A417 Missing Link

Preliminary Environmental Information Report
Non-Technical Summary

September 2020

Introduction

Highways England proposes to improve the A417 Missing Link by providing a dual two-lane carriageway between Brockworth bypass and Cowley roundabout in Gloucestershire (the proposed scheme). The proposed scheme is a highways Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. This means that an application will need to be made for permission to construct the scheme. This permission is called a Development Consent Order (DCO).

Before a planning application for a DCO is submitted, the local community and other stakeholders must be formally consulted on the proposals including:

- a description of the proposed scheme and the reasonable alternatives considered
- the environmental setting
- the likely significant environmental effects based on the preliminary environmental information available at the time
- the measures to avoid or reduce such effects

This is to support consultees in developing an informed view of the likely significant environmental effects of the proposed scheme.

As well as undertaking this consultation, we are continuing to collect and assess information about environmental effects to inform decision making, a process known as environmental assessment.

While the environmental assessment is ongoing, we have prepared a Preliminary Environmental Information (PEI) Report to provide sufficient information to help consultees to develop an informed view of the project in light of its likely environmental effects. The PEI Report has been developed for the purposes of this consultation and presents currently available information from the ongoing environmental assessment. This document provides a summary of the PEI Report.

The information contained within the PEI Report is preliminary and this along with feedback received from the consultation will help to shape and develop the findings for the Environmental Statement (ES). The ES will be submitted as part of the DCO application.

Why is the scheme needed?

In 2014, the Government identified the A417 Missing Link in its first Road Investment Strategy (RIS1) 2015-2020, which sets out a five year investment programme for improvements to the Strategic Road Network (SRN). Work completed in RIS1 acknowledged that any solution for the Missing Link needs to take into account both the environmental sensitivity of the site and the importance of the route to the local economy. Funding for delivery of the proposed scheme was confirmed within the second Road Investment Strategy (RIS2 published in March 2020), which covers the period between 2020 and 2025.

The A417/A419 provides an important route between Gloucester, Cheltenham and Swindon that helps connect the West Midlands and the north to the south of England via the M5 and M4 motorways. While most of the route is dual carriageway, there is one section that isn't. Known as the Missing Link, this three-mile stretch of single carriageway between the Brockworth bypass and Cowley roundabout severely restricts the flow of traffic.

Traffic congestion can be frequent and unpredictable, leading to motorists, including heavy goods vehicle drivers, diverting onto smaller local roads to avoid long delays. This causes difficulties for neighbouring communities as these local roads were not built to accommodate such a high level of traffic.

The sensitive nature of the Cotswold escarpment, the shape of the landscape and the area being part of the Cotswolds Area of Outstanding Natural Beauty (AONB) present particular environmental and engineering constraints on the scheme.

There are also specific planning and regulatory requirements that apply to development within the AONB including that we need to demonstrate a compelling reason for the improvement scheme and show that the scheme demonstrates that any benefits outweigh the costs very significantly.

Over the years, there have been numerous attempts to find a solution, but for various reasons, including affordability and changes in investment priorities, these have never become a reality.

However, in recent years, the case for improvement has become far more compelling – to improve safety, support the economy, ease congestion and reduce pollution. On this stretch of road alone, there were 49 personal injury collisions between 2013 and April 2018, 10 of which were fatal.

The project

Description of the proposed scheme

The proposed scheme would provide 3.4 miles (5.5km) of new dual carriageway connecting the existing A417 Brockworth bypass with the existing A417 dual carriageway south of Cowley. It consists of the following key sections:

- **Climbing the escarpment** – a section of road which would follow the existing A417 corridor from Brockworth bypass to the existing Air Balloon roundabout.
- **Existing Air Balloon roundabout to new Cowley Junction** – a section including two new junctions. A new junction at Shab Hill, with a link road to both Birdlip and to the A436, for journeys towards Oxford and Cheltenham. A new junction near Cowley, replacing the existing Cowley roundabout. Access to local villages would be maintained via existing underbridges from the A417.
- **Repurposed A417** – repurposing the existing A417 between the Air Balloon roundabout and Cowley roundabout. Some of the existing road would be converted into a route for walkers, cyclists, horse riders and disabled users. The section adjacent to Barrow Wake would be demolished and replaced with Common Land designation. Other sections would be kept to maintain local access for residents.

These features are illustrated on the overall scheme plans presented on the following pages.

The proposed scheme's vision: reconnecting the landscape

As part of this improvement, Highways England want to create a landscape-led highways scheme that will deliver a safe and resilient free-flowing road while conserving and enhancing the special character of the Cotswolds AONB; reconnecting landscape and ecology; bringing about landscape, wildlife and heritage benefits, including enhanced residents' and visitors' enjoyment of the area; improving quality of life for local communities; and contributing to the health of the economy and local businesses.

Design principles

The overarching design principles have been developed as part of engagement exercises undertaken with key stakeholders and include:

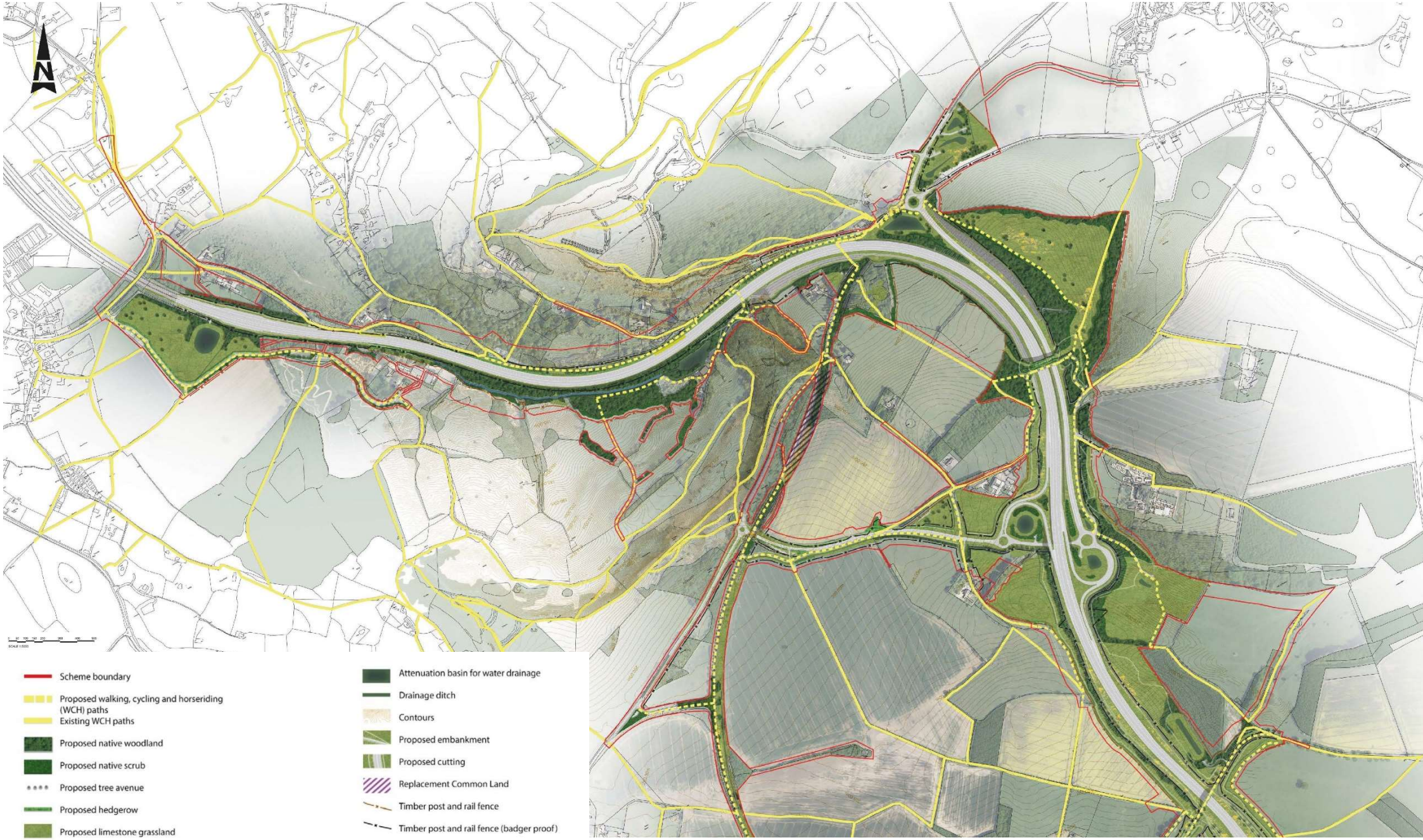
- Any solution involving a new road must ensure that the scheme is designed to meet the character of the landscape, not the other way around.
- Any scheme should bring about substantial benefits for the Cotswolds landscape and environment as well as people's enjoyment of the area.
- Any scheme must have substantially more benefits than negative impacts for the Cotswolds AONB.

The three design principles are underpinned by objectives and are applied throughout the design of the proposed scheme. Information on the scheme objectives can be found in PEI report Chapter 2 The Project.

What do we mean by 'landscape-led'?

Landscape-led means that landscape is a primary consideration in every design decision that is taken. The proposals have been designed to meet the character of the surrounding area, rather than changing the landscape to fit the proposals.

An environmental masterplan has been developed to set out how any impact on the environment has been reduced and where areas for wildlife, archaeology, watercourses and public accessibility have been enhanced. This will be submitted as part of the DCO application.



A417 Missing Link Overall Scheme Consultation Plan Sheet 1 of 2

A417 Missing Link Overall Scheme Consultation Plan Sheet 2 of 2

Alternatives

A range of route options for the A417 Missing Link were investigated and assessed against the proposed scheme's vision and objectives, as well as a range of engineering, economic and financial criteria. The need for a safe, resilient road that reconnects the landscape and contributes to local communities is imperative for this scheme.

As a result of this assessment, two route options were proposed at consultation in February and March 2018: Option 12 and Option 30. The consultation showed widespread public support for improving the A417 Missing Link, and particularly for Option 30, which 72% of respondents to the consultation favoured. Option 30 was selected as the preferred route to be taken forward.

During the 2019 statutory consultation Alternative 2 was presented as the preferred link to the A436. This proposed link runs parallel to the new A417, linking the existing A436 by way of a new, smaller roundabout to the north of the Air Balloon roundabout. This solution would reduce impact on the landscape by ensuring that as much as possible of the surrounding land is left as we found it. The link would be single carriageway, with verges on each side. A junction would provide access to Birdlip Radio Station, as well as Shab Hill Barn and Farm.

For more information on the route options consultation, the preferred route announcement and the 2019 statutory consultation, please visit our scheme's webpage by following this link:

https://highwaysengland.co.uk/projects/a417-missing-link/

Scheme development

Following the 2019 statutory consultation, work was undertaken to consider the feedback. This identified that there were opportunities to improve the scheme design. Engagement with affected landowners and ongoing environmental assessment has also contributed to the amendments made:

- A safer, off-road crossing of the A417 to accommodate the Cotswold Way National Trail. The Cotswold Way crossing, located near to Emma's Grove, would be for walkers, cyclists and horse riders, including disabled users.
- A new crossing of the A417 to accommodate the Gloucestershire Way long distance footpath. The Gloucestershire Way crossing would help people and wildlife, including bats, to cross the new A417.
- Removal of the vehicle access from Cowley junction to Cowley Village via Cowley Lane to address safety concerns and prevent rat running.
- Increase the gradient of the road to 8% as it climbs the escarpment at Crickley Hill, rather than 7% as proposed in autumn 2019. This will significantly reduce the impact of the scheme and cut the construction period by around six months.
- Reroute the B4070 to Birdlip to improve accessibility and natural surveillance of Barrow Wake.
- Extend access along Dog Lane and Cold Slad Lane for walkers, cyclists and horse riders, including disabled users, which will improve links between Brockworth and Crickley Hill.
- Creation of a new area of Common Land, which will be north of the new Air Balloon Way.
- Inclusion of a new underpass with bridleway near Cold Slad.
- Inclusion of a new underpass near Dog Lane to help bats cross the A417.
- New car parks near the Golden Heart Inn and Birdlip, which would include disabled and horse box spaces and help everyone access this special area.

Our considerations for these changes are set out in the PEI Report.

https://highwaysengland.co.uk/projects/a417-missing-link/

Potential environmental effects

The environmental impact assessment (EIA) considers impacts during the construction and operation of the scheme. The construction phase assessment addresses both the temporary activities involved in building the scheme and the subsequent permanent presence of the scheme once constructed. The operational assessment considers the situation when the scheme is being used by traffic.

This section provides an overview of the preliminary findings relating to environmental impacts. The preliminary assessment is summarised in the table at the back of this non-technical summary.

During its construction, most of the proposed scheme's potential adverse impacts would be avoided or reduced by the implementation of industry standard practice and control measures, which would be contained within an Environmental Management Plan (EMP).

Further work continues to be undertaken as part of the EIA process to confirm the preliminary findings presented below. The final assessment of environmental impacts will be presented in the ES that will be submitted with the DCO application.

Air quality

Baseline

Air quality is generally good in the area, however, there are areas of poor air quality around the proposed scheme. There is one Air Quality Management Area (AQMA) within 200m of the proposed scheme, located at the Air Balloon roundabout, known as the Birdlip AQMA.

There are a further 7 AQMAs within the wider road network outside of the construction footprint.

AQMAs are areas which the local authority has identified as requiring management to achieve desired air quality objectives and to protect health. Birdlip AQMA suffers from poor air quality as a result of traffic emissions from vehicles using the existing road. Air quality at the Crickley Hill and Barrow Wake Site of Special Scientific Interest (SSSI) is below the critical air quality levels defined for the SSSI.

Construction

During construction, potential air quality effects may arise from emissions of construction dust and particulate matter. These emissions could occur as a result of the proposed construction activities such as demolition and earthworks. The quantities of emissions depend on the scale and intensity of the construction works. Best practice mitigation measures to reduce effects from construction dust would be used. These measures typically include dust suppression techniques and road sweeping.

Preliminary construction assessment

- No likely significant effects are anticipated during construction due to emissions of dust from construction activities.

Operation

During the operational phase, potential air quality effects may arise from emissions of pollutants from vehicles using the road network. The proposed scheme would change the traffic flows on roads in the wider surrounding area. This would result in changes to pollutant emissions from vehicle traffic on the affected roads and thus changes in pollutant concentrations at nearby sensitive locations.

There are no predicted exceedances of the air quality objectives in the opening year. Where increases in pollutant concentrations do occur as a result of the proposed scheme these are considered to be negligible. The proposed scheme improves air quality at a number of locations nearby, in particular at the Air Balloon roundabout and the properties known as Air Balloon cottages which make up the Birdlip AQMA. The proposed scheme moves the road away from receptors in this area and improvements to traffic flow are predicted.

Ecological receptors are not predicted to experience any significant effects as a result of the proposed scheme. Large improvements have been predicted to occur at the Crickley Hill and Barrow Wake SSSI. Air quality is predicted to improve at these locations as the existing A417 is moved away from these receptor locations and the congestion on the A417 is improved.

Preliminary operation assessment

- No likely significant impacts to local air quality are predicted to occur as a result of the proposed scheme.
- Air quality would likely be improved at properties in the Birdlip AQMA and at ecological receptors close to the proposed scheme.
- The proposed scheme would likely not impact the predicted date of compliance of roads in the study area with legally binding EU limit values.

Cultural heritage

Baseline

Cultural heritage includes archaeology, historic buildings/structures and historic landscapes. The existing A417 runs through a landscape of historical interest, with archaeological evidence present from prehistoric times to the Second Word War. Within the study area of the proposed scheme, the landscape comprises historical assets including 10 scheduled monuments, 50 listed buildings, a registered park and garden and two conservation areas.

Construction

During construction, there is potential for disturbance to unknown archaeological remains where the proposed scheme requires excavation below the existing ground surface. An archaeological geophysical survey has been undertaken, which has identified a number of areas in which likely archaeological remains are present. These sites, as well as areas in which the potential for archaeology is unclear are currently being investigated by targeted archaeological evaluation trenching. The surveys will inform mitigation and will help establish pre-construction archaeological investigation strategies.

Construction activity, including movements of plant, temporary lighting and temporary construction compounds, would take place within the wider setting of listed buildings and other heritage assets within the study area. These works would be temporary and of limited duration.

Preliminary construction assessment

- Direct impacts would occur on both known and unknown buried archaeological deposits resulting in a likely permanent adverse significant effect.
- Scheduled monument Emma's Grove barrows would experience a likely permanent adverse significant effect as a result of changes to its setting.
- At Shab Hill Barn, a Grade II listed building, the presence of the proposed scheme would result in a likely permanent adverse significant effect on its setting.
- Although not listed, the Air Balloon public house, a local landmark, would be demolished resulting in a likely permanent adverse significant effect.

Preliminary operation assessment

- Shab Hill Barn, a Grade II listed building, would experience a likely adverse significant effect as a result of increased traffic noise compared to the existing situation.

Landscape and visual impacts

Baseline

The proposed scheme would be situated in the Cotswold AONB, a landscape which is highly valued and designated for its scenic qualities and enjoyed by visitors and residents to landscape features including Crickley Hill Country Park, Barrow Wake, Leckhampton Hill and Coopers Hill. The landscape has a strong landscape character with a diverse and rich cultural heritage. Landscape features include the dramatic escarpment, which rises steeply up from the neighbouring low-lying vales before forming the open, undulating high wolds. Cotswold stone walling, beech hangers (woodland) and open long-distance views all form key characteristics of this landscape. The area's rich cultural heritage is visually evident through Neolithic barrows, Iron age hill forts, historic medieval field patterns with ridge and furrow and later planned enclosures as well as historic parks and gardens.

Views to and from the escarpment and across the wolds are important to the AONB. Recreational viewpoints exist along the Cotswold Way National Trail and Gloucestershire Way long distance footpath, as well as other local public footpaths and cycle networks, Crickley Hill Country Park, Leckhampton Hill, Barrow Wake and The Peak. The proposed scheme has the potential to affect these viewpoints. Viewpoints which could also be affected include those from communities around Shab Hill, Stockwell and Brimpsfield, from employment and commercial viewpoints representative of Cowley Manor and The Golden Heart Inn, along with views from the road.

Construction

During construction, there would likely be significant effects on the landscape character within the study area and on the special qualities of the Cotswolds AONB, despite construction mitigation measures. These effects would mostly be temporary in nature, associated with temporary construction compounds and the presence of construction activities. The compounds include lighting, fencing and the storage of materials and laydown areas. Construction activities include felling of woodland, clearing of vegetation, large scale excavation across the site, earthworks to form landscape bunding and erection of retaining walls and overbridges. As the proposed scheme is gradually built throughout the construction phase, permanent effects would increasingly become part of the landscape and views.

Preliminary construction assessment

- Likely temporary adverse significant effects on the landscape character within the study area and on some of the special qualities of the Cotswolds AONB.
- Likely temporary adverse significant effects on landscape character types (LCT) that are directly affected by the proposed scheme.
- Likely temporary adverse significant effects experienced by residents of Nettleton Bottom, Shab Hill, Stockwell, visitors to Crickley Hill Country Park, Barrow Wake, Great Witcombe Roman Villa, Leckhampton Hill and users of the Public Rights of Way (PRoW) network, including the Cotswold Way National Trail, Gloucestershire Way long distance footpath and local footpaths, bridleway and byways. Users of the main road network including the A417, A436 and B4070 would also experience likely temporary adverse significant visual effects.

Operation

The design of the proposed scheme has been developed to integrate the A417 into the existing surroundings, enhancing the local environment where possible.

Landscape and visual effects are likely to occur as a result of the long-term loss or changes to existing landscape features or characteristics, features or composition of a view, or the addition of new features within the landscape or view. Changes includes the presence of the widened road, the Cotswold Way and Gloucestershire Way crossings, the overbridges at Cowley Lane and Stockwell Farm, earthworks and bunding, attenuation basins and the presence of replacement vegetation, particularly along the southern side of the A417 between Brockworth bypass and Air Balloon roundabout.

The visual character of the area is likely to change as a result of the presence of the widened road, the overbridges, and changes to vegetation along the southern side of the A417. Large areas of calcareous grassland and woodland will be created, replacing more than what would be removed. The proposed scheme also includes long sections of hedgerows and Cotswolds stone walling to create a rich network of robust landscape features.

Preliminary operation assessment

- Likely permanent beneficial significant effects on some of the special qualities of the Cotswolds AONB.
- Likely permanent adverse significant effects on LCT that are directly affected by the proposed scheme.
- Combination of likely permanent adverse effects (at year 1) and neutral effects (15 years after opening) for residents of Shab Hill and Stockwell.
- Combination of likely permanent adverse effects (at year 1) and neutral effects (15 years after opening) for visitors to Barrow Wake and Great Witcombe Roman Villa.
- Likely permanent adverse effects experienced by visitors to Crickley Hill Country Park at year 1 and year 15.
- Combination of likely permanent adverse and neutral effects experienced by users of the PRoW network, including the Cotswold Way National Trail (adverse at year 1 and year 15), Gloucestershire Way long distance footpath (adverse at year 1) and local footpaths, bridleway and byways (adverse at year 1).

Biodiversity

Baseline

There are numerous sites designated for ecological interest within the vicinity of the proposed scheme. These include Cotswold Beechwoods Special Area of Conservation (SAC) and several SSSI including Crickley Hill and Barrow Wake SSSI of which the Barrow Wake unit is partly within the proposed scheme boundary. There are also many Local Wildlife Sites in the surrounding area including Ullen Wood Ancient Woodland and an adjacent Woodland Trust site.

There are protected and priority species within the proposed scheme area including bats, badgers, reptiles, Roman snails, barn owl, invertebrates and hedgehogs. There are also habitats of principal importance (priority habitats) within or adjacent to the proposed scheme including, lowland calcareous grassland, deciduous broadleaved woodland (including ancient woodland and veteran trees) and hedgerows.

Construction

The sites of ecological interest and other priority habitats throughout the proposed scheme have the potential to be affected by the proposed scheme either directly as a result of habitat severance and loss, or indirectly due to changes in air quality from dust and pollution, noise and vibration, or hydrological changes resulting in degradation of habitat.

Protected species have the potential to be affected by the proposed scheme both directly and indirectly. To minimise adverse effects, mitigation measures such as the sensitive timing of works and protection of retained habitats are embedded within the construction phase to avoid or reduce the impacts of habitat loss, habitat degradation, habitat fragmentation, disturbance and species mortality. Further mitigation measures are provided for specific species including replacement bat roosts where habitats are lost during construction, and the creation of replacement habitat for reptiles, badgers and Roman snails in advance of construction.

Preliminary construction assessment

The proposed scheme would have likely permanent and temporary impacts resulting in adverse and beneficial significant effects on some protected species and habitats. These include:

- adverse significant effect on Crickley Hill and Barrow Wake SSSI.
- adverse significant effect on veteran trees and semi-natural woodland.
- beneficial significant effect on semi-natural woodland due to planting of new woodland.
- adverse and beneficial significant effect on species-rich hedgerows due to loss of existing and planting of new hedgerow.
- adverse significant effect on species-rich grassland.
- beneficial significant effect on calcareous grasslands due to creation of new species-rich calcareous grassland.
- adverse significant effects on bats and barn owls.

Operation

Potential impacts on protected species during operation may include, but would not be limited to, disturbance from increased levels of noise or lighting, habitat degradation due to changes in air quality and incidental mortality through animal vehicle collisions.

Mitigation measures incorporated into the proposed scheme design include a number of crossings to provide connectivity for wildlife including the Gloucestershire Way crossing, two smaller overbridges with hedgerows, wildlife-friendly culverts, and underpasses to maintain connectivity for species such as badgers Habitats appropriate for the Cotswolds AONB, native broadleaved woodland, calcareous grassland and species rich hedgerows, would be created along the route to connect existing habitat and wildlife corridors, which would mitigate the loss and fragmentation of habitat due to the proposed scheme. The proposed scheme maximises biodiversity delivery and provides an increase in priority habitats for protected and notable species.

Wildlife fencing would be included to reduce the risk of mortality to badgers and other wildlife. Hedgerow, woodland, tree and scrub planting would assist in encouraging and channelling movement of badgers away from the highway and through safe culverts, underpasses and overbridges. Tree planting adjacent to the road will encourage bats and barn owls to fly over the road at height to reduce the risk of mortality from traffic collisions.

Preliminary operation assessment

- The proposed scheme would have a likely adverse significant effect on barn owls through increased risk of mortality and injury through traffic collisions, and severance of habitat.

Geology and soils

Baseline

The proposed scheme runs along an asymmetrical valley that separates the two sides of Crickley Hill and Barrow Wake SSSI, which is a designated geological site. The Cotswold escarpment dominates the regional landscape. An extensive plateau exists above the escarpment, underlain by limestone, which was historically quarried across Crickley Hill and Leckhampton Hill. The proposed scheme passes through an area of relict landslide deposits around Brockworth bypass and Crickley Hill. Agricultural land includes areas classified as best and most versatile land. A number of possible sources of contamination have been identified.

Construction

The proposed scheme would not directly affect the existing geological exposures within the Crickley Hill and Barrow Wake SSSI therefore would not result in any impact on the geological importance of the SSSI. New geological exposures would be created within the highway cuttings.

The construction of the proposed scheme would affect approximately 20ha of best and most versatile agricultural land. It also has the potential for adverse impacts related to contaminated materials that may be present in the ground. Construction activity could result in the mobilisation of contaminants and the generation of contaminant transport pathways from site activities.

The findings from the ongoing and historical ground investigations have been used to inform options for appropriate mitigation. A management plan would be produced, detailing mitigation measures to limit or completely remove these effects and ensure adverse effects are reduced as far as possible.

Preliminary construction assessment

- Likely permanent adverse significant effect on best and most versatile agricultural land.
- Likely permanent adverse significant effect on water as a result of identified soil and groundwater contamination. Mitigation is to be developed to reduce the impact.

Operation

Operation of the proposed scheme would not include any activities that are likely to have an impact on geology and soils.

Preliminary operation assessment

- No likely significant effects are anticipated during the operation of the proposed scheme.

Material assets and waste

Baseline

The use of materials and the generation of waste is under consideration as part of the assessment. The baseline situation includes the availability of materials including primary minerals within the region and the capacity of waste management infrastructure. In the Gloucestershire region the landbank for crushed rock and sand and gravel are expected to meet projected demand for 17 years and 6 years, respectively. Gloucestershire Council have identified areas of finite mineral resources within the area of the proposed scheme that should be safeguarded for the future. There is capacity in the waste management infrastructure in Gloucestershire and the UK should this be required for the proposed scheme.

Construction

During construction, the proposed scheme would require the import of materials to site which may have an impact on local sources of material, although this is anticipated to be small in the context of suppliers which regularly provide material for similar projects. The excavation works would result in a surplus of material (approximately 86,000 cubic metres). Opportunities to use this material as part of the proposed scheme would be sought, including for engineering uses and essential landscaping. This would reduce the noise and air quality impacts associated with the transportation of large quantities of materials.

The scheme would impact on a small area of safeguarded mineral resources but would not diminish access to this or sterilise the use of the wider resource.

There would likely be some waste arising from the proposed scheme, however, where possible, waste would be prevented and designed out. Any waste generated would be managed in accordance with the waste hierarchy, with a preference to reduce and reuse prior to disposal.

Preliminary construction assessment

- There would be no likely significant effects related to materials or waste during construction.

Operation

Material use and waste generation is expected to be very small during operation of the proposed scheme, with no significant effects expected. Operational waste and materials have consequently been scoped out of the assessment.

Preliminary operation assessment

- There would be no likely significant effects relating to materials or waste during operation.

Noise and vibration

Baseline

The existing A417 passes close to residential properties resulting in high existing noise levels along the A417. This is reflected in the designation of six 'Noise Important Areas' (areas identified by the Government as being most exposed to noise) in the vicinity.

Construction

During the construction of the proposed scheme, temporary significant adverse noise effects would occur at 14 residential locations, and three non-residential locations as well as certain Public Rights of Way (PRoW) in the AONB. Construction noise would be managed through the application of best practice measures which would include the selection of quiet and low vibration equipment, locating equipment away from residential areas to minimise noise disturbance, the use of enclosures for stationary equipment, the use of temporary screening hoarding/bunds, and the implementation of a traffic management plan. Construction vibration impacts are identified at four dwellings and one non-residential property. However, these impacts would be of short duration i.e. less than 10 days, and therefore are assessed as not significant. Vibration effects from construction would be controlled with suitable mitigation measures.

Preliminary construction assessment

- Construction activities would result in likely significant temporary adverse noise effects at 14 residential properties, along with three non-residential locations as well as some public footpaths which would be in close proximity to the works.
- Four dwellings and one non-residential property are assessed as being subject to a moderate impact from construction vibration. However, the short duration of these works (less than 10 days) has been assessed as likely not significant.

Operation

Once operational, changes in the noise environment would arise from changes in the road layout which would alter the distance between road traffic and sensitive receptors such as residential properties and PRoW. Changes in noise levels would also be associated with changes in traffic flows, composition and speed on the local road network.

During operation, significant beneficial effects would mainly occur in areas where the existing A417 would be removed, such as near Birdlip. However, potential significant adverse noise effects would occur at some dwellings across the area of the proposed scheme. There would be considerably more significant beneficial effects than adverse effects.

Incorporated noise mitigation measures have been included where practicable within the proposed scheme where these would achieve beneficial noise reductions. These mitigation measures comprise a combination of earthwork bunding and vertical screening (noise barriers). The use of low noise surfacing has been included along all new and altered highways related to the proposed scheme.

At Crickley Hill Country Park, 'The Scrubbs' area and footpaths on the escarpment rising up to the Country Park, along with other local trails, there would be a reduction in road traffic noise levels.

Significant beneficial effects have been assessed for PRoWs in the AONB near to where the existing alignment would be removed (e.g. the Cotswold Way National Trail). There are also some footpaths, including one section of the Gloucestershire Way long distance footpath, which would be subject to significant adverse effects near to the corridor of the new alignment between the existing Air Balloon roundabout and Cowley junction.

Two Noise Important Areas would benefit from noise reductions such that they would be lower than the current noise levels without the proposed scheme.

Preliminary operation assessment

- Likely significant permanent adverse effects at 22 dwellings and some PRoW along the route.
- Likely significant permanent beneficial effects at 65 dwellings and some PRoW where the existing A417 is removed.

Population and human health

Baseline

The assessment of population and human health considers the potential effects on private property and housing, community land and assets, development land and businesses, agricultural holdings, walkers, cyclists and horse riders including disabled users, and human health.

The area surrounding the proposed scheme is largely rural in nature with a number of agricultural holdings as well as dispersed residential properties and businesses. There is an extensive Public Rights of Way (PRoW) network and local routes in the vicinity of the proposed scheme which have the potential to be affected, including the Cotswolds Way National Trail and Gloucestershire Way long distance footpath. These connect into wider recreational resources such as the Crickley Hill Country Park.

Construction

During construction the proposed scheme is likely to lead to both beneficial and adverse effects. Three residential properties will be directly affected by the proposed scheme with two being demolished. In addition, two businesses will also be demolished, and one agricultural holding significantly affected as a result of land take for the proposed scheme.

Some community assets, PRoW and agricultural holdings in close proximity to the proposed scheme are also likely to be negatively affected through temporary land take or the indirect effects of construction activities.

The proposed scheme would also bring both temporary and permanent effects on open space land (including Common Land, Open Access Land and Country Park). Common Land removed during construction would be replaced with an area of Common Land greater than that being lost to the proposed scheme.

Mitigation measures during construction would include temporary diversions and signage to limit the impacts of any temporary closures of PRoW and agricultural accesses. Access to businesses and residential properties would also be maintained and managed.

Preliminary construction assessment

- Likely permanent adverse significant effects on demolished properties and businesses.
- Likely permanent adverse significant effects effect on one agricultural holding due to extent of land take.
- Likely temporary adverse significant effects on community land and assets in close proximity to the proposed scheme.
- Likely temporary adverse significant effects on the PRoW network in the study area.
- Likely negative health outcomes identified in relation to construction noise, air quality and landscape.
- Likely positive health outcomes identified in relation to employment and economy.

Operation

Once operational, the proposed scheme is anticipated to bring beneficial effects in terms of overall accessibility and connectivity for the local community, businesses and for those visiting the area.

The proposed scheme includes a number of new crossing points that would provide better and safer links across the A417 for road users and walkers, cyclists and horse riders including disabled users. The proposed scheme also includes proposals for new and improved rights of way through a PRoW Management Plan.

Preliminary operation assessment

- Likely permanent beneficial significant effects for users of the PRoW network.
- Likely permanent beneficial significant effects for local communities, businesses and visitors due to increased accessibility and safety.
- Likely positive health outcomes identified in relation to transport and connectivity, open space and nature, air quality and employment and economy.

Road drainage and the water environment

Baseline

The water environment comprises the road drainage system, surface water features such as watercourses, groundwater resources in relation to water supplies and flood risk within the study area. The links between the surface water, groundwater and nature creates a very complex and sensitive environmental setting.

The land within the proposed scheme drains to the River Severn and its tributaries to the west, and to the River Churn, a tributary of the River Thames to the east and south-east. There are areas of surface water flood risk across the route of the proposed scheme. The value of the water environment results from the ground and surface water features themselves, and the biodiversity and landscape features they support.

The understanding of the baseline is being supplemented by ongoing groundwater and surface water surveys. This will give greater certainty about the nature and scale of potential impacts and inform the design of mitigation and enhancement measures.

Construction

During construction, there would be potential adverse impacts on surface water and groundwater flow and quality, due to works including cuttings and trenches near to watercourses and the risk of accidental spillages. The proposed scheme would also require the realignment of Norman's Brook tributary.

There are established construction practice guidelines to manage pollution risks during construction. Measures to mitigate adverse effects on the water environment during construction would include best practice pollution control measures including emergency spill procedures and the approach to managing storage areas and stockpiles. The appropriate sequencing of works would seek to minimise the impact on Norman's Brook and groundwater resources. Environmental monitoring of the water environment would be undertaken throughout construction.

Preliminary construction assessment

- Likely temporary adverse significant effect on surface water due to the realignment of Norman's Brook during the construction phase.

Operation

The excavation of the cuttings through Shab Hill and the top of Crickley Hill may act as a pathway that diverts surface water between catchments, thereby resulting in a change in flows. Drainage design would be developed to maintain existing catchments.

Without mitigation, operation of the road could lead to pollution impacts on surface water and groundwater from road run-off. Road drainage for the proposed scheme would be developed to protect the water environment from highway pollution and to prevent increases in flood risk. A sustainable drainage system would be developed that would discharge into a series of road drainage attenuation basins to provide treatment before allowing water to gradually soak into the ground or flow into a watercourse. This approach would control pollution from road run-off to higher standards than for the current road.

Preliminary operation assessment

- No likely significant adverse effects on the water environment.

Climate

Baseline

The assessment of climate includes the effects of greenhouse gas emissions associated with the proposed scheme and resilience of the proposed scheme to cope with extreme weather events.

The baseline for the assessment of climate resilience is made up of the current climate observations and future projected climate conditions and extreme weather events in the local area. UK climate projections predict an increase in annual temperatures and rainfall, with wetter winters and drier summers and increases in the frequency of heatwaves, prolonged periods with no rainfall and days with heavy rainfall (when precipitation is greater than 25mm).

Construction

The proposed scheme would result in greenhouse gas emissions during construction from the raw materials required, transport and construction processes. The provisional estimate of emissions from the construction phase total 47,000 tCO_2e (metric tonnes of carbon dioxide equivalents).

Mitigation measures would be implemented to reduce emissions during construction of the proposed scheme, for example through specification of ultra-low sulphur diesel, management and minimisation of energy use, sourcing recycled or secondary materials from the local area and exploring the use of lower carbon materials.

The proposed scheme would be designed to be resilient to impacts arising from projected future weather events and climatic conditions and designed in accordance with current planning, design and engineering practice and codes.

Preliminary construction assessment

- No likely significant effects with regard to greenhouse gas emissions during the construction of the scheme.
- No likely significant effects with regard to the vulnerability of the proposed scheme to climate change during construction.

Operation

During operation, emissions would be generated primarily from the exhaust pipes of vehicles using the road network, and from maintenance and refurbishment of the proposed scheme. Vehicles using the proposed scheme would constitute the vast majority of the greenhouse gas emissions across the proposed scheme's assumed lifetime (including both construction and operation). It is considered that the emissions from the proposed scheme in isolation would not have a material impact on the ability of the government to meet its carbon budgets, and therefore is not anticipated to give rise to a significant effect on climate.

Climate change risks to the proposed scheme assets have been assessed during operation of the road. Potential impacts include increased heat stress for maintenance workers, damage to road surfaces from high temperatures, flooding and weakening of embankments from storms. The design has embedded measures to ensure resilience to these potential impacts. Climate change risks to the proposed scheme have been assessed and found to be not significant because of mitigation measures already built in to the design and regular maintenance reviews during operation to ensure the design is working as intended. These measures would make the proposed scheme resilient to future climate conditions.

Preliminary operation assessment

- No likely significant effects with regard to greenhouse gas emissions during the operation of the scheme.
- No likely significant effects with regard to the vulnerability of the proposed scheme to climate change during operation.

Cumulative effects

An assessment will be undertaken of potential cumulative effects arising from the following:

- proposed developments in the vicinity of the proposed scheme that are under construction or have been consented, combined with the effects of the proposed scheme; and
- combined effects from the proposed scheme on a single receptor from a number of individual environmental impacts, for example noise, dust and traffic.

Cumulative effects with other developments

A preliminary review of the planning applications and allocations within the area around the proposed scheme has been undertaken to identify any other developments which may result in a cumulative effect together with the proposed scheme, which is a greater, new or different significant effect than would result from the proposed scheme on its own. The search area for these other developments was the largest combined area based on the likely distances from which developments could influence each environmental topic.

The cumulative effects will be assessed when the conclusions of individual environmental factor assessments have been reached and reported. Therefore, cumulative effects are not reported in the PEI report, but will be assessed and reported in the Environmental Statement (ES).

Combined effects on a single receptor

Combined impacts are from the action of a number of different impacts upon a single resource/receptor and are considered within the environmental factor chapters of the PEI report.

The results of this provisional assessment do not indicate that any additional mitigation measures are required. A full combined effects assessment will be included within the environmental factor chapters of the ES.

Preliminary assessment of likely significant environmental effects

Factor	Construction stage	Operation stage
Air quality	• No likely significant effects anticipated from construction activities.	• No likely significant effects anticipated.
Cultural heritage	• Permanent adverse significant effect on Shab Hill Barn Grade II Listed Building resulting from the scheme altering the rural setting of the resource. • Permanent adverse significant effect on Emma's Grove scheduled monument resulting from the scheme altering the immediate setting of the resource. • Permanent adverse significant effects from the loss or partial loss of six non-designated archaeological heritage resources. • Permanent adverse significant effect on the Air Balloon public house (a non-designated heritage resource) resulting from its demolition. • Permanent adverse significant effects on below ground archaeology within the footprint of the scheme.	• Permanent adverse significant effect on Shab Hill Barn Grade II Listed Building due to increased traffic noise compared to the existing situation.

Factor	Construction stage	Operation stage
Landscape and visual	• Temporary adverse significant effect on some of the Special Qualities of the Cotswolds Area of Outstanding Natural Beauty (AONB). • Temporary adverse significant effects on landscape character types (LCT) that are directly affected by the proposed scheme, including: LCT 2 Escarpment; LCT 7 High Wold; and LCT 8 High Wold Valleys. • Temporary adverse significant effects experienced by residents of Nettleton Bottom, Shab Hill, Stockwell, visitors to Crickley Hill Country Park, Barrow Wake, Great Witcombe Roman Villa, Leckhampton Hill and users of the Public Rights of Way (PRoW) network, including the Cotswold Way National Trail, Gloucestershire Way long distance footpath and local footpaths, bridleway and byways. Users of the main road network including the A417, A436 and B4070 will also experience temporary adverse significant visual effects.	• Permanent beneficial significant effects on some of the Special Qualities of the Cotswolds AONB. • Permanent adverse significant effects on LCT that are directly affected by the proposed scheme, including: LCT 2 Escarpment (year 1); and LCT 7 High Wold (year 1). • Combination of likely permanent adverse effects (at year 1) and neutral effects (15 years after opening) for residents of Shab Hill and Stockwell. • Combination of likely permanent adverse effects (at year 1) and neutral effects (15 years after opening) for visitors to Barrow Wake and Great Witcombe Roman Villa. • Likely permanent adverse effects experienced by visitors to Crickley Hill Country Park at year 1 and year 15. • Combination of likely permanent adverse and neutral effects experienced by users of the PRoW network, including the Cotswold Way National Trail (adverse at year 1 and year 15), Gloucestershire Way long distance footpath (adverse at year 1 only) and local footpaths, bridleway and byways (adverse at year 1 only).

Factor	Construction stage	Operation stage
Biodiversity	• Adverse significant effect on the Barrow Wake unit of the Crickley Hill and Barrow Wake Site of Special Scientific Interest (SSSI) due to loss 0.07ha of grassland and 0.03ha of woodland. • Adverse significant effect on veteran trees due to the loss of up to nine veteran trees. • Adverse significant effect on semi-natural broadleaved woodland and scattered trees through habitat loss along verges and embankments, loss and severance of beech woodland at Shab Hill. • Beneficial significant effect on semi-natural broadleaved woodland due to planting approximately 19ha of new woodland. • Adverse significant effect on important and species-rich hedgerows through habitat loss of approximately 5.5km of hedgerow. • Beneficial significant effect on species-rich hedgerow habitat due to planting approximately 7.7km of new hedgerow. • Adverse significant effect on species-rich neutral grassland due to habitat loss. • Beneficial significant effect on calcareous grasslands across the proposed scheme due to habitat creation. • Adverse significant effect on a petrifying spring with tufa formation through loss of Annex 1 habitat. • Adverse significant effect on bat assemblages due to temporary severance and fragmentation of foraging and commuting features. • Adverse significant effect on barn owl through loss and fragmentation of foraging habitat.	• Adverse significant effect on barn owl through increased risk of mortality and injury through traffic collisions due to severance of habitat.

Factor	Construction stage	Operation stage
Geology and soils	• Permanent adverse significant effect on Agricultural Land Classification (ALC) Grade 3a best and most versatile agricultural land. • Permanent adverse significant effect on ALC Grade 3b agricultural land. • Permanent adverse significant effect on controlled waters as a result of identified soil and groundwater hydrocarbon contamination. Further investigations and assessments would be required to identify the source, confirm the risks and design appropriate remediation measures.	• No likely significant effects anticipated.
Material assets and waste	• No likely significant effects anticipated.	• No likely significant effects anticipated.
Noise and vibration	**Residential:** • Temporary adverse significant noise effects from construction activities for fourteen residential properties. **Non-residential:** • Temporary adverse significant noise effects from construction activities at non-residential locations. • Temporary adverse significant noise effects from construction activities identified at PRoWs within approximately 500m of major excavation works in the AONB near the new alignment, in particular along a 500m section of the Gloucestershire Way long distance footpath (footpath link ACY3).	**Residential:** • Direct permanent beneficial significant noise effects have been identified at 45 residential properties. • Direct permanent adverse significant noise effects have been identified at 22 residential properties. • Indirect permanent beneficial significant noise effects have been identified at 20 residential properties. **Non-residential:** • Permanent beneficial significant effects along the existing section of A417 highway to be detrunked and along the Cotswold Way. • Direct permanent significant adverse effects on part of the Gloucestershire Way long distance footpath between the Air Balloon roundabout and Coberley to the east. • Direct permanent significant adverse effects on footpath links running for approximately one kilometre to the east from Stockwell.

Factor	Construction stage	Operation stage
Population and human health	• Permanent adverse significant effects on two businesses (Air Balloon Public House and Crickley Hill Tractors) and three residential properties on Crickley Hill (Woodside House, Pinewood and Crickley Ridge). • Temporary adverse significant effect on users of Crickley Hill Country Park. • Permanent adverse significant effect on one Agricultural Holding, Shab Hill Farm. • No adverse health outcomes.	• Permanent beneficial significant effect on the Cotswold Way National Trail. • Permanent beneficial significant effect on walking, cycling and horse riding / PrOW. • Positive health outcomes identified in relationship to transport and connectivity, open space and nature, air quality and employment and economy. • Mixed health outcomes (both positive and negative) in relation to noise, therefore an overall neutral health outcome across the communities.
Road drainage and the water environment	• Temporary adverse significant effect on hydromorphology due to the removal of Norman's Brook during the construction phase.	• No likely significant effects anticipated.
Climate	• No likely significant effects anticipated.	• No likely significant effects anticipated.

Consultation

Public consultation

Highways England wishes to obtain the views of the public on the changes to the draft proposals for the proposed scheme design, taking into account the potential environmental effects of the proposed scheme. These views can then be taken into account in finalising the design and refining the EIA and ES.

There will be a consultation on the proposed scheme running from Tuesday 13 October to Thursday 12 November 2020 for members of the public to respond to the consultation.

Responses can relate to the preliminary environmental information set out in the report in respect to changes to proposed scheme. This will provide an opportunity for stakeholders to give views on our proposals. There are various ways to respond to the consultation.

Online:

The feedback form can be completed on our consultation website at: https://highwaysengland.co.uk/projects/a417-missing-link/

Freepost:

The feedback form, or any other feedback, can be posted to the freepost address below. If using this freepost address please write it exactly as shown on a single line, otherwise it may not be delivered.

FREEPOST A417 MISSING LINK (please note that the address must be written in capital letters and you do not need a stamp).

If you need a hard copy of the feedback form, let us know and we can provide one in the post.

Email:

You can email us your feedback via:
A417MissingLink@highwaysengland.co.uk

All consultation responses must be received by 23:59 on 12 November 2020. Responses received after this date may not be taken into consideration as part of the consultation.

If you have any questions you can also call us on 0300 123 5000.

After the consultation

After the consultation period, all responses will be considered in finalising the scheme design and the Environmental Statement. A Consultation Report will be prepared on the responses received and how they have been taken into account, including whether or not they led to changes to the proposed scheme. Highways England will include this report as part of the DCO application which is planned for submission in spring 2021. The Planning Inspectorate will decide whether the application meets the required standards to proceed to examination.

This document is also available on our website at www.highwaysengland.co.uk

For an accessible version of this publication please call 0300 123 5000 and we will help you.

If you have any enquiries about this publication email info@highwaysengland.co.uk

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