Open Access Land)
Development land and businesses	Permanent Large Adverse – Air Balloon Public House Permanent Large Adverse – Crickley Hill Tractors Temporary Neutral or Slight Adverse – all other receptors	Permanent Slight Beneficial – all receptors

Agricultural land holdings	Permanent Moderate Adverse – Shab Hill Farm Neutral or Slight Adverse – all receptors	Neutral or Slight Adverse – all other receptors
WCH	Temporary Neutral or Slight Adverse – PRow network in the study area	Permanent Moderate Beneficial – Cotswold Way National Trail Permanent Slight Beneficial – Gloucestershire Way Permanent Moderate Beneficial – PRow network in the study area

12.12.9 Table 12-27 is a summary matrix of the health outcomes identified for the scheme during construction and operation. This is an initial characterisation which, for the ES, will be broken down further into each ward within the study area.

**Table 12-27 Summary assessment of human health outcomes**

Health determinant	Sensitivity	Health outcome during construction	Health outcome during operation
Healthcare services and other community facilities	Medium	Neutral	Neutral
Transport and connectivity	Low	Neutral	Positive
Open space and nature	Low	Neutral	Positive
Air quality	Medium	Negative / Neutral	Positive
Noise	Low	Negative	Neutral
Landscape and visual amenity	Low	Negative	Neutral
Employment and economy	Medium	Positive	Positive

### Further work

- 12.12.10 Lengths of stopping up, diversions and new sections of PRow would be calculated and provided when the draft Public Rights of Way Management Plan (Appendix 12.2) is finalised.
- 12.12.11 Quantified effects on agricultural land and common land would be updated and provided to reflect any changes made to the DCO boundary.
- 12.12.12 The impacts on health effects would be updated and provided to reflect any changes to the results reported in other relevant environmental Chapter assessments.

## End Notes & References

---

- <sup>1</sup> Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure Northern Ireland, “Design Manual for Roads and Bridges LA 112 Population and human health,” 2019
- <sup>2</sup> Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure Northern Ireland, “Design Manual for Roads and Bridges LA 104 Environmental Assessment and Monitoring”, 2019
- <sup>3</sup> Taking into account the relevant Design Manual for Roads and Bridges (DMRB) guidance where there is an appropriate approach.
- <sup>4</sup> Public Health England, “Public Health Profiles Cotswold,” 2018. [Online]. Available: <https://fingertips.phe.org.uk/profile/health-profiles/data#page/1/gid/1938132696/pat/6/par/E12000009/ati/201/are/E07000079>. [Accessed: 06-Jan-2020]
- <sup>5</sup> Public Health England, “Public Health Profiles Tewkesbury,” 2018. [Online]. Available: <https://fingertips.phe.org.uk/profile/health-profiles/data#page/1/gid/1938132696/pat/6/par/E12000009/ati/201/are/E07000083>. [Accessed: 06-Jan-2020]
- <sup>6</sup> Gloucestershire County Council, “Gloucestershire Health and Wellbeing Board - Gloucestershire County Council,” 2019. [Online]. Available: <https://www.gloucestershire.gov.uk/council-and-democracy/gloucestershire-health-and-wellbeing-board/>. [Accessed: 03-Dec-2019]
- <sup>7</sup> Durham University, “Nomis - Official Labour Market Statistics,” 2019. [Online]. Available: <https://www.nomisweb.co.uk/>. [Accessed: 03-Dec-2019]
- <sup>8</sup> Office for National Statistics, “Local statistics,” 2019. [Online]. Available: <https://www.ons.gov.uk/help/localstatistics>. [Accessed: 03-Dec-2019]
- <sup>9</sup> <https://www.jointcorestrategy.org/examination>
- <sup>10</sup> S19 Acquisition of Land Act 1981
- <sup>11</sup> Gloucester City Council, Cheltenham Borough Council, and Tewkesbury Borough Council, “Joint Core Strategy 2011-2031,” November, 2017
- <sup>12</sup> Department for Transport, “Guidance on Road Classification and the Primary Route Network 2,” 2012
- <sup>13</sup> Public Health England, “Public Health Profiles Gloucestershire,” 2019. [Online]. Available: [https://fingertips.phe.org.uk/profile/health-profiles/area-search-results/E10000013?place\\_name=Gloucestershire&search\\_type=parent-area](https://fingertips.phe.org.uk/profile/health-profiles/area-search-results/E10000013?place_name=Gloucestershire&search_type=parent-area). [Accessed: 06-Jan-2020].
- <sup>14</sup> Office for National Statistics, “2011 Census,” 2019. [Online]. Available: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/2011censuskeystatisticsforenglandandwales/2012-12-11>. [Accessed: 03-Dec-2019]
- <sup>15</sup> Using the Construction Industry Joint Council: Working Rule Agreement, which covers over 500,000 workers within the UK construction industry and incorporates a subsistence (lodging) allowance of £36 per night.
- <sup>16</sup> When applying DMRB LA 112, before applying professional judgement as set out in the sections below.
- <sup>17</sup> When applying DMRB LA 112, before applying professional judgement as set out in the sections below.
- <sup>18</sup> [http://www.bhs.org.uk/~/\\_media/bhs/files/pdf-documents/access-leaflets/surfaces.ashx?la=en](http://www.bhs.org.uk/~/_media/bhs/files/pdf-documents/access-leaflets/surfaces.ashx?la=en)
- <sup>19</sup> SOAEL – this is Significant Observed Adverse Effect Levels and identifies the onset of significant impacts on health and quality of life.