

A417 Missing Link
TR010056

6.2 Environmental Statement
Chapter 12 Population and Human
Health

Planning Act 2008

APFP Regulation 5(2)(a)
Infrastructure Planning (Applications: Prescribed Forms and
Procedure) Regulations 2009

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**The Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations 2009**

A417 Missing Link

Development Consent Order 202[x]

**6.2 Environmental Statement
Chapter 12 Population and Human Health**

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12 Population and human health

12.1 Introduction

12.1.1 This chapter of the Environmental Statement (ES) reports the potential effects of the construction and operational of the A417 Missing Link scheme (the scheme) on population and human health.

12.1.2 The chapter follows the method set out in Design Manual for Roads and Bridges (DMRB) *LA 112 Population and Human Health*¹, and *LA 104 Environmental Assessment and Monitoring*². This Chapter is structured under the following impact areas (receptor groups)³:

Land-use and accessibility, including:

- private property and housing
- community land and assets
- development land and businesses
- agricultural land holdings
- walkers, cyclists and horse riders (WCH)

Human health, including:

- health profiles of affected communities
- health determinants
- likely health outcomes

12.1.3 It is important to acknowledge that since the scoping stage of the scheme the methods for undertaking assessment of potential effects on population and human health have been superseded. ES Appendix 4.5 Changes to scope and methodology (Document Reference 6.4) outlines the changes in scope and methodology since the submission of the Scoping Report in May 2019.

12.2 Competent expert evidence

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 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 are provided in ES Appendix 1.2 Competent expert evidence (Document Reference 6.4).

12.3 Legislative and policy framework

Legislation

- 12.3.1 The following legislation has been considered as part of the population and human health assessment where these have informed the identification of receptors and resources and their sensitivity; the assessment methodology; the potential for significant environmental effects; and required mitigation. This legislation includes the following.

Countryside and Rights of Way Act 2000

- 12.3.2 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 Act also obliges the highway authority to recognise the needs of the mobility impaired when undertaking improvements.

The National Parks and Access to the Countryside Act 1949

- 12.3.3 The Act sets out the protection for national trails (including the Cotswold Way National Trail) and the mechanism by which they can be diverted.

Health and Social Care Act 2012

- 12.3.4 The Act is a wide-ranging piece of legislation that places a duty of care on the Secretary of State to protect and improve public health the National Health Service (NHS), in pursuit of a number of key aims, which include:
- An improvement in the quality of services.
 - A reduction in health inequalities.
 - The promotion of autonomy for General Practitioners (GPs) and health centres.
 - Improvements to the treatments and services offered to patients.

Policy framework

- 12.3.5 As documented in ES Chapter 1 Introduction (Document Reference 6.2), the *National Policy Statement for National Networks* (NPSNN) is the primary planning policy for the scheme and forms the principal basis for making decisions on DCO applications in England. The *National Planning Policy Framework* (NPPF) is noted as being 'important and relevant' and is to be considered, however, if there is a conflict between the NPSNN and NPPF, the NPSNN takes precedence.
- 12.3.6 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 ES information is provided to address the policy.

Table 12-1 Relevant NPSNN policies for population and human health assessment

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the ES is information provided to address this policy
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 ES Chapter 1 Introduction (Document Reference 6.2).
Chapter 2 – The Need for Development	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 Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (JCS) 2011-2031 Infrastructure Delivery Plan as a key piece of infrastructure in order to support economic and population growth within the JCS area. See section 12.7 Baseline conditions of this Chapter for more about the JCS.
Chapter 2 – The Need for Development	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 Baseline conditions and 12.10 Assessment of likely significant effects 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 Design, mitigation and enhancement measures and 12.10 Assessment of likely significant effects of this Chapter. Opportunities for wider benefits have also been considered, particularly in relation to the Walking Cycling Horse riding (WCH)/ Public Rights of Way (PRoW) network.

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the ES is information provided to address this policy
Chapter 3 – Wider Government Policy on the national networks	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 Assessment of likely significant effects with detailed proposals outlined in Public Rights of Way Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) which seeks to better connect and enhance the WCH network in the area surrounding the scheme.
Chapter 3 – Wider Government Policy on the national networks	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 Assessment of likely significant effects.
Chapter 4 - Health	Paragraphs 4.79 to 4.82 recognises that <i>“National road and rail networks and strategic rail freight interchanges have the potential to affect the health, well-being and quality of life of the population. They can have direct impacts on health because of traffic, noise, vibration, air quality and emissions, light pollution, community severance, dust, odour, polluting water, hazardous waste and pests. New or enhanced national network infrastructure may have indirect health impacts; for example if they affect access to key public services, local transport, opportunities for cycling and walking or the use of open space for recreation and physical activity. It outlines that where the proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and set out the assessment of any likely significant adverse health impacts. The applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate.</i>	An assessment of any likely significant adverse health impacts alongside any measures to avoid, reduce or compensate for adverse health impacts as appropriate. In particular this is considered in 12.7 (health baseline), 12.8 (potential impacts on health) and 12.10 (assessment of likely significant effects on health).

Relevant NPSNN paragraph reference	Requirement of the NPSNN	Where in the ES is information provided to address this policy
Chapter 5 – Generic Impacts	Paragraph 5.162 recognises that “ <i>Access to high quality open spaces and the countryside and opportunities for sport and recreation can be a means of providing necessary mitigation and/or compensation requirements. Green infrastructure can also enable developments to provide positive environmental and economic 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 Assessment of likely significant effects.
	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: <ul style="list-style-type: none"> - <i>Identify existing and proposed land uses near the scheme 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> - <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> 	The potential effects on community land and assets (including recreation space, Common Land and Open Access Land) is presented in section 12.10 Assessment of likely significant effects.
	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 section 12.10 Assessment of likely significant effects. Opportunities to improve access and connectivity across the PRoW network is presented in the PRoW Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)).

12.3.7 Table 12-2 and Table 12-3 present national and local policy framework 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.

12.3.8 This section does not provide a review of the legislation and policy support for the scheme itself, or provide a full consideration of relevant documents and their application to the scheme. That is provided within the Case for the Scheme (Document Reference 7.1) that accompanies the application for a DCO.

Table 12-2 National policy

Relevant document	Application to the scheme
<i>Revised National Planning Policy Framework (2019) (NPPF)</i>	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. In particular specific policies relating to population and human health include Policy 2 (sustainable development), Policy 6 (strong, competitive economy), Policy 8 (promoting health communities), Policy 9 (sustainable transport), Policy 12 (well-designed places) and Policy 15 (natural environment).
<i>National Planning Practice Guidance (PPG) – Open Space, Sports and recreation facilities, public rights of way and local green space (2014)</i>	The Guidance states that existing open space should be taken into account when considering development proposals, and that it can provide health and recreation benefits to people living and working nearby. The Guidance states that public rights of way form an important component of sustainable transport links and should be protected or enhanced.
<i>Government White Paper: Healthy Lives, Healthy People (2010)</i>	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.
<i>Highways England Cycling Strategy (2016)</i>	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.
<i>Highways England Accessibility Strategy (2016)</i>	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.
<i>Road Investment Strategy 2 (RIS2)</i>	RIS2 sets out that the provision of a safe, reliable, resilient, responsive and efficient transport network can significantly expand the opportunities for success and encourage greater ambitions. Conversely, a failing network that lacks capacity and performs poorly will limit what people can achieve. It also sets out that Highways England take the needs of cyclists, pedestrians and equestrians (non-motorised users) seriously. Encouraging people to opt for active modes of travel is both an effective means of reducing congestion on our roads and offers health benefits for all by improving air quality and developing fitness. This is particularly welcome at a time when there are growing demands on both our transport and health services. Easing these pressures will benefit both communities and the economy: it offers major benefits through connecting communities and making street environments more liveable and attractive.

Table 12-3 Local policy

Relevant document	Application to the scheme
<p><i>Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (JCS) 2011-2031 December 2017 and Gloucester Local Plan (1983) – saved policies</i></p>	<p>The 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"> • Policy SD1: Employment – Except Retail Development • Policy SD2: Retail and City/Town Centres • Policy SD10: Residential Development • Policy SD14: Health and Environmental Quality • Policy INF1: Transport Network • Policy INF4: Social and Community Infrastructure <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.</p> <p>The A417 Air Balloon (Missing Link) scheme is identified as a key priority through the JCS infrastructure delivery plan.</p>
<p><i>Second Stage Deposit City of Gloucester Local Plan (2002)</i></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 JCS. 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><i>Cotswold District Local Plan 2011-2031 (2018)</i></p>	<p>Adopted policies which relate to population and human health include:</p> <ul style="list-style-type: none"> • Cotswolds Area of Outstanding Natural Beauty (AONB) (EN5) • Social and Community Infrastructure (INF2) • Sustainable Transport (INF3) • Highway Safety (INF4)
<p><i>Tewkesbury Borough Local Plan 2011-2031 (2019)</i></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><i>Local Transport Plan (LTP) for Gloucestershire (2015-2031)</i></p>	<p>The LTP's overarching objectives are to:</p> <ul style="list-style-type: none"> • support sustainable economic growth. • enable community connectivity. • conserve the environment. • Improve community health and well-being. <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 2019-2020 consultation period closed on 26 March 2020 and following consideration of the consultation responses an updated LTP for the period 2015-2041 will be adopted by the Council.</p>

Relevant document	Application to the scheme
<p><i>Strategic Economic Plan (SEP) and Gloucestershire Economic Growth Capital Investment Pipeline (CIP) 2018</i></p>	<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 scheme 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>
<p><i>Cotswolds AONB Management Plan 2018- 2023</i></p>	<p>The purposes of the AONB Management Plan 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 Management Plan sets 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"> • <i>Policy UE2: Access and Recreation</i> - Of specific relevance to this assessment, Policy UE2 seeks to ensure that a safe, accessible, waymarked and connected 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. • <i>Policy UE3: Health and Well-being</i> - 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.

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 or ‘sensitivity’ 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 parts of the assessment methodology have been developed in accordance with the DMRB methodology in LA 104 Environmental assessment and monitoring.

Baseline data gathering

12.4.3 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.
- Consultation (where required to inform assessment conclusions).

12.4.4 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.
 - 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 and sports pitches) 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 and religious facilities) 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.
 - 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.
 - 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. PRow) within the study area.
 - The frequency of use of the WCH provision within the study area.

- 12.4.5 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.
- 12.4.6 Surveys are undertaken as part of the DMRB assessment and review of WCH, which provide helpful usage data for the WCH network in the area surrounding the scheme. Please see ES Appendix 12.2 Walking, cycling and horse riding including disabled users review at preliminary design (Document Reference 6.4).
- 12.4.7 Data collection and surveys have been undertaken to help inform this assessment.
- 12.4.8 Baseline conditions are identified and reported in section 12.7 Baseline conditions.

Receptor value (sensitivity)

- 12.4.9 Where possible, environmental value/sensitivity has been applied as set out in Table 12-4.
- 12.4.10 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.
- 12.4.11 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 12-4 Receptor sensitivity for land use and accessibility

Receptor sensitivity	Criteria
Very high	<p>Private property and housing:</p> <ul style="list-style-type: none"> • existing private property or land allocated for housing located in a local authority area where the number of households are expected to increase by >25% by 2041 (Office for National Statistics (ONS) data); and/or • existing housing and land allocated for housing (e.g. strategic housing sites) covering >5ha and/or >150 houses. <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> • complete severance between communities and their land/assets, with little/no accessibility provision; • alternatives are only available outside the local planning authority area; • the level of use is very frequent (daily); and • the land and assets are used by the majority (>=50%) of the community. <p>Development land and businesses:</p> <ul style="list-style-type: none"> • existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering >5ha. <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> • areas of land in which the enterprise is wholly reliant on the spatial relationship of land to key agricultural infrastructure; and • access between land and key agricultural infrastructure is required on a frequent basis (daily).

Receptor sensitivity	Criteria
	<p>WCH:</p> <ul style="list-style-type: none"> 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; 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 rights of way for WCH crossing roads at grade with >16,000 vehicles per day.
High	<p>Private property and housing:</p> <ul style="list-style-type: none"> 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 existing housing and land allocated for housing (e.g. strategic housing sites) covering >1-5ha and/or >30-150 houses. <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> there is substantial severance between community and assets, with limited accessibility provision; alternative facilities are only available in the wider local planning authority area; the level of use is frequent (weekly); and the land and assets are used by the majority (>=50%) of the community. <p>Development land and businesses:</p> <ul style="list-style-type: none"> existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering >1 - 5ha. <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> areas of land in which the enterprise is dependent on the spatial relationship of land to key agricultural infrastructure; and access between land and key agricultural infrastructure is required on a frequent basis (weekly). <p>WCH:</p> <ul style="list-style-type: none"> 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 rights of way for WCH crossing roads at grade with >8,000 - 16,000 vehicles per day.
Medium	<p>Private property and housing:</p> <ul style="list-style-type: none"> houses or land allocated for housing located in a local authority area where the number of households are expected to increase by >6-15% by 2041 (ONS data); and/or existing housing and land allocated for housing (e.g. strategic housing sites) covering <1ha and/or <30 houses. <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> there is severance between communities and their land/assets but with existing accessibility provision; limited alternative facilities are available at a local level within adjacent communities; the level of use is reasonably frequent (monthly); and

Receptor sensitivity	Criteria
	<ul style="list-style-type: none"> the land and assets are used by the majority (>=50%) of the community. <p>Development land and businesses:</p> <ul style="list-style-type: none"> existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering <1ha. <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure; and access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly). <p>WCH:</p> <ul style="list-style-type: none"> PRoW and other routes close to communities which are used for recreational purposes (e.g. dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys; and/or rights of way for WCH crossing roads at grade with >4,000 – 8,000 vehicles per day.
Low	<p>Private property and housing:</p> <ul style="list-style-type: none"> proposed development on unallocated sites providing housing with planning permission/in the planning process. <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> limited existing severance between community and assets, with existing full Disability Discrimination Act (DDA) compliant accessibility provision; alternative facilities are available at a local level within the wider community; the level of use is infrequent (monthly or less frequent); and the land and assets are used by the minority (>=50%) of the community.
	<p>Development land and businesses:</p> <ul style="list-style-type: none"> proposed development on unallocated sites providing employment with planning permission/in the planning process. <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> areas of land which the enterprise is not dependent on the spatial relationship of land to key agricultural infrastructure; and access between land and key agricultural infrastructure is required on an infrequent basis (monthly or less frequent). <p>WCH:</p> <ul style="list-style-type: none"> 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 rights of way for WCH crossing roads at grade with <4,000 vehicles per day.
Negligible	<p>Private property and housing:</p> <ul style="list-style-type: none"> N/A. <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> no or limited severance or accessibility issues; alternative facilities are available within the same community; the level of use is very infrequent (a few occasions yearly); and

Receptor sensitivity	Criteria
	<ul style="list-style-type: none"> the land and assets are used by the minority ($\geq 50\%$) of the community. <p>Development land and businesses:</p> <ul style="list-style-type: none"> N/A. <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> areas of land which are infrequently used on a non-commercial basis. <p>WCH:</p> <ul style="list-style-type: none"> N/A.

12.4.12 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.

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

Magnitude of impact

12.4.14 Magnitude criteria have been applied as set out in Table 12-5.

Table 12-5 Magnitude of impact for land use and accessibility

Magnitude of impact	Typical description
Major	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <ul style="list-style-type: none"> 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 introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision. <p>WCH:</p> <ul style="list-style-type: none"> >500m increase (adverse)/decrease (beneficial) in WCH journey length.
Moderate	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <ul style="list-style-type: none"> 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 introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision. <p>WCH:</p> <ul style="list-style-type: none"> >250m - 500m increase (adverse) or decrease (beneficial) in WCH journey length.
Minor	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <ul style="list-style-type: none"> 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

Magnitude of impact	Typical description
	<p>compromise overall viability of property, businesses, community assets or agricultural holdings; and/or</p> <ul style="list-style-type: none"> introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision. <p>WCH:</p> <ul style="list-style-type: none"> >50m - 250m increase (adverse) or decrease (beneficial) in WCH journey length.
Negligible	<p>Private property and housing, community land and assets, development land and businesses and agricultural land holdings:</p> <ul style="list-style-type: none"> 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 very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision. <p>WCH:</p> <ul style="list-style-type: none"> <50m increase (adverse) or decrease (beneficial) in WCH journey length.
No change	<p>No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction.</p>

- 12.4.15 In addition to the above descriptions, professional judgement has also been applied where 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 in section 12.10 Assessment of likely significant effects.
- 12.4.16 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.
- 12.4.17 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.
- 12.4.18 In considering significance, the assessment also makes distinction between temporary and permanent effects, 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 WCH 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

- 12.4.19 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) affected by a project. It is noted that significant effects typically comprise effects after consideration of mitigation.

- 12.4.20 For the purposes of this assessment, the significance of effects has been applied as per Table 12-6.
- 12.4.21 Significant effects are those where significance is deemed to be 'moderate' or greater, overall.
- 12.4.22 Where there are two potential categories of significance, evidence is provided to support the reporting of a single significance category.

Table 12-6 Significance of effects for land use and accessibility

		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
Environmental value	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Design and mitigation

- 12.4.23 The following mitigation hierarchy has been implemented during design and assessment:

Avoidance and prevention

- Identify alternative design/route options that avoid the requirement to compulsory purchase property, land and assets.
- Identify alternative design/route options that avoid introducing or worsening severance and avoid reducing WCH provision/increasing journey times.

Reduction

- Reduce impacts on property, land and assets by selecting route alignments that avoid land take from the most sensitive receptors/aspects of receptors thereby maintaining viability.
- By altering alignment to reduce severance to communities and disruption to WCH provision.

Remediation

- Where it is not possible to avoid or reduce a significant adverse effect, e.g. community sports pitches have to be acquired to facilitate construction, provide equivalent facilities as close to the original location as possible.

- 12.4.24 Engagement with the scheme 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. Highways England's approach

and response to engagement and consultation is provided in the separate Consultation Report that supports the DCO Application (Document Reference 5.1).

- 12.4.25 WCH design, assessment and provision has been undertaken in accordance with *DMRB GG 142 - Walking, cycling and horse-riding assessment and review*⁴. The Preliminary Review of Walking, Cycling and Horse-riding including Disabled Users is provided in ES Appendix 12.2 Walking, cycling and horse riding including disabled users review at preliminary design (Document Reference 6.4).

Environmental enhancement

- 12.4.26 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

- 12.4.27 As part of the assessment, land use effects have been assessed during construction and for the first year of operation (future year scenario).
- 12.4.28 After the first year of operation, effects on land use are assumed to be associated with routine maintenance operations and are unlikely to be significant.

Assessment methodology for human health elements

- 12.4.29 The assessment of human health is a multidisciplinary process designed to identify and assess the potential health outcomes (both negative and positive) 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.
- 12.4.30 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.
- 12.4.31 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 and the definition of health that is applied is the World Health Organisation (WHO) definition, '*Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*'.
- 12.4.32 The assessment approach has been qualitative except where informed by quantitative findings from other environmental factor assessments of the ES, including ES Chapter 5 Air quality, ES Chapter 11 Noise and vibration, ES Chapter 10 Material assets and waste and ES Chapter 14 Climate (Document Reference 6.2).

Baseline data gathering

- 12.4.33 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
 - the local physical environment

- 12.4.34 This gathering of baseline data has been coordinated with other workstreams within the ES such as socio-economic issues, air quality and noise and vibration assessments.
- 12.4.35 The data reviewed has included, but has not been limited to:
- Public Health England publications such as the *Cotswold Health Profile, 2018*⁵ and *Tewkesbury Health Profile 2018*⁶.
 - Gloucestershire Health and Well-being Board website⁷.
 - Nomis Labour Market Statistics⁸.
 - Office for National Statistics, Census 2011 data⁹.
- 12.4.36 Baseline conditions are identified and reported in section 12.7 Baseline conditions.

Determinants of human health

- 12.4.37 Health and well-being, or 'health outcomes' can be influenced by external factors such as the environmental, social or economic conditions in which individuals and/or communities find themselves. These factors are collectively known as '*health determinants*'.
- 12.4.38 Social, environmental and economic health determinants listed in Table 12-7, have been used for the identification of health impacts relevant to construction and/or operation of the scheme. Factors which have been considered relevant to each of these health determinants in the context of the scheme are listed alongside. These health determinants have been identified based on the indicative types of health determinants in DMRB LA 112.

Table 12-7 Health determinants relevant to the scheme

Health determinant	Contributing factors
Lifestyle/social and community determinants	
Community, recreational and education facilities	<ul style="list-style-type: none"> • Equitable access • Severance/separation of communities from these facilities
Green/open space	<ul style="list-style-type: none"> • Opportunities for exercise • Equitable access • Severance/separation of communities from assets
Healthcare facilities	<ul style="list-style-type: none"> • severance/separation of communities from such facilities
Transport and connectivity	<ul style="list-style-type: none"> • Congestion on the surrounding road network • Provision for active travel (PRoW, cycle ways, non-designated public routes) • Public transport routes • Equitable access
Safety of the existing affected road network	<ul style="list-style-type: none"> • Road safety
Environmental determinants	
Ambient air quality	<ul style="list-style-type: none"> • Changes in local environmental conditions
Ambient noise environment (ambient noise and areas sensitive to noise)	
Sources and pathways of potential pollution (e.g. land/water contamination)	

Health determinant	Contributing factors
Lifestyle/social and community determinants	
Landscape amenity (including light)	

Definition of community in relation to human health

12.4.39 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.

12.4.40 Table 12-8 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 in section 12.6 Study area (see ES Appendix 12.1 Health evidence literature review (Document Reference 6.4) for the relevant community health and well-being profile). A short justification for what relevance has been given to each vulnerable group is also provided in Table 12.8.

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 characteristics groups as defined by the Equality Act (2010) where these are considered to be vulnerable groups. An Equality Impact Assessment (EqIA) has been prepared for the scheme (Document Reference 7.8)

Table 12-8 Relevant vulnerable and disadvantaged groups

Vulnerable and disadvantaged groups	Sensitivity (high/medium/low)	Reason for assigned sensitivity in the context of the scheme
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%).
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.

Vulnerable and disadvantaged groups	Sensitivity (high/medium/low)	Reason for assigned sensitivity in the context of the scheme
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

- 12.4.41 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 ES Appendix 12.1 Health evidence literature review (Document Reference 6.4).
- 12.4.42 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.
 - Public health reports and research papers from a range of sources, including:
 - Public Health England
 - WHO
 - National Institute for Health and Care Excellence (NICE)
 - Health Development Agency (HDA).

Assessing human health effects

- 12.4.43 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.
- 12.4.44 Assessment is made as to whether the effect on health determinants is:
- Direct or indirect
 - Positive or negative
 - Permanent or temporary
- 12.4.45 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. The sensitivity of the population is reported as:
- Low
 - Medium
 - High
- 12.4.46 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 12-9.

Table 12-9 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

- 12.4.47 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 including disability groups. This has helped inform decision making on the scheme to date, taking into account identified needs and opportunities.
- 12.4.48 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 Public Rights of Way Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)).

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 primarily been obtained from desk-based research alongside site-based review.
- 12.5.7 Land ownership information has been collected using land registry data and is updated by the project team for the scheme on an ongoing basis based on, for example, information gathered from site visits and landowner discussions. This Chapter 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 ES and other scheme 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, which is presented within the Combined Modelling and Appraisal (ComMA) report (Document Reference 7.6).
- 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 ES and other scheme documents has been used to characterise the study area and identify impacts on health determinants.

Limits of deviation

- 12.5.15 An assessment has been conducted within the Limits of Deviation (LoD) outlined within ES Chapter 2 The project (Document Reference 6.2) and Chapter 4 Environmental assessment methodology (Document Reference 6.2). It is not considered likely that there would be any changes to the assessment carried out in this Chapter in light of the sensitivity tests undertaken pertinent to the LoD as addressed in other ES chapters.

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 500 metre 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 PRow network, whilst the baseline and assessment considers all PRow and recreational routes within 500 metres 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. ES Figure 12.1 Population and health study area (Document Reference 6.3) shows the 500 metre extent in the scheme's context and also includes a 250 metre extent for context.
- 12.6.6 ES Figure 12.1 Population and health study area (Document Reference 6.3) 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 and noise).
- 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 Tewkesbury District, Cotswold (as the lower tier local authority) and Gloucestershire (as the upper tier local authority) authority areas.
- 12.6.10 In relation to quantification of air quality and noise effects, reference has been made to assessments in ES Chapter 5 Air quality (Document Reference 6.2) and ES Chapter 11 Noise and vibration (Document Reference 6.2) that have been prepared for the scheme, which have used a 200 metre and 600 metre 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 12-10.

Table 12-10 Study areas

Impact area	Study area for indirect or amenity effects	Study area for direct effects
Land-use and accessibility		
Private property and housing	Receptors located within 500m of the DCO Boundary.	Receptors located within the DCO Boundary.

Community land and assets	Receptors located within 500m of the DCO Boundary.	Receptors (assets and/or community land) located within the DCO Boundary.
Development land and businesses	Receptors located within 500m of the DCO Boundary.	Receptors located within the DCO Boundary.
Agricultural land holdings	Receptors located within 500m of the DCO Boundary.	Receptors located within the DCO Boundary where land-take is required.
Walkers, cyclists and horse riders (WCH)	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.
Human health		
Affected communities	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 preparing this ES 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
 - WCH including all groups of non-motorised travellers
- human health, including;
 - health profiles of affected communities
 - health determinants (e.g. noise or air pollution)
 - likely health outcomes

Land-use and accessibility

Private property and housing

12.7.2 In determining the sensitivity of private property and housing, household projections are utilised 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 12-11.

Table 12-11 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 would give a high sensitivity for private property and housing.
- 12.7.5 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” (local allocation of land for development) within the *Gloucester, Cheltenham and Tewkesbury Joint Core Strategy (2017)*¹⁰ 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 scheme 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 12-12. These are also shown on ES Figure 12.3 Community facilities, business and tourism receptors (Document Reference 6.3).

Table 12-12 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 existing 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 ES Figure 12.3 Community facilities, business and tourism receptors (Document Reference 6.3) 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 ES Figure 12.3 Community facilities, business and tourism receptors (Document Reference 6.3) 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. 4.2 miles (6.8 kilometres) to the north), Gloucester (approx. 6.2 miles (10 kilometres) to the east) and Stroud (approx. 8.4 miles (13.5 kilometres) to the south). 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.
 - This growth continues earlier trends and suggests further growth in the older population within the county.
- 12.7.14 When considering the socio-economic profile of the local area, the scheme is situated 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 scheme interacts:
- Badgeworth (Tewkesbury)
 - Ermin (Cotswold)

- 12.7.15 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 Cotswold.
- 12.7.16 The main villages located along the Existing A417 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*.
- 12.7.17 The Existing A417 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)
 - Brimpsfield (south-east)
- 12.7.18 Settlements and facilities in the study area and the area surrounding the scheme are shown on ES Figure 12.3 Community facilities, business and tourism receptors (Document Reference 6.3).
- 12.7.19 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

- 12.7.20 ES Figure 12.3 Community facilities, business and tourism receptors (Document Reference 6.3) shows the community assets located within 500 metres of the scheme and these are summarised in Table 12-13. This also includes recreational assets. An appropriate allocation of sensitivity is provided.
- 12.7.21 Some community land is Common Land and is shown on ES Figure 12.4 Open access land (Document Reference 6.3). For more information, refer to the Special Category Land Plans that support the DCO Application (Document Reference 2.3).

Table 12-13 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.	Regular/weekly services	Used by the minority of the community	Medium
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	High
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	Very High
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	High
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 variations in use (weekend peak)	Used by the minority of the community	Medium

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 variations in use (weekend peak)	Used by the minority of the community	Medium
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 seasonal variations (summer peak) 190,000 visitors per year	Used by the majority of the community	Very High
Barrow Wake	Car Park (and registered common land)	No or limited severance or accessibility issues	Alternative facilities exist at a local level	Daily with seasonal variations (summer peak)	Used by the majority of the community	High
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	Low

- 12.7.22 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 Cotswolds AONB.
- 12.7.23 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).
- 12.7.24 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.
- 12.7.25 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.
- 12.7.26 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
 - recording car registrations and sending follow-up letters to their owners
- 12.7.27 Anecdotal evidence exists for other anti-social behaviour activities in the area, including:
- drug-taking
 - littering (including fly-tipping)
 - sex work
 - theft
- 12.7.28 It is understood from stakeholder engagement activities that a 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. Highways England also understands environmental groups are in discussions with the local authority about the future of the car park.
- 12.7.29 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.
- 12.7.30 These measures are considered within ES Chapter 7 Landscape and visual effects (Document Reference 6.2).

12.7.31 As shown in ES Figure 12.4 Open access land (Document Reference 6.3), and the Special Category Land Plans that support the DCO Application (Document Reference 2.3) 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 (SCL), are located primarily in the vicinity of Crickley Hill Country Park and Barrow Wake. For clarity, the Country 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 recreation¹¹”.

Country Park

12.7.32 The land required for the scheme 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.

Open Access Land

12.7.33 Open Access Land is land which is made available to the public for recreation on foot only, as defined under the Countryside and Rights of Way Act 2000 (CROW).

12.7.34 The Open Access Land which is required for the scheme falls into the definition of Open Space as it is land which is used for the purposes of public recreation.

Common Land

12.7.35 The Common Land affected by the scheme is areas of land known as Barrow Wake near Birdlip and is registered as common land parcel CL274.

12.7.36 Common Land is also Open Access Land under the CROW Act unless there is evidence that the public have a right of access on foot for recreation by some other means. There is no right for use by bicycle or on horseback unless that right has been specifically provided by the landowner.

12.7.37 Different areas of SCL overlap in this area (e.g. Common Land and Open Access Land in the areas surrounding Barrow Wake), and so whilst the quantity of different types of this land affected is presented below, the total area of all three types is not the cumulative sum:

- Common Land: 5,741 m²
- Open Access Land: 43,959 m² (including Common Land which is also Open Access) or 38,219 m² (excluding the Common Land)
- Country Park: 1,436 m²

12.7.38 All SCL is considered to be of high sensitivity given its nature. However, it should be acknowledged that sections of the Open Access Land are currently inaccessible due to its location either under the Existing A417 or forming steep embankments.

12.7.39 There are no other land uses such as allotments or playgrounds located along the length of the scheme.

Development land and businesses

12.7.40 ES Figure 12.3 Community facilities, business and tourism receptors (Document Reference 6.3) shows the development land and businesses located along the scheme. These have been identified through both desk-based and site work and are summarised in Table 12-14.

- 12.7.41 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.
- 12.7.42 Data has been presented where possible from publicly available sources or stakeholder engagement, to help inform the sensitivity values. Where able to be sourced, this includes number of jobs.
- 12.7.43 In all cases for this scheme, the receptors and parts thereof which relate to the business/production of goods or services identified are less than 1ha in size. As such, they have been applied medium sensitivities.

Table 12-14 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
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	A club leasing land for motorcycle trials	3	Less than 1ha	Medium
Hanson Quarry Products Ltd	Quarry (currently inactive)	-	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

Receptor	Main activity	Jobs (where known)	Size of employment site	Sensitivity
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 Public House	Pub and Restaurant	-	Less than 1ha	Medium
The Golden Heart Inn	Sixteenth 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
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

- 12.7.44 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 JCS12 identifies the site for the provision of circa 1,500 new homes and 3 hectares of employment land.
- 12.7.45 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 scheme 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.

- 12.7.46 At the time of writing this ES there were no known current pending planning applications within the DCO Boundary of the scheme or within proximity to the scheme that would affect this assessment.

Agricultural land holdings

- 12.7.47 Effects on agricultural land and soils are presented within ES Chapter 9 Geology and soils (Document Reference 6.2), 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.
- 12.7.48 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 DCO Boundary are shown on ES Figure 12.5 Agricultural land holdings (Document Reference 6.3) and listed in Table 12-15.
- 12.7.49 Table 12-15 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. 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).
- 12.7.50 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 access is required weekly (frequently) the sensitivity is high. Where access is required monthly (reasonably frequent) the sensitivity is medium, and where access is required less than monthly, the sensitivity is low.
- 12.7.51 One entry in Table 12-15 which reads as 0ha of land take includes a very small area of land required as follows:
- Pither Agricultural – 27.6m² required to facilitate drainage works and a field access.
- 12.7.52 Overall, approximately 137.6ha 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 804ha.
- 12.7.53 Overall, land take within the DCO Boundary (temporary and permanent) therefore equates to 17% of the agricultural holdings affected. However, the actual proportion of the holding which would be required either temporarily or permanently as part of the scheme varies between <1% and 59% of the overall holding affected.
- 12.7.54 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).

- 12.7.55 There are no known existing accessibility issues between these holdings and existing key agricultural infrastructure.
- 12.7.56 The baseline has also considered agricultural holdings within the wider 500 metre 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 would not interact with the scheme, these holdings would be considered of low sensitivity.

Table 12-15 Agricultural land holdings

Name of farm or landowner surname	Total plot area(s) (ha)	Area (ha) within DCO Boundary	% 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
Crickley Hill Country Park (National Trust)	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	6.56	61%	Grazing or arable land	Not currently in use.	Negligible
Field	3.75	0.27	7%	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
Fosse Farm	64.97	8.04	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
Garlick	27.88	6.64	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

Name of farm or landowner surname	Total plot area(s) (ha)	Area (ha) within DCO Boundary	% of plot affected	Use	Observations	Sensitivity
Gloucestershire Wildlife Trust	33.14	0.82	2%	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	24.53	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	4.15	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	2.78	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
Rushwood Kennels	9.48	1.98	21%	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

Name of farm or landowner surname	Total plot area(s) (ha)	Area (ha) within DCO Boundary	% of plot affected	Use	Observations	Sensitivity
Shab Hill Farm	32.05	19.65	61%	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	54.54	14%	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

Walkers, cyclists and horse riders (WCH)

- 12.7.57 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 WCH Technical Working Groups. For clarity, the section considers all groups of non-motorised users and is not restricted to walkers, cyclists and horse riders.
- 12.7.58 ES Figure 12.2 Public rights of way and local routes (Document Reference 6.3) shows PRoW and local routes including unclassified roads which carry public rights. This has been drawn from published data and consultation feedback.
- 12.7.59 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).
- 12.7.60 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 footpath, and more than 20 footpaths, bridleways and restricted byways.
- 12.7.61 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.
- 12.7.62 A site walkover visit was undertaken on Tuesday 18 June 2019 in order to visit and review each of the PRoW identified as being potentially impacted by the scheme.
- 12.7.63 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.
- 12.7.64 Some of the identified routes, in particular the Cotswold National Trail and Gloucestershire Way long distance footpath 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.
- 12.7.65 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.
- 12.7.66 Department for Transport guidance¹³ 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.
- 12.7.67 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.

- 12.7.68 PRow that intersect with the scheme are shown on ES Figure 12.2 Public rights of way and local routes (Document Reference 6.3) and are summarised in Table 12-16.
- 12.7.69 Alongside the findings of site walkover surveys, Table 12-16 also presents data from WCH survey counts in order to report against the sensitivity criteria.
- 12.7.70 WCH survey locations and results are shown in ES Figure 12.2 Public rights of way and local routes (Document Reference 6.3). The sensitivities presented against each PRow identified in Table 12-16 are partly informed by the user/frequency survey results.
- 12.7.71 The WCH surveys were conducted for one weekend day in the school summer holidays with 14-hour (06:00 to 20:00) video surveys conducted on Saturday 2 September 2017. Surveys at sites 8, 11 and 14 were undertaken on Sunday 10 September 2017 due to access issues.
- 12.7.72 Further surveys to inform the assessment were undertaken on 31 August 2019 (06:00 to 20:00) 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.
- 12.7.73 Following engagement with stakeholders through the WCH Technical Working Group in 2020 and early 2021, it was clear that some participants consider PRow and at Badgeworth footpaths 80, 84, 86 and 126 in particular, provide for crossings of the A417 carriageway to the west of the scheme, and should therefore be mitigated by additional crossing facilities along the A417 at Crickley Hill to those proposed as part of the scheme. It is not the case that the PRows continue across the carriageway, but some users may choose to cross the carriageway. As a result of this engagement, Highways England commissioned additional surveys to understand user behaviour along this section of the A417.
- 12.7.74 The additional surveys supplement the aforementioned data.
- 12.7.75 Surveys were undertaken on Saturday, 2 September 2017 for the WCH studies are comprehensive across the network and include Dog Lane, the PRow between locations Badgeworth footpaths 80 (location A), 84 (location B), 126 (locations A and B) and 86 (location C).
- 12.7.76 An additional survey on Saturday, 20 March 2021 (06:00 to 20:00) records users in the area of Badgeworth footpath 80 (location A). The 2017 surveys record WCH users only but the 2021 survey records WCH and vehicles.
- 12.7.77 Motorised vehicles are recorded as motorbikes, car/light goods vehicles and heavy goods/agricultural vehicles.
- 12.7.78 The survey data shows a high walking demand along Dog Lane but less demand on the eastern part of this stretch of A417 to Air Balloon roundabout. No users are recorded crossing the road, but this could reflect a lack of safe facilities rather than a lack of desire. The data shows a noticeable uplift in user numbers between years 2017 and 2021, which is assumed to be as consequence of the current pandemic.
- 12.7.79 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 12-16 Existing PRow that interact with the scheme

PRoW	Location	Commentary	Sensitivity
Cotswold 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. Annual average daily traffic (AADT) for the A417 west of Air Balloon shows two-way flows of 36,900 in the base year (2015) and 42,100 in a Do-Minimum scenario (2026)	Very high
Gloucestershire Way long distance footpath	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 29,500 in the base year (2015) and 33,000 in a Do-Minimum scenario (2026)	High
Badgeworth bridleway 125	West to east, Cirencester Road to south of A417	Surfaced path along access to Flyup 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 Badgeworth bridleway 125 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 Flyup 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 National Trail 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
Cowley footpath 24	Links Badgeworth bridleway 89 to Cotswold Way National Trail	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 Coberley bridleway 117 – does not appear to offer a meaningful route.	Low
Coberley footpath 15	South of Ullen Wood connecting unclassified road 50852	Footpath likely used for recreational purposes. Footpath connects into the wider PRoW network including routes joining the Gloucestershire Way.	Medium
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

PRoW	Location	Commentary	Sensitivity
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
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 21	Connects Existing A417 to Cowley footpath 22	Footpath which is close to communities and is likely used for recreational purposes. Footpath connects into the wider PRoW network.	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

12.7.80 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 12-16 are located within 250 metres of the scheme and are likely to experience a direct effect as part of construction and/or operation. Those PRow within the wider 500 metre 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

- 12.7.81 As previously explained, the scheme also has the potential to affect unclassified roads or ORPAs that interface with the scheme. Those that are directly affected by works are also shown on ES Figure 12.2 Public rights of way and local routes (Document Reference 6.3).
- 12.7.82 There are local routes that interface and are considered of interest in light of stakeholder engagement (see section 12.7 Baseline conditions). These are all single track road unless otherwise stated and are identified on the relevant List of Streets as:
- 50852, links Barrow Wake to Ullenwood
 - 50853, links 50852 near Birdlip Radio Station to 50855 near Cowley Lane
 - 50944, links Stockwell Farm to 50853
 - 47282, links B4070 to Barrow Wake car park and continues to A417 (twin lane single carriageway in places and footway in others)
 - 40859, links A417 past Stockwell farm to Cowley
- 12.7.83 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.
- 12.7.84 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.
- 12.7.85 The local routes are also shown on the Rights of Way and Access Plans submitted as part of the DCO Application (Document Reference 2.5).

Human health

12.7.86 When considering the baseline for human health, it is important to build up an overall understanding of the health profile of the communities being considered within the assessment. This enables a view to be taken on how sensitive these communities may be to changes in health determinants, resulting either directly or indirectly from the scheme. The baseline listed below aims to achieve this and follows recommendations set out in various health assessment guidance such as that developed by the Wales Health Impact Assessment Support Unit (WHIASU)¹⁴ and the Institute of Environmental Assessment and Management (IEMA)¹⁵.

Population

12.7.87 In 2017, the county of Gloucestershire had a population of 628,139 (50.9% male) with 61% being between 16-64 years old. This is just below the national figure of

62.9% of people being within this age bracket Table 12-7 sets out the population figures at the ward level compared to the regional and national figures.

Table 12-17 Population comparisons (2017)

	Ermin, Cotswold E05004321	Badgeworth, Tewkesbury E05008563	Cotswold (lower tier local authority 2013)	Gloucestershire (upper tier local authority 2013)	England
Total population	2,548	2,737	87,509	628,139	55,619,432

Source: Public Health England, Local Health, 2017¹⁶

Age structure

- 12.7.88 Table 12-18 shows that 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 12-18 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%

Life expectancy

- 12.7.89 Table 12-19 shows that life expectancy is not significantly better within each ward than the national average except for men in Ermin, who have a significantly longer life expectancy than the England average.

Table 12-19 Life expectancy for men and women

	Ermin ward	Badgeworth ward	Gloucestershire	England
Life expectancy at birth for males, 2013-2017 (years)	84.5	79.4	80.1	79.5
Life expectancy at birth for females, 2013-2017 (years)	84.1	84.2	83.6	83.1

Source: ONS Census, 2018

Personal well-being

- 12.7.90 Self-reported well-being status of people within the UK is now measured by the Office for National Statistics. Both nationally and in Gloucestershire, life satisfaction has increased although only marginally.
- 12.7.91 In 2019/20 the self-reported personal well-being status of people in Gloucestershire showed that overall life satisfaction is reasonably good. Table 12-20 shows the average life satisfaction ratings where 10 is the most satisfied and 0 the least satisfied for Gloucestershire and England over the period 2012 – 2020.

Table 12-20 Personal well-being – self reported, 2011-2018¹⁷

	Average (mean) ratings							
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Life satisfaction								
England	7.44	7.50	7.60	7.64	7.68	7.68	7.71	7.66
Gloucestershire	7.60	7.60	7.62	7.70	7.73	7.79	7.89	7.83
Worthwhile								
England	7.69	7.74	7.82	7.83	7.86	7.88	7.88	7.86
Gloucestershire	7.79	7.86	7.81	7.85	7.83	7.88	7.97	7.90
Happiness								
England	7.29	7.38	7.46	7.47	7.51	7.52	7.56	7.48
Gloucestershire	7.29	7.49	7.48	7.38	7.39	7.43	7.60	7.54
Anxiety								
England	3.04	2.93	2.86	2.87	2.91	2.9	2.87	3.05
Gloucestershire	2.91	2.90	2.85	2.91	2.81	2.81	2.87	2.98

Long-term human health conditions

- 12.7.92 Self-reported health status was measured in the 2011 census and within the study area 16.4% in Ermin and 21.3% in Badgeworth reported having a limiting long-term illness or disability. This compares to the national rate of 17.6% making Badgeworth significantly worse than the England average.
- 12.7.93 In Gloucestershire 61.5% of adults are classified as overweight or obese. This is similar to the national proportion of 62%. No data is available for the ward level for adults however for children it is and obesity amongst children is not significantly different in either ward to the national rate amongst children.

Carers

- 12.7.94 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 care¹⁸.

Deprivation

- 12.7.95 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).
- 12.7.96 Both Ermin and Badgeworth wards have significantly lower levels of income deprivation, child poverty and older people living in deprivation than the England average¹⁹. However, 5.3% of children in Ermin (15 children) and 11.6% in Badgeworth (34 children) were living in poverty in 2015. Whilst this is significantly better than the 19.9% living in childhood poverty nationally, it still represents 49 children within the study areas living in income deprived households. For older people (60+), this rises to 95 people in Badgeworth and 23 people in Ermin living

in a pension credit household. Similarly, this is significantly better than the national proportion of older people living in poverty.

Air quality

- 12.7.97 Full baseline conditions related to air quality are found in ES Chapter 5 Air quality (Document Reference 6.2). There are currently two Air Quality Management Areas (AQMAs) within 200 metres of the Affected Road Network (ARN) (study area for air quality assessment):
- Birdlip AQMA in Cotswold District Council
 - Cheltenham AQMA in Cheltenham Borough Council
- 12.7.98 Cotswold District Council declared the Birdlip AQMA for exceedances of the annual mean NO₂ objective. The Birdlip AQMA is within the DCO Boundary and includes the Air Balloon public house and the residential houses opposite known as Air Balloon cottages.
- 12.7.99 Cheltenham Borough Council has declared the whole of their local authority area as an AQMA. This was declared for exceedances of the annual mean NO₂ objective.
- 12.7.100 The air quality assessment identifies a total of 132 receptors within 200 metres of the scheme that could potentially be affected during construction as a result of changes to air quality.

Noise

- 12.7.101 Full details of the noise and vibration baseline is set out in ES Chapter 11 Noise and vibration (Document Reference 6.2). There are Noise Important Areas (NIA) within the study area that are areas that have been identified as being areas where noise is an existing issue – usually for residential receptors.
- 12.7.102 These are shown on ES Figure 12.1 Population and health study area (Document Reference 6.3) 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)
 - Air Balloon roundabout to Cowley junction – re-alignment – 2+100.000 to 5+760.000 (NIA 13196)

Emergency hospital admissions

- 12.7.103 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

- 12.7.104 Public Health England (PHE) data from 2013-2017²⁰ 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.

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

Travel to work

- 12.7.106 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 Cotswold, a slightly higher proportion of people work from home (16% compared to 13% in Gloucestershire) and slightly fewer people commute on foot (9% compared to 11% in Gloucestershire). Approximately 3% of people were recorded as cycling to work.
- 12.7.107 Within Tewkesbury and Cotswold, 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 miles and 12.4 miles (10 kilometres and 20 kilometres) (15%).

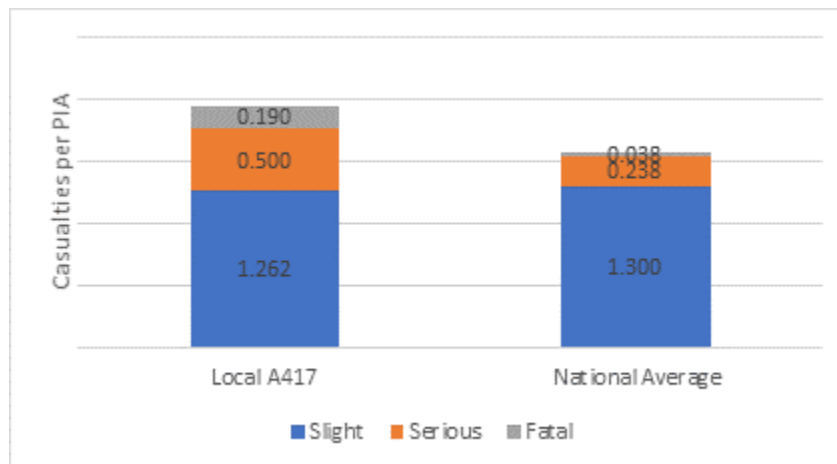
Employment and skills

- 12.7.108 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
 - accommodation and food services
- 12.7.109 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.
- 12.7.110 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 similar to Badgeworth ward, but Ermin ward has 45.7% of the population achieving this level of qualification which is substantially higher.

Road Safety

- 12.7.111 Relevant to this transport scheme is the safety of people taking into account incidents involving vehicles, walkers, cyclists and horse riders. Within the 5-year period from July 2014 to June 2019 inclusive, on the single carriageway section of the A417 between Brockworth bypass and Cowley roundabout, there were 42 Personal Injury Accidents (PIAs) recorded. These accidents resulted in 82 casualties, of which 8 were fatalities, 21 seriously injured and 53 slight.
- 12.7.112 In terms of collisions on the single carriageway section of the A417 between Brockworth bypass and Cowley roundabout involving WCH over the same period, records show two PIAs involved pedestrians, which resulted in 1 fatality and one serious injury.
- 12.7.113 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 for fatal and serious casualties as shown below in Extract 12-1.



Extract 12-1 Incident rates on the Existing A417

Healthcare facilities

12.7.114 Table 12-13 identifies community facilities and services within 500m of the scheme. No healthcare facilities are identified. The closest hospitals include Cirencester Hospital, Gloucestershire Royal Hospital and Cheltenham General Hospital; all of which are within approximately 10 miles (16 km) of the scheme.

Community, recreational and education facilities

12.7.115 Table 12-13 identifies community facilities and services within 500m of the scheme and includes recreational facilities (e.g. Crickley Hill Country Park) and educational facilities (e.g. National Star College).

Future baseline

12.7.116 ES Chapter 4 Environmental assessment methodology (Document Reference 6.2) sets out the 'Do-Minimum' and 'Do-Something' scenarios, 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 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
- 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 scheme, including direct effects on the receptor as well as indirect effects associated with any impacts on users of the receptors (e.g. amenity/perceived effects).
 - Potential effects on other land (e.g. open space land) during 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).
 - 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 potential impacts arising from the scheme on WCH as follows:
- Potential effects on WCH during construction including severance of key routes, any diversions required and associated impacts in relation to journey length and amenity.
 - Potential effects on WCH 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 Potential impacts in terms of human health include:
- Temporary changes in air quality, noise and vibration and amenity arising from construction activities and associated vehicle movements.
 - Permanent changes in air quality, noise and vibration and amenity arising from operation of the Scheme.
 - Temporary and permanent impacts on access to healthcare services and social infrastructure as a result in changes in severance.
 - Temporary and permanent impacts on social cohesion as a result of changes in severance.

- 12.8.8 The assessment of human health also considers how changes that result from the scheme would affect health determinants during both construction and operation. Based on the information that has been gathered for the community health profile and baselines described in other chapters of the ES (Document Reference 6.2), a judgement has been made on how sensitive the community (i.e. in this case the two wards) would be to changes in health determinants. This is based on the sensitivity criteria and listed in Table 12-21. There is potential for each of the health determinants to be affected by the scheme, therefore each of them represents a potential impact.

Table 12-21 Sensitivity of study area communities to changes in health determinants

Health determinant	Sensitivity of Ermin ward (high/medium/low)	Sensitivity of Badgeworth ward (high/medium/low)
Community, recreational and education facilities	medium	medium
Green/open space	low	low
Healthcare facilities	medium	medium
Transport and connectivity	medium	medium
Safety of the existing affected road network	high	high
Ambient air quality	medium	medium
Ambient noise environment	medium	medium
Sources and pathways of potential pollution	medium	medium
Landscape amenity	high	high

12.9 Design mitigation and enhancement measures

Embedded mitigation

- 12.9.1 The scheme has been designed, to avoid and prevent adverse environmental effects through the process of design development and consideration of good design principles. Embedded mitigation measures are reported as part of the scheme description in ES Chapter 2: The project (Document Reference 6.2).

Essential mitigation

Construction mitigation

- 12.9.2 ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4) provides a list of outline mitigation measures to be taken into account as part of the construction stage. Annex F of the EMP provides the Public Rights of Way Management Plan, which is of particular relevance to this Chapter. That Plan details the proposed diversions and new routes before and during construction, which seek to mitigate impacts on the PRow network. It also sets out a hierarchy of mitigation to help maintain access across the PRow network during construction, for example through the use of appropriate signage, diversions and/or public liaison where necessary.
- 12.9.3 Necessary access arrangements during construction is detailed in a Construction Traffic Management Plan (CTMP). This is included as Annex B of ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4). Implementation of the EMP and CTMP will be secured through the DCO. That Plan sets out mitigation measures to help maintain access across the highway network during

construction, for example through the use of appropriate signage, diversions and/or landowner or public liaison where necessary.

- 12.9.4 For example, where the construction works would affect access to existing tourism receptors, temporary alternative access arrangements would be provided in agreement with the receptor.
- 12.9.5 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.
- 12.9.6 No operational public transport routes or operational bus stops would be affected, as discussed with Gloucestershire County Council and local Parish Councils.
- 12.9.7 Land required for construction compounds would be used temporarily before being returned to its original use and condition as per before the works (unless required for essential mitigation such as alternative habitat creation), please refer to the Environmental masterplan Figure 7.11 (Document Reference 6.3) for further information.
- 12.9.8 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.
- 12.9.9 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.
- 12.9.10 Essential mitigation measures for noise and visual impacts during construction of the scheme are outlined in ES Chapter 11: Noise and Vibration (Document Reference 6.2) and essential mitigation measures for air quality are reported in ES Chapter 5 Air quality (Document Reference 6.2).
- 12.9.11 Potential indirect amenity effects relating to air quality (dust), noise, ground conditions 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 is outlined in further detail within ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4). The EMP preparation and delivery during construction would involve the local community through the appointed Public Liaison Officer (or similar) as set out in its Annex F Public Rights of Way Management Plan.

Operational mitigation

- 12.9.12 Annex F of ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4) incorporates the Public Rights of Way Management Plan which sets out the operation mitigation for WCH and other users of rights of way/highway with public access. This includes changes to existing routes or new routes as part of the scheme design, as detailed within the Plan, and reflected in ES Chapter 2 The project (Document Reference 6.2). For example, with the introduction of the Gloucestershire Way multi-purpose crossing, which will accommodate the mitigation of the severance of the Gloucestershire Way and other connecting routes as part of the scheme design.

- 12.9.13 This also 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.
- 12.9.14 The need for additional signage beyond typical highway signage, for example to tourism assets, would be discussed with Highways England and Gloucestershire County Council as the design process continues.
- 12.9.15 Noise mitigation measures where required are detailed in ES Chapter 11 Noise and Vibration (Document Reference 6.2) within Table 11-16. There are a variety of measures including provision of different medium noise barriers (as appropriate) such as stone walls, earth bunds and vertical barriers (absorptive and reflective of noise). These will mitigate the health impacts related to noise.
- 12.9.16 Landscape mitigation measures where required are detailed in ES Chapter 7 Landscape and visual effects (Document Reference 6.2). 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.

Enhancement

- 12.9.17 There are opportunities to enhance the options for local communities to access open spaces and to utilise well designed and integrated active travel options such as cycle paths that connect existing residential areas to each other and the provision of car parking areas with disabled spaces and horse box spaces near The Golden Heart Inn and Stockwell Lane, which would enable people who may otherwise not visit sites, easier access to open space.
- 12.9.18 These are considered carefully and also form part of ES Appendix 2.1 Environmental Management Plan Annex F Public Rights of Way Management Plan (Document Reference 6.4), which sets out the proposed enhancement with new routes for WCH and other users of rights of way/highways with public access rights.
- 12.9.19 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 restricted byway, and grade separated diversion of the Cotswold Way National Trail via a new crossing to enhance WCH connectivity and improve safety of users throughout the study area.
- 12.9.20 Care has been taken to ensure that any proposed PRoW, such as the Air Balloon Way does not traverse the replacement Common Land. The replacement Common Land is proposed to be greater in size and more accessible to permitted users than the Common Land required for the scheme.
- 12.9.21 Segregated routes, signage and enclosures would be discussed and agreed at the detailed design stage to help reduce or avoid any impacts of WCH on ecological sites, for example with managed interfaces between bridleways and SSSI.
- 12.9.22 Highways England acknowledges feedback received in response to public consultation, which has suggested the relocation of the school bus stop in Birdlip. Concerns have been expressed about the safety of current turning movements by the school bus, and suggestions have been made about potential alternative locations for a new bus stop facility. This change has been carefully considered within the land available as part of the scheme and Highways England has discussed opportunities with the Cowley and Birdlip Parish Council and

Gloucestershire County Council officers but does not propose any new facility as part of the scheme.

- 12.9.23 Highways England has offered help to the relevant stakeholders to inform or facilitate any discussions about any changes that might be proposed to the bus stop and its access within or near Birdlip. Highways England will ensure the A417 scheme would not adversely impact the existing bus stop arrangement, or could accommodate an enhanced future scenario where the bus stop and its access is improved or relocated if within the DCO Boundary.

12.10 Assessment of likely significant effects

- 12.10.1 This section presents the assessment of likely significant effects on population and human health resulting from the construction and operation of the scheme.
- 12.10.2 The assessment of effects takes into account the potential impacts to each receptor following the implementation of embedded and essential mitigation measures to determine the significance of the residual effects.

Land use and accessibility

- 12.10.3 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 Assessment assumptions and limitations.

Private property and housing

- 12.10.4 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

- 12.10.5 The potential direct effects on residential properties during construction are explored in Table 12-22, 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 12-22 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	Minor	Slight adverse

Receptor	Sensitivity	Potential effect(s)	Magnitude	Significance
		construction activities in close proximity. This relates to ground stabilisation works.		
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

- 12.10.6 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 (ES Appendix 2.1 Environmental Management Plan Annex B (Document Reference 6.4)).
- 12.10.7 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.
- 12.10.8 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.
- 12.10.9 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.
- 12.10.10 In relation to private property and housing within the wider study area (500 metres) 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 (ES Appendix 2.1 Environmental Management Plan Annex B (Document Reference 6.4)).
- 12.10.11 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.
- 12.10.12 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

- 12.10.13 The potential direct effects on private property and housing during operation are explored in Table 12-23, which considers the potential effects, magnitude of this effect and subsequent significance within the DCO Boundary, where there would be potential for direct effects.
- 12.10.14 Pinewood and Woodside House have been removed from this assessment, given they would be demolished as part of the construction phase.

Table 12-23 Effects on residential properties – operation

Receptor	Sensitivity	Potential effect(s)	Magnitude	Significance
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)
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

- 12.10.15 In relation to private property and housing within the wider study area (500 metres), 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.
- 12.10.16 Detailed assessment of the indirect/amenity effects described above are considered in ES Chapter 5 Air quality, ES Chapter 7 Landscape and visual effects and ES Chapter 11 Noise and vibration assessments (Document Reference 6.2). Where relevant to human health, impacts are considered later in

this section, for example where there are significant impacts on properties arising from noise changes during construction and operation.

- 12.10.17 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

- 12.10.18 This section of the assessment considers effects on the communities in the study area with a focus on assets, facilities and land.
- 12.10.19 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, the assessment considers likely effects on communities as a whole (local population) and then community assets/facilities and land.
- 12.10.20 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

- 12.10.21 There are a limited number of settlements along the scheme which rely on the A417 for direct access and the majority of planned works would 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 and increased construction traffic on the road network).
- 12.10.22 During construction, it is acknowledged that some individual properties could be adversely affected by noise and vibration (see ES Chapter 11 Noise and vibration (Documents Reference 6.2)). 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.
- 12.10.23 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 is outlined in further detail in ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4).
- 12.10.24 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. Mitigation is detailed in a Construction Traffic Management Plan (CTMP), Annex B of ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4). Implementation of the EMP and CTMP will be secured through the DCO.

- 12.10.25 Detailed assessment of the indirect/amenity effects are considered in ES Chapter 5 Air quality, ES Chapter 7 Landscape and visual effects and ES Chapter 11 Noise and vibration assessments (Document Reference 6.2). Where relevant to human health, impacts are considered later in this section, for example where there are impacts on communities arising from noise changes during construction.
- 12.10.26 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.
- 12.10.27 This could bring beneficial effects to the local accommodation sector during the construction programme, bringing additional trade at their quietest times of the year.
- 12.10.28 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. services²¹.

Community land and assets during construction

- 12.10.29 Highways England has 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.
- 12.10.30 Potential effects on community assets during construction of the scheme are explored further in Table 12-24.

Table 12-24 Effects on community assets during construction

Receptor	Main activity	Sensitivity	Magnitude	Significance
Community assets				
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

Receptor	Main activity	Sensitivity	Magnitude	Significance
National Star	Education (further education, training, personal development and residential services for people with physical and learning disabilities and acquired brain injuries).	Very High	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity, with works proposed to formalise existing drainage.	Moderate adverse (not considered to be large because land required and access arrangements would not compromise the overall viability)
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)
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)
Barrow Wake	Car Park (and registered common land)	High	Negligible – very minor change given construction activities in the surrounding areas – assumed that access would be maintained at all times.	Slight adverse
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)

- 12.10.31 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.
- 12.10.32 The scheme includes changes to access provision and 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 receptor's very high sensitivity, gives rise to a potential moderate adverse effect, which would be significant. The CTMP (ES Appendix 2.1 Environmental Management Plan Annex B (Document Reference 6.4)) would ensure access is available to the facility during construction of the scheme.
- 12.10.33 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).
- 12.10.34 The CTMP (ES Appendix 2.1 Environmental Management Plan Annex B (Document Reference 6.4)) identifies 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.
- 12.10.35 With good design that ensures ongoing access to facilities, and with mitigation measures defined within the Annex B CTMP of ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4) and ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4) 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.
- 12.10.36 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 ES Figure 12.4 Open Access Land (Document Reference 6.3). For more information, refer to the Special Category Land Plans that support the DCO Application (Document Reference 2.3).

- 12.10.37 This section takes each of these in turn.

Common Land

- 12.10.38 The compulsory acquisition of 6,576 square metres of Common Land is required to enable delivery of the scheme including in the area surrounding Barrow Wake. This includes 3,970 square metres of permanent acquisition in the areas surrounding Barrow Wake and to the south of the A417 in the vicinity of Crickley Ridge. It also includes 2,606 square metres of temporary possession of some Common Land in the areas adjacent to Barrow Wake car park and the Birdlip Link road. Within the area of temporary possession, no works are proposed, and the land is solely required in order to construct a stone wall or similar boundary feature on land adjacent to the Common Land.
- 12.10.39 The existing 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.

- 12.10.40 In accordance with Section 131 of the Planning Act 2008, Highways England is 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
- 12.10.41 As shown in ES Figure 12.4 Open access land (Document Reference 6.3), and the Special Category Land Plans that support the DCO Application (Document Reference 2.3) the preferred location for the replacement Common Land is within a section of the repurposed A417. This land is connected to the existing Common Land although at different levels, and would be re-landscaped as part of the scheme (see ES Chapter 7 Landscape and visual effects (Document Reference 6.2)). The land would be accessible, and the proposal would return to Common Land that which was previously de-registered for the construction of the current A417. It would also provide ecological connectivity (see ES Chapter 8 Biodiversity (Document Reference 6.2)) subject to being planted as calcareous grassland habitat in coordination with the Gloucestershire Wildlife Trust at the detailed design stage, who would become the owner of the replacement Common Land.
- 12.10.42 The Air Balloon Way would navigate a route adjacent and separate to the Common Land to provide access to cyclists and horse riders but avoid them using the Common Land). Users who wish to access the Barrow Wake Car Park would join the Air Balloon Way from its existing access north of the Car Park, with the access improved as part of the scheme to better accommodate walkers, cyclists and horse riders.
- 12.10.43 Use of drystone walls and/or other physical barriers and/or clear signage would help demark routes for these users to help manage the separation between the Common Land and unauthorised users, to be agreed at the detailed design stage as outlined in the Public Rights of Way Management Plan (ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4)).
- 12.10.44 The land identified as replacement land measures in the region of 10,542m² 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 believes that the proposed replacement land meets the requirements of the Planning Act 2008. 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.
- 12.10.45 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*
- 12.10.46 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.

- 12.10.47 Some of the land plots affected currently have an extremely steep gradient and are difficult to access for the purposes of recreation. Proposals within the PRoW Management Plan (ES Appendix 2.1 Environmental Management Plan, Annex F (Document Reference 6.4)) may make these areas more accessible and they would certainly be no less advantageous.
- 12.10.48 The plots currently located under the Existing A417 should have been de-registered with the maps updated when the current road was constructed, as they are no longer available for recreation.
- 12.10.49 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.
- 12.10.50 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 (as set out in the EMP (ES Appendix 2.1 Environmental Management Plan Document Reference 6.4)), and with proposals such as the Cotswold Way crossing which will make open space more accessible, construction of the scheme is considered to bring a slight adverse effect which would not be significant.

Community land and assets during operation

- 12.10.51 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 (see ComMA Report, Document Reference 7.6). 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.
- 12.10.52 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.
- 12.10.53 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.
- 12.10.54 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.
- 12.10.55 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.
- 12.10.56 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.

- 12.10.57 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.
- 12.10.58 The scheme proposes additional parking provision in the vicinity of The Golden Heart Inn and junction at Stockwell Lane, which would provide designated parking for horse boxes, disabled users and other WCH users. This would be accessed via the Existing A417 and Stockwell Farm, with no through road for vehicles to or from the village of Birdlip (although it would be accessible for pedestrians). Further to engagement with the local community and Parish Council, there would be a smaller car park off the Stockwell Lane junction with the Existing A417 (accessed from the east) to serve five disabled spaces only. There would be a further ten parking spaces and three horse box parking spaces near The Golden Heart Inn. These details could be amended at detailed design stage but serve to help redistribute parking in the area and reduce impacts from WCH on the SSSI at Barrow Wake and the Country Park.
- 12.10.59 Local management of the car parking would help to address any concerns about anti-social behaviour, for example through signage and security measures that would be subject to any required agreements at the detailed design stage should the scheme progress to construction. Ongoing engagement with the local authority, parish councils and local community groups at that future stage would seek to identify and agree any appropriate detailed design measures if considered necessary (for example signage and locked gates to prevent use out of hours).
- 12.10.60 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 ES Figure 12.4 Open access land (Document Reference 6.3)). 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 / Air Balloon Way.
 - As part of these proposals, the land would be re-landscaped.
 - The land would bring back into Common, land which was previously de-registered to facilitate the construction of the current A417.
- 12.10.61 This replacement land includes in the region of 10,542m² of Common Land.
- 12.10.62 The replacement Common Land would be re-landscaped as part of the scheme, would be accessible on foot and would offer enhanced attributes when compared to the Common Land to be acquired.
- 12.10.63 The Air Balloon Way would be adjacent but separate from the replacement Common Land, to provide access for walkers but navigate cyclists and horse riders along a continuous/through route. Users of the Barrow Wake Car Park would need to join the Air Balloon Way from the north, to avoid a route severing the replacement Common Land. Use of drystone walls and/or other physical barriers and/or clear signage would help demark routes for these users.

12.10.64 Following provision of this replacement Common Land and during operation of the scheme, it is considered there would be a slight beneficial change.

Development land and businesses

12.10.65 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

12.10.66 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).

12.10.67 Access arrangements would be maintained during construction to all identified commercial property and businesses, and any disruption would be minimised as much as possible. 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 12-25.

12.10.68 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.

12.10.69 Best practice construction techniques would be used to help reduce and avoid where practicable any likely adverse impacts. Details are provided within the EMP and CTMP (ES Appendix 2.1 Environmental Management Plan, including Annex B, (Document Reference 6.4).

Table 12-25 Businesses during construction

Receptor	Sensitivity	Magnitude	Significance
Galtec Civil Engineering/groundw ork 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)

Receptor	Sensitivity	Magnitude	Significance
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 scheme mainline and associated earthworks.	Large adverse (not considered to be moderate given total demolition)
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)

Receptor	Sensitivity	Magnitude	Significance
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
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

Receptor	Sensitivity	Magnitude	Significance
Race Techniques at Birdlip Quarry Motorcycle trials	Medium	<p>It should be noted that this is an extant dormant quarry, and through correspondence with Gloucestershire County Council Highways England understand that there has been no active working in the past 25 years, instead with a current lease for use by Race Techniques for recreational dirt biking or similar. Whilst there would be partial loss of the land with land take through the scheme, acquisition of land is likely to result in changes to operating conditions that do not compromise overall viability. The club could continue to operate on the remaining land. As such, the impact is considered to be:</p> <p>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.</p>	Slight adverse
Hanson Quarry Products Ltd	Medium	<p>It should be noted that this is an extant dormant quarry, and through correspondence with Gloucestershire County Council Highways England understand that there has been no active working in the past 25 years. Whilst there would be partial loss of the land with land take through the scheme, acquisition of land is likely to result in changes to operating conditions that do not compromise overall viability. It is not operational and has not been for more than 25 years. As such, the impact is considered to be:</p> <p>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.</p>	Slight adverse
Tarren Production	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral
DJP Construction	Medium	No Change – no loss or alteration of characteristics, features or accessibility given relative distance from the scheme.	Neutral

Receptor	Sensitivity	Magnitude	Significance
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
Stockwell Farm Residential Lettings	Medium	Minor - A discernible change in attributes and environmental quality during construction activities in close proximity.	Slight adverse
Air Balloon Public House	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)

Receptor	Sensitivity	Magnitude	Significance
The 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

- 12.10.70 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.
- 12.10.71 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.
- 12.10.72 With appropriate mitigation, the construction of the scheme is not anticipated to bring any further significant adverse effects on business receptors. The CTMP (included as Annex B of ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4)), would help 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.
- 12.10.73 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

- 12.10.74 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.
- 12.10.75 The Golden Heart Inn would not be directly affected by the scheme. Its tenants then responding to 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 / Air Balloon Way as a key WCH corridor and recreational trail have been welcomed.
- 12.10.76 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 Air Balloon Way and providing a commercial opportunity for the public house. In addition, access to The Golden Heart would be maintained via the proposed Cowley junction.
- 12.10.77 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. There are also likely to be benefits to noise and air quality in this area given the reduction in traffic passing the facility, with further information provided in Chapter 5 Air Quality and Chapter 11 Noise and Vibration (Document Reference 6.2).
- 12.10.78 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.
- 12.10.79 Two-way AADT on the A417 as a result of the scheme is forecast to increase by around 19% west of Air Balloon and by around 37% south of Air Balloon compared to a Do-Minimum scenario (2026). The anticipated increase in traffic along the A417 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.
- 12.10.80 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

- 12.10.81 The assessment of effects in relation to agricultural land quality is provided separately within ES Chapter 9 Geology and soils (Document Reference 6.2).
- 12.10.82 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 are shown on ES Figure 12.5 Agricultural Land Holdings (Document Reference 6.3).

- 12.10.83 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).
- 12.10.84 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 12-26 which details the proportion of the holding required and whether land take is permanent, temporary (i.e. for construction only), or temporary with access rights during operation. In summary, of the 16 agricultural holdings affected:
- 15 would experience some permanent land take
 - 12 would experience some temporary land take during construction
 - 9 would experience temporary land take with rights over the land during operation of the scheme
- 12.10.85 The assessment of potential significant effects is considered for both the construction phase (where temporary land take only is relevant) and operation (where permanent land take and where rights over the land are required only) and is presented in Table 12-26.

Table 12-26 Land holdings and land take

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO Boundary	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance ²²
Alexander and Angell Limited	34.73	6.19	6.19	0	0	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)
Crickley Hill Country Park (National Trust)	27.24	0.20	0.20	0	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	0.86	0.13	0	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)
Dick	10.72	6.56	6.32	0.18	0.06	Negligible	Major - Scheme proposes loss of 60% of the holding which may compromise the overall viability. Adequate ongoing accessibility to remaining land.	Slight adverse

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO Boundary	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance ²²
Field	3.75	0.27	0.13	0	0.14	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)
Fosse Farm	64.97	8.04	0.59	7.44	0	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	6.64	6.25	0.05	0.33	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)
Gloucestershire Wildlife Trust	33.14	0.82	0.35	0.38	0.10	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 Boundary	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance ²²
Hazell	7.15	0.24	0.02	0.22	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	24.53	22.01	2.52	0.01	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	4.15	2.85	0.64	0.66	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)
Overbury	50.19	2.78	0.88	0.34	1.55	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 ²) to facilitate construction access.	Neutral (not considered to be slight given size and nature of the works on the holding)

Name of farm or landowner surname	Total plot area(s)	Area (ha) within DCO Boundary	Area (ha) permanent	Area (ha) temporary	Area (ha) temporary with rights	Sensitivity	Magnitude	Significance ²²
Rushwood Kennels	9.48	1.98	1.57	0.41	0	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	19.65	18.96	0.55	0.15	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)
Stockwell Farm	389.23	54.54	48.22	3.18	3.15	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

- 12.10.86 The scheme would lead to the temporary loss of approximately 16.04ha with an additional 6.15ha taken temporarily with future rights over it. This requirement can be summarised as follows:
- 4 holdings experiencing no temporary land take.
 - 11 holdings experiencing temporary land take less than 10% of the overall holding.
 - 1 holding experiencing temporary land take of between 10% and 25% of the overall holding.
- 12.10.87 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 can be found in ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4).
- 12.10.88 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 would be provided (e.g. Stockwell and Cowley 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.
- 12.10.89 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 12-15) only Shab Hill Farm is expected to experience a potential significant effect.
- 12.10.90 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.
- 12.10.91 Agricultural holdings within the wider 500 metre 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

- 12.10.92 The scheme would lead to the loss of approximately 115ha of agricultural land across the 15 agricultural holdings that are affected during operation of the scheme. Of those holdings experiencing permanent land take:
- 9 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
 - 1 would experience land take between 26 and 50% of the overall holding
 - 2 would experience land take which is in excess of 50% of the overall holding
- 12.10.93 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.
- 12.10.94 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.
- 12.10.95 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.
- 12.10.96 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.
- 12.10.97 Agricultural holdings within the wider 500 metre 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 (WCH)

General approach to assessment of WCH

- 12.10.98 The assessment of effects on 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).
- 12.10.99 The assessment also considers indirect amenity effects on users of routes within an area up to 500 metres 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.
- 12.10.100 As explained as part of the baseline (see section 12.7 Baseline conditions), 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 ES Figure 12.2 Public rights of way and local routes (Document Reference 6.3).
- 12.10.101 The Public Rights of Way Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) shows proposed stopping up, diversions and new routes for WCH and other users of highways and local routes with public access rights.
- 12.10.102 ES Chapter 2 The project (Document Reference 6.2) describes details of structures carrying existing or proposed rights of way where appropriate for example clearance heights of underpasses suitable for walking, cycling and/or horse riding.

- 12.10.103 The scheme includes elements that either help ensure continued access for WCH or bring improvements in terms of current accessibility/severance. More significant elements include:
- The Cotswold Way crossing – a 5 metre wide restricted byway 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 when compared to 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. At 5 metres wide, the crossing would be wide enough to accommodate different users, and there would be resting places along it to help assist those with mobility needs.
 - The Gloucestershire Way crossing - a new 37 metre wide multi-purpose crossing would provide essential mitigation for bats and enhancement opportunity of ecology and landscape integration. The public would also further benefit as the crossing would accommodate the Gloucestershire Way long distance footpath and provide an improved visitor experience. Walkers would use the structure to connect to Cowley footpaths 1, 16 and 3 which form part of the promoted Gloucestershire Way long distance footpath 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 3.5 metre wide bridleway running over the crossing.
 - Cowley overbridge – this crossing over the new A417 would provide access between Stockwell and Cowley. The crossing 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 overbridge – this crossing over the new A417 would primarily provide a farm access track from Stockwell Farm in an east-west direction. The crossing would include provision for WCH, helping connect into existing routes 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.
 - Repurposed A417 – part of the Existing A417 would be repurposed to provide a restricted byway connection between new car parking near the Stockwell Lane junction and the Cotswold Way crossing (and beyond), proposed to be called the ‘Air Balloon Way’.
- 12.10.104 New parking areas near The Golden Heart Inn and Stockwell Lane would help encourage the redistribution of WCH activity away from the areas of SSSI.
- 12.10.105 The Air Balloon Way and people accessing it would improve natural surveillance in the area including at/near car parking areas to help create a more family friendly area.
- 12.10.106 Details around signage and security associated with the new parking areas are matters for detailed design. Highways England is committed to ongoing engagement with the local authority, parish councils and community groups to

help address any concerns about the operation of the new areas of parking including for example its management at times of darkness.

- 12.10.107 The PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) 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. It also sets out how it would secure through the DCO appropriate surfacing, signage and enclosures, which would be discussed and agreed at the detailed design stage.
- 12.10.108 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).
 - Provision of new crossings/routes as part of the scheme (new routes).
- 12.10.109 Each of these measures is described in further detail within the Public Rights of Way Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)).
- 12.10.110 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).
 - Where the scheme and the mitigation proposals divert a route, rendering part of the current route no longer accessible.
- 12.10.111 All potential diversions and proposed new routes are also shown on the Rights of Way and Access Plans (Document Reference 2.5) supporting the DCO Application.
- 12.10.112 The DCO will provide the necessary powers to stop up PRow and implement diversions and new routes as necessary.
- 12.10.113 An assessment of potential effects on PRow that interact with the scheme is provided in Table 12-27. 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.
- 12.10.114 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 PRow Management Plan

(ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)). These new proposals are detailed in Table 12-28.

- 12.10.115 The assessment of likely effects at Table 12-27 considers the impacts in the construction phase. The operational impacts would be the same as the construction impacts as the PROW are going to be diverted during the construction phase. Table 12-28 sets out the new/upgraded PROW being provided as part of the scheme. As these will not exist during the construction phase they are only assessed in the operational phase of the scheme. The details of the stopping up, diversion and creation of new PROW and their interrelation and phasing is detailed in the PROW Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)). Consideration of specific impacts during construction and operation are considered in the sections following Table 12-28.

Table 12-27 Assessment of effects PRow

PRoW	Sensitivity	Effects/mitigation	Journey distance	Magnitude	Significance²³
Existing PRow Network					
Cotswold Way National Trail	Very high	152m section 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	652m 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	307m 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	529m 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	328m 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 ²³
Badgeworth footpath 80	Medium	38m short section to be stopped up and footpath to be diverted along new PMA.	<50m decrease	Minor	Slight adverse
Badgeworth footpath 126	Medium	298m 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	182m 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	71m 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	162m (in two parts with 139m and then 23m) section at northern extent to be stopped up, with slight diversion to connect into 24m new section of bridleway to new Grove Farm underpass	>50m-250m decrease (beneficial)	Minor	Slight beneficial
Badgeworth footpath 89	Medium	171m section to be stopped up, with diversion onto new 242m footpath joining Cowley Footpath 24, Badgeworth bridleway 87 and new bridleway (Ref no. 13) and through new Grove Farm underpass. Rights on foot to area of existing Common Land retained.	>50m-250m decrease (beneficial)	Minor	Slight beneficial
Cowley Footpath 24	Medium	163m section to be stopped up, with diversion onto new 242m footpath joining Cowley Footpath 24, Badgeworth bridleway 87 and new bridleway (Ref no. 13) and through new Grove Farm underpass. Rights on foot to area of existing Common Land retained.	>50m-250m decrease (beneficial)	Minor	Slight beneficial

PRoW	Sensitivity	Effects/mitigation	Journey distance	Magnitude	Significance ²³
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 15	Medium	91m short section to be stopped up and diverted adjacent to existing with new 94m section of footpath to avoid Gloucestershire Way crossing embankment	<50m decrease	Negligible	Neutral (not considered to be slight given re-provision and scale of change in journey distance)
Coberley footpath 16	High	71m section to be stopped up, with diversion via new 98m section of bridleway 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 1	High	No change proposed as part of the scheme.	No Change	No Change	Neutral
Cowley footpath 3	High	73m 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	11m section to be stopped up, joining new section of unclassified road	<50m decrease	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	384m section to be stopped up with diversion to new Cowley overbridge.	>250-500m increase (adverse) due to re-alignment	Moderate	Slight adverse
Cowley restricted byway 26	Medium	804m section to be stopped up with diversion to new Cowley overbridge.	>50m-250m increase (adverse) due to re-alignment	Minor	Slight adverse

PRoW	Sensitivity	Effects/mitigation	Journey distance	Magnitude	Significance ²³
Cowley footpath 22	Medium	356m section to be stopped up at its northern extent and diverted over new Stockwell overbridge. 183m section be stopped up at its southern extent and diverted to the east of the scheme earthworks at new Cowley junction with a new section of restricted byway	>50m-250m increase (adverse) due to re-alignment	Negligible	Slight adverse (not considered to be neutral given scale of change with diversion)

Table 12-28 Proposed PRow

Proposal	Description
New footpath	982m new section of footpath over PMA to divert and accommodate Badgeworth Footpaths 74, 78, 77, 80 and 84 (and part of Badgeworth bridleway 125)
New bridleway	831m 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	436m Reclassification of Badgeworth footpath 86 to bridleway
New bridleway	Delivered in two parts for 460m and 155m, new section of bridleway to connect the reclassified Badgeworth footpath (bridleway) 86 to Badgeworth bridleway 87 and new Grove Farm underpass
New bridleway	24m new section of bridleway via a new Grove Farm underpass to connect Badgeworth bridleway 87 with Cold Slad Lane
New footpath	155m new section of footpath to connect Badgeworth bridleway 87, Grove Farm underpass and Badgeworth Footpath 89/Cowley Footpath 24
New restricted byway	180m new restricted byway over the new Cotswold Way crossing to connect repurposed A417 to Cold Slad Lane, accommodating the Cotswold Way National Trail
New bridleway	221m new bridleway to connect Leckhampton Hill to Cold Slad Lane and Cotswold Way crossing
New footpath	739m new footpath to connect Cold Slad Lane and the Cotswold Way crossing to Coberley Footpath 15 and the Gloucestershire Way crossing
New bridleway	473m new bridleway over new Gloucestershire Way crossing to accommodate the Gloucestershire Way long distance footpath, connecting Cowley Footpath 1, Coberley Footpath 16, Coberley Footpath 15, unclassified road 50852 and Cowley Footpath 3
New footpath	91m new footpath to connect Coberley footpath 15 to the Gloucestershire Way crossing
New bridleway	130m new bridleway to connect Coberley footpath 16 south to unclassified road 50852
New bridleway	277m new bridleway to connect unclassified road 50852 with B4070
Access rights	491m new section of B4070 with access rights along it and with adjacent pedestrian link as part of highway
New bridleway	213m section of bridleway to connect B4070 with unclassified road 50852, with provision of equestrian holding areas on either side of crossing on B4070
New restricted byway	141m new short section of restricted byway to connect B4070 with repurposed A417 and Cowley Footpath 44
New restricted byway	107m new short section of restricted byway to connect the repurposed A417 with the realigned B4070
New byway open to all traffic (BOAT)	417m new section of BOAT to connect Shab Hill junction with unclassified road 50853
New byway open to all traffic (BOAT)	277m new section of BOAT to connect unclassified roads 50853 and 50944, joining Cowley Footpath 7
New footpath	A new 208m section of footpath to connect Cowley Footpath 44 and Cowley Lane overbridge
New footpath (steps)	Two new sets of steps (36m and 28m respectively) on new footpath to connect Cowley Footpath 44 onto new Cowley overbridge (west) and to connect new Cowley overbridge to Cowley Restricted Byway 26 (east)

Proposal	Description
New restricted byway	1023m new section of restricted byway to connect new Cowley overbridge and Cowley Restricted Byway 26
Access rights	575m new Cowley overbridge to carry public access rights, connecting unclassified roads 50855, 50853, Cowley Restricted Byway 26, Cowley Footpath 44 and Cowley Footpath 22
New bridleway	400m new bridleway over the new Stockwell overbridge.
Cowley footpath 22	486m Cowley footpath 22 to be reclassified as restricted byway between Cowley Footpath 40 and the new Stockwell overbridge
New restricted byway	214m new restricted byway between Cowley footpath 40 and new Cowley junction
New bridleway	464m new bridleway between Cowley footpath 40 and Cowley footpath 39 (Cowley Wood Lane)
Cowley footpath 21	325m Cowley footpath 21 to be reclassified as bridleway
New restricted byway	2870m new restricted byway along the repurposed A417 between new area of parking near The Golden Heart Inn (west of Stockwell Lane) and the new Cotswold Way crossing (the Air Balloon Way)
New restricted byway	255m new restricted byway to connect Barrow Wake Car Park to repurposed A417 (north)
New footpath	60m new section of footpath to connect Air Balloon Way to Cowley Footpath 46

Walkers, cyclists and horse riders during construction

- 12.10.116 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)
 - 19 footpaths across the scheme (three of which form part of the Gloucestershire Way)
 - 4 bridleways across the scheme
 - 3 restricted byways across the scheme
- 12.10.117 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 PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)), it is intended to keep the majority of PRow 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.
- 12.10.118 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.
- 12.10.119 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.

- 12.10.120 The above would be secured through the Environmental Management Plan Annex F (Document Reference 6.4).
- 12.10.121 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.
- 12.10.122 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 scheme. 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 limiting periods where access is affected to a minimum.
- 12.10.123 It is therefore anticipated that with the implementation of management and appropriate mitigation as identified in the PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) there would be slight adverse effects on the majority of WCH during construction of the scheme, which would not be significant.
- 12.10.124 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

- 12.10.125 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:
- 7 sections of proposed new footpath (including new stepped accesses)
 - 10 sections of proposed new bridleway
 - 7 sections of proposed new restricted byway, including the repurposed A417 / Air Balloon Way
 - 2 sections of new byways open to all traffic
 - 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 (two footpaths to bridleway, and one footpath to restricted byways)
 - 2 instances where access rights are proposed to provide greater connectivity between the existing and proposed PRow
- 12.10.126 As identified in the PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) this would mean:
- 1 PRow would be stopped up without a substitute, although alternative routes exist / would be provided (Badgeworth bridleway 125)
 - 18 PRow would be stopped up with substitutes / diversions provided
 - 19 PRow would be created to help increased or improve connectivity
 - 3 PRow would be reclassified (2 footpaths to bridleway, and 1 footpath to restricted byway)
 - 5 unclassified roads / ORPAs would be promoted for use of access rights to help increased or improve connectivity across the PRow network (3 existing and 2 new routes)

- 12.10.127 All new structures proposed, as described in detail in ES Chapter 2 The project (Document Reference 6.2) 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.
- 12.10.128 For the purposes of this assessment, the following measures would be secured in relation to mitigation, management and re-provision via the Environmental Management Plan (Document Reference 6.4):
- 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 Society²⁴. 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.
 - 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.
- 12.10.129 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 PRoW Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) and summarised in Table 12-27 and Table 12-28 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.
- 12.10.130 In relation to the Cotswold Way National Trail, 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, on balance, it is considered that the proposal would bring moderate beneficial effects to this PRoW and its users, which would be significant.
- 12.10.131 In relation to the Gloucestershire Way long distance footpath, proposals include a new WCH crossing 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 long distance footpath who would also benefit from no longer having to cross the A417 at grade.

- 12.10.132 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, 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 long distance footpath.
- 12.10.133 Additional crossings at the Cowley and Stockwell overbridges and Shab Hill junction would also mitigate severance of existing footpaths, restricted byways and highways.
- 12.10.134 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.
- 12.10.135 The commitments outlined in the PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4) and future detailed design discussions and agreements would help ensure appropriate route segregation, signage, surfacing and enclosures to help manage interfaces between user groups, people and nature. For example, segregation of PRow would help ensure any potential adverse impacts on the SSSI are reduced or avoided.
- 12.10.136 In summary, when considering the proposed re-provision, increased access rights and extent of new provision detailed within Table 12-28 and the 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

- 12.10.137 The assessment of effects on human health considers each of the determinants of human health identified in Table 12-7. 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 areas. Where relevant, assessment outcomes from other ES assessments have been used as a basis for the assessment on health.
- 12.10.138 Different vulnerabilities to a health determinant within populations 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 12-21).
- 12.10.139 Health assessments consider how health outcomes of populations within the study areas 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.
- 12.10.140 As outlined within section 12.4 Assessment methodology of this Chapter, whilst this assessment is not an equality assessment, it does consider protected characteristics groups as defined by the Equality Act (2010) where these are considered to be vulnerable groups. An EqIA has been prepared for the scheme (Document Reference 7.8).

Community, recreational and education facilities

Access to community, recreational and education facilities during construction

- 12.10.141 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.
- 12.10.142 The loss of the 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 restaurant 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.
- 12.10.143 During construction, access to healthcare, community, recreational and educational 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.
- 12.10.144 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 but would not impact the overall accessibility to facilities.
- 12.10.145 Overall it is considered that the construction phase of the scheme would result in a neutral health outcome for those within the study areas as result of any impacts on health care or other community, recreational and education facilities.

Access to other community, recreational and education facilities during operation

- 12.10.146 Once the scheme has been completed it is likely that ease of access to community, recreational and education facilities would be improved due to the reduced amount of travel time/reduced congestion that the scheme 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.
- 12.10.147 Overall, it is considered that there would be a neutral health outcome within the study areas with regards to access to healthcare and other community, recreational and education facilities.

Green/open space

Access to green/open space during construction

- 12.10.148 As discussed in the assessment of Transport and Connectivity effects (paragraphs 12.10.159 - 12.10.166) there would be a variety of effects on the local PRoW ranging from complete closure and re-provision/redirection to

temporary diversions. There would only be one instance of a PRow being stopped up without re-provision (Badgeworth Bridleway 125) and users of that route would still benefit from local alternatives. These would be managed via the PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) to help ensure public safety and reduce disruption to users. It is Highways England's intention to keep PRow open wherever and whenever possible via local management, early re-provision and/or use of short-term, temporary closures in accordance with the PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)).

- 12.10.149 In all appropriate cases, realignment or diversion of these local routes is proposed as detailed in the PRow Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)), to maintain access for users. This would enable local communities to maintain access for recreation within the affected area.
- 12.10.150 Access to open space would be maintained throughout construction where possible, although some access to Common Land, Open Access Land and Country Park would be restricted where construction works take place. 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 alternative options in close proximity which could be used during construction and therefore, despite the possible reduction of access to Common Land/Open Access Land/Country Park during construction, it is considered that neutral health outcomes are likely for both study areas.

Access to green/open space during operation

- 12.10.151 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 12-28.
- 12.10.152 There would be an increased area of Common Land following its replacement near Barrow Wake as part of the repurposed A417.
- 12.10.153 As a result of the improvements, it is anticipated that health outcomes would be long-term and positive for both study areas 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.

Healthcare facilities

Severance/separation of communities during construction

- 12.10.154 The impacts during construction would be similar as those related to other social infrastructure in that access to healthcare 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.
- 12.10.155 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 but would not impact the overall accessibility to facilities.

- 12.10.156 Overall it is considered that the construction phase of the scheme would result in a neutral health outcome for those within the study areas as result of any impacts on health care facilities.

Severance/separation of communities during operation

- 12.10.157 Once the scheme has been completed it is likely that ease of access to healthcare facilities would be improved due to the reduced amount of travel time/reduced congestion that the scheme 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.
- 12.10.158 Overall, it is considered that there would be a neutral health outcome within the study areas with regards to access to healthcare facilities.

Transport network and usage

Transport network and usage during construction

- 12.10.159 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.
- 12.10.160 The scheme has the potential to affect PRoW, which are shown on ES Figure 12.2 Public rights of way and local routes (Document Reference 6.3).
- 12.10.161 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 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 PRoW Management Plan (ES Appendix 2.1 Environmental Management Plan Annex F (Document Reference 6.4)) details how impacts on PRoW would be managed during construction.
- 12.10.162 In all cases, 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 across both study areas.

Transport network and usage during operation

- 12.10.163 Once the scheme is fully operational, active travel facilities for walking, cycling and horse riding would be improved and new routes would be in place. 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 long distance footpath and the Cotswold Way National Trail.

- 12.10.164 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 scheme 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.
- 12.10.165 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 would be associated with a PRow which is segregated and tarmacked, making it 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.
- 12.10.166 It is not considered that active commuting would increase as result of the scheme. 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 across both study areas.

Ambient air quality

Ambient air quality during construction

- 12.10.167 ES Chapter 5 Air quality (Document Reference 6.2) considers effects related to construction dust and construction traffic. During construction, potential air quality effects arise from fugitive dust emissions due to earthworks, track out and general construction activity associated with the scheme. During these activities the contractor would be following procedures set out within ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4), which sets out how environmental impacts should be mitigated during construction.
- 12.10.168 Whilst the scheme is considered to have potential for generation of construction dust, with the implementation of these mitigation measures, the air quality assessment considers impacts to be not significant. The health outcome is considered to be neutral for both study areas.
- 12.10.169 Construction traffic in not considered to pose a risk to human health, with no locations where there are predicted exceedances of annual mean NO₂.

Ambient air quality during operation

- 12.10.170 The scheme would provide a duelled off-line section of road which would allow for faster and less congested journeys along the A417. The scheme would have a shallower gradient from the top of the Crickley Ridge to Cowley and the new route

- would move traffic away from Birdlip and closer to Shab Hill and remove the Air Balloon roundabout.
- 12.10.171 Traffic would be moved away from receptors at the Air Balloon roundabout and hence concentrations reduce by $8.7\mu\text{g}/\text{m}^3$ and $10.3\mu\text{g}/\text{m}^3$ (receptors 50 and 51). The overall traffic on the A417 would increase but the traffic flow would be improved and would move away from sensitive receptors at the roundabout.
- 12.10.172 The routing of the scheme would remove the Air Balloon roundabout and divert traffic away from the AQMA. The maximum predicted annual mean NO_2 concentration in this AQMA occurs at receptor H50 ($22.2\mu\text{g}/\text{m}^3$) which is below the air quality objective. The predicted change as a result of the scheme is an improvement of $8.7\mu\text{g}/\text{m}^3$.
- 12.10.173 Where the scheme moves traffic closer to existing receptors the total annual mean NO_2 concentrations remain well below the objectives.
- 12.10.174 In the wider ARN the air quality assessment does not identify any predicted exceedances of the annual mean NO_2 objective in 2026 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 at sensitive receptor locations, as set out in ES Chapter 5 Air quality (Document Reference 6.2).
- 12.10.175 The 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 for both study areas.

Ambient noise environment

Ambient noise environment during construction

- 12.10.176 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.
- 12.10.177 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 total construction duration is expected to be approximately 33 months.
- 12.10.178 During construction it is likely that some residential receptors along the scheme would experience daytime noise levels that exceed SOAEL²⁵ 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:
- R1 Holly Brae
 - R2 Crickley Court

- R3 Fernbank (also Grove Lodge, Haroldstone Lodge, Halfacres, The Willows (2 properties) and The Spinney)
 - R5 Crickley Ridge
 - R7 Air Balloon Cottages (numbers 1 and 2)
 - R13 Rushwood Kennels
 - R14 Shab Hill Farm (also Shab Hill Barn)
- 12.10.179 The noise assessment (see ES Chapter 11 Noise and vibration (Document Reference 6.2)) 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 across both wards.
- 12.10.180 It is also predicted that the following receptors would experience noise levels that exceed LOAEL²⁶ threshold limits (this is the Lowest Observed Adverse Effect Level), but not exceed the SOAEL, for some of the construction period:
- R6 Four Winds
 - R9 National Star College
 - R11 Barrow Wake House
 - R15 Stockwell Farm Barn and Cottages (8 dwellings)
 - R16 Chestnut Cottage (also Cottage Barn, Hill Barn and Cuckoopen Barn Farm)
 - R17 Nothill (representing the village of Cowley)
 - R19 Keepers Cottages (2 dwellings)
- 12.10.181 The noise assessment concludes that the construction noise increased at these receptors are minor impacts and not significant.
- 12.10.182 With regards to National Star College, which is an educational facility for young people with complex disabilities, the children who are residents are considered to be particularly vulnerable to changes in noise. Noise mitigation measures would include provision of mechanical ventilation so that windows could be closed if necessary to achieve guideline noise levels for educational spaces. Further mitigation detail is included, where relevant, in ES Appendix 2.1 EMP (Document Reference 6.4). The EMP includes details of the monitoring regime and stakeholder communication strategy. With these mitigation measures in place, it is considered that there would be no adverse health impacts.
- 12.10.183 The night-time noise assessment identifies a number of residential receptors which would experience significant short-term night-time noise during the construction period. These include:
- R2 Crickley Court
 - R3 Fernbank (also Grove Lodge, Haroldstone Lodge, Halfacres, The Willows (x2) and The Spinney)
 - R5 Crickley Ridge
 - R13 Rushwood Kennels
 - R14 Shab Hill Farm (also Shab Hill Barn)
- 12.10.184 The noise assessment also concludes that vibration effects from construction would not be significant for the majority of receptors. However, there are some

receptors which would experience exceedances of SOAEL for human response to vibration, due to either earthworks or pavement works. These include:

- R1 Holly Brae;
- R2 Crickley Court;
- R3 Fernbank (also Grove Lodge, Haroldstone Lodge, Halfacres, The Willows (2 properties) and The Spinney);
- R5 Crickley Ridge;
- R7 Air Balloon Cottages (numbers 1 and 2);
- R12 Birdlip Radio Station;
- R13 Rushwood Kennels; and
- R14 Shab Hill Farm (also Shab Hill Barn).

12.10.185 These exceedances would only be temporary and would not reach levels which would cause structural damage.

12.10.186 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 across both study areas.

Ambient noise environment during operation

12.10.187 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.

12.10.188 There are 21 dwellings with a significant adverse noise impact predicted with the scheme in the opening year (i.e. short term). These residential properties would be subject to direct permanent likely significant effects which would not be possible to mitigate through screening due to the locations or elevations of the dwellings, relative to the scheme. Conversely, there are 31 dwellings subject to direct permanent likely significant beneficial effects as a result of the scheme. These are generally located around the Birdlip area near to the section of highway that would be removed under the scheme proposals.

12.10.189 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.

12.10.190 There are six 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) would be subject to direct permanent likely significant beneficial effects. NIA 13196 (Laurel Cottage) would be subject to a negligible noise decrease.

12.10.191 With the proposed mitigation (see ES Chapter 11 Noise and vibration (Document Reference 6.2)), NIA 3906 (Crickley Court) and NIA 3907 (Fernbank) would be subject to direct permanent likely significant beneficial effects.

12.10.192 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 areas in relation to noise.

Sources and pathways of potential pollution

Sources and pathways of potential pollution during construction

- 12.10.193 ES Chapter 9 Geology and soils (Document Reference 6.2) notes that there are localised areas of known contamination and localised areas of unexpected contamination that may be present within the scheme DCO Boundary. These may pose a risk to construction workers (low sensitivity of receptor) and controlled waters (low to high sensitivity of receptors). This would be mitigated by an action plan and procedures on how to manage and assess unexpected contamination as presented in the EMP (ES Appendix 2.1 Environmental Management Plan Document Reference 6.4)). With the mitigation measures in place, population health outcomes across the study areas are unlikely to be affected as a result, i.e. a neutral outcome.

Sources and pathways of potential pollution during operation

- 12.10.194 ES Chapter 9 Geology and soils (Document Reference 6.2) notes that the permanent operation of the scheme would not result in any detriment to human health from land contamination. Population health outcomes across the study areas are unlikely to be affected as a result, i.e. a neutral outcome.

Landscape amenity

Landscape amenity during construction

- 12.10.195 ES Chapter 7 Landscape and visual effects (Document Reference 6.2) identifies the sources of effects on landscape and visual receptors during construction as:
- a) temporary construction compounds with associated lighting and fencing
 - b) temporary haul roads
 - c) stockpiling and storage of materials
 - d) excavation and handling of materials
 - e) on-site and off-site construction traffic
 - f) 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
 - cranes, telescopic boom lifts, piling rigs and telescopic forklifts for construction of structures
 - g) Night-time security lighting year-round such as:
 - isolated task lighting which would be provided intermittently where required during the winter months only
 - lighting of construction site compounds
- 12.10.196 The majority of construction activities would take place between 2023 and 2025 and is considered temporary. The construction period would be 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 landscape and visual impact assessment identifies a temporary significant adverse effect on the AONB special qualities within the 1.9 mile (3 kilometre) study area.

12.10.197 From a health perspective, changes to the landscape and visual amenity during construction are considered to result in neutral health outcomes across the study areas due to the temporary nature of loss of amenity.

Landscape amenity during operation

12.10.198 ES Chapter 7 Landscape and visual effects (Document Reference 6.2) 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 Cotswold Way crossing linking the Cotswold Way National Trail, Crickley Hill and Barrow Wake providing a traffic free WCH route over the 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 east of Flyup;
- loss of the Air Balloon public house 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 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.

- 12.10.199 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.
- 12.10.200 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 and 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 ES Chapter 7 Landscape and visual effects (Document Reference 6.2) relate to temporary visitors to the areas and not residents, on balance changes would result in a neutral health outcome across the study areas.

Safety of the existing affected road network

Safety of the existing affected road network during construction

- 12.10.201 Periods of construction may introduce additional risks to road users as a result of construction vehicles, changes in road layout, potential delays (leading to frustration and lack of concentration) and distractions. The implementation of the EMP and CTMP would help mitigate these risks such that impacts on health within the study areas would be neutral, for example through best practice traffic management and signage.

Safety of the existing affected road network during operation

- 12.10.202 An assessment has been carried out to identify how the scheme would improve road safety over a 60 year period; Combined Modelling and Appraisal (ComMA) Report (Document Reference 7.6) identifies that the scheme is forecast to lead to a large reduction in the number of killed or seriously injured casualties (66 fewer deaths and 201 fewer serious injuries forecast over the 60 year appraisal period).
- 12.10.203 However, due to the increase in total traffic (vehicle kilometres) the forecast predicts an increase in total number of incidents and slight casualties over the study period (60 years).
- 12.10.204 It is not known where the people who have been, or will be included in these statistics, come from, although it is very unlikely that they would all be resident within the study populations (Ermin and Badgeworth). These improvements in road safety would lead to positive health outcomes overall, but within these study areas it is likely to be a neutral health outcome.

12.11 Monitoring

- 12.11.1 Beyond the recommendations for monitoring made in other relevant assessments, there are no proposals for monitoring arising from this chapter.

12.12 Summary

Construction assessment

- 12.12.1 This section provides a summary of the potential effects of the scheme on the various receptor groups during construction. 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 12-29, summarises the overall assessment of significance of identified effects for the topics discussed in this section.
- 12.12.4 A significant effect is identified if the impact would be moderate adverse or worse.
- 12.12.5 In summary, there would be potential significant effects on property and land which is lost as part of the scheme, which would be permanent large and moderate adverse impacts respectively. All other receptors would experience temporary neutral or slight effects during construction, which are not considered to be significant.
- 12.12.6 All health effects have been identified as being neutral in the construction phase.

Operational assessment

- 12.12.7 This section provides a summary of the potential effects of the scheme on the various receptor groups during operation. This is provided for both land use and accessibility and human health separately.
- 12.12.8 Mitigation for potential adverse effects has been identified where necessary and as appropriate for the long-term operation of the scheme.
- 12.12.9 summarises the overall assessment of significance of identified effects for the topics discussed in this section.
- 12.12.10 A significant effect is identified if the impact would be moderate adverse or worse.
- 12.12.11 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.
- 12.12.12 In relation to health, positive health outcomes have been identified in relation to access to facilities including healthcare, community and recreation, and education. All other health outcomes are identified as neutral.

Table 12-29 Summary of significance during construction and operation – land use and accessibility

Land use and accessibility category	Significance of effect during construction	Significance of effect during operation
Private property and housing	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 Slight Adverse – properties within close proximity and community of Cowley Slight Beneficial – communities of Birdlip and Brimpsfield

Land use and accessibility category	Significance of effect during construction	Significance of effect during operation
Community land and assets	Temporary Moderate Adverse – Crickley Hill Country Park Temporary Moderate Adverse – National Star College Temporary Neutral or Slight Adverse – all other community receptors Slight Adverse – Community Land (Common Land and Open Space Land)	Slight Beneficial – all receptors Slight Beneficial – Community land (Common Land and 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	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	Moderate Beneficial – Cotswold Way National Trail Slight Beneficial – Gloucestershire Way Moderate Beneficial – PRow network in the study area

12.12.13 Table 12-30 is a summary matrix of the health outcomes identified for the scheme during construction and operation.

Table 12-30 Summary assessment of human health outcomes

Health determinant	Sensitivity	Health outcome during construction		Health outcome during operation	
		Ermin	Badgeworth	Ermin	Badgeworth
Community, recreational and education facilities	Medium	Neutral	Neutral	Positive	Positive
Green/open space	Low	Neutral	Neutral	Positive	Positive
Healthcare facilities	Medium	Neutral	Neutral	Positive	Positive
Transport and connectivity	Medium	Neutral	Neutral	Positive	Positive
Safety of the existing affected road network	High	Neutral	Neutral	Neutral	Neutral
Ambient air quality	Medium	Neutral	Neutral	Neutral	Neutral
Ambient noise environment	Medium	Neutral	Neutral	Neutral	Neutral
Sources and pathways of potential pollution	Medium	Neutral	Neutral	Neutral	Neutral
Landscape amenity	High	Neutral	Neutral	Neutral	Neutral

End Notes & References

- ¹ 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
- ² 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
- ³ Taking into account the relevant Design Manual for Roads and Bridges (DMRB) guidance where there is an appropriate approach.
- ⁴ Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure Northern Ireland, “Design Manual for Roads and Bridges GG 142 - Walking, cycling and horse-riding assessment and review”, 2019
- ⁵ 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]
- ⁶ 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]
- ⁷ Gloucestershire County Council, “Gloucestershire Health and Well-being Board - Gloucestershire County Council,” 2019. [Online]. Available: <https://www.gloucestershire.gov.uk/council-and-democracy/gloucestershire-health-and-well-being-board/>. [Accessed: 03-Dec-2019]
- ⁸ Durham University, “Nomis - Official Labour Market Statistics,” 2019. [Online]. Available: <https://www.nomisweb.co.uk/>. [Accessed: 03-Dec-2019]
- ⁹ Office for National Statistics, “Local statistics,” 2019. [Online]. Available: <https://www.ons.gov.uk/help/localstatistics>. [Accessed: 03-Dec-2019]
- ¹⁰ <https://www.jointcorestrategy.org/examination>
- ¹¹ S19 Acquisition of Land Act 1981
- ¹² Gloucester City Council, Cheltenham Borough Council, and Tewkesbury Borough Council, “Joint Core Strategy 2011-2031,” November, 2017
- ¹³ Department for Transport, “Guidance on Road Classification and the Primary Route Network 2,” 2012
- ¹⁴ WHIASU, 2012, Health impact assessment: a practical guide
- ¹⁵ IEMA, 2017, Health in Environmental Impact Assessment A Primer for a Proportionate Approach
- ¹⁶ Public Health England Local Health. Available at www.localhealth.org.uk
- ¹⁷ ONS, Personal well-being estimates. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/well-being/datasets/headlineestimatesofpersonalwell-being>
- ¹⁸ 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]
- ¹⁹ Public Health England – Local Health 2013- 2017. Available at www.localhealth.org.uk
- ²⁰ Public Health England – Local Health 2013- 2017. Available at www.localhealth.org.uk
- ²¹ 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.
- ²² When applying DMRB LA 112, before applying professional judgement as set out in the sections below.
- ²³ When applying DMRB LA 112, before applying professional judgement as set out in the sections below.
- ²⁴ http://www.bhs.org.uk/~/_media/bhs/files/pdf-documents/access-leaflets/surfaces.ashx?la=en
- ²⁵ SOAEL – this is Significant Observed Adverse Effect Levels and identifies the onset of significant impacts on health and quality of life.