

A303 Sparkford to Ilchester Dualling

Environmental Impact Assessment Scoping Report

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1 Introduction

1.1 Purpose of this Report

- 1.1.1 This Environmental Impact Assessment Scoping Report has been prepared in accordance with Section 10 of the Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017. It is submitted by Mott MacDonald Sweco on behalf of Highways England to request a Scoping Opinion in respect to the A303 Sparkford to Ilchester Dualling (hereafter referred to as ‘the Scheme’).
- 1.1.2 The purpose of this Environmental Impact Assessment Scoping Report is to establish the scope of the Environmental Statement (ES) and the level of detail required, and to support the request for a Scoping Opinion under Regulation 10(1) of the Infrastructure Planning (EIA) Regulations 2017. This Environmental Impact Assessment Scoping Report has been completed in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11¹ and the Planning Inspectorate’s (PINS) Advice Note 7² to a Scoping Level for all environmental factors (topics) set out in the Infrastructure Planning (EIA) Regulations 2017.

1.2 Overview of the Scheme

Existing Route Corridor

- 1.2.1 The A303/A30 forms part of the Strategic Road Network (SRN) and a strategic link between the south west and the rest of the south, south-east and London. The route comprises multiple road standards, including dual carriageway, single carriageway and single carriageway sections with overtaking lanes. Speed limits also vary between 40mph and 70mph, depending on the character of the road and its surroundings.

Existing Project Road

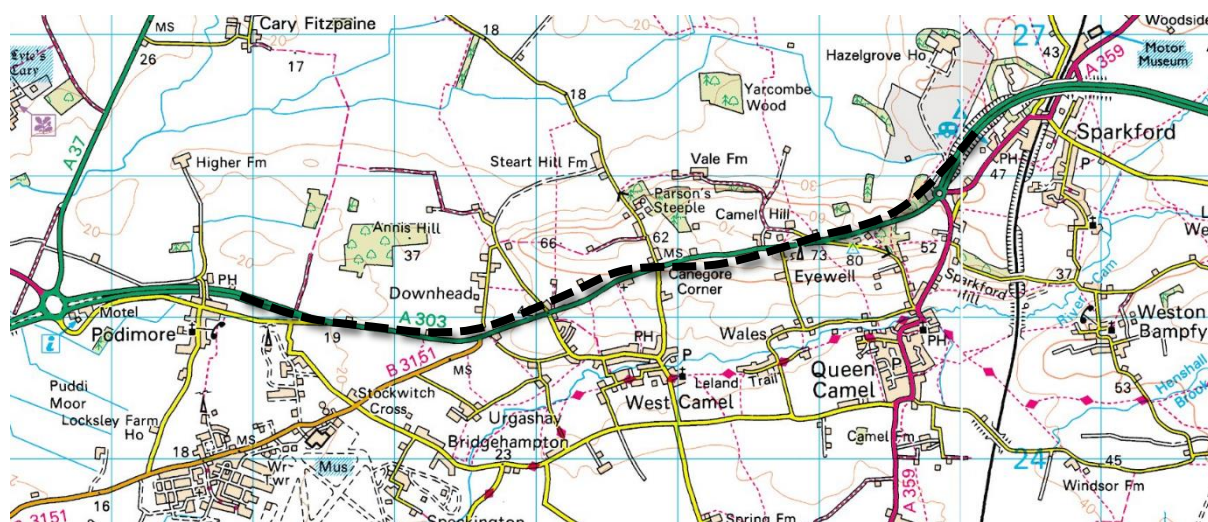
- 1.2.2 The section of the A303 that is being upgraded as part of this project commences at the eastern limits of the existing dual carriageway Podimore Bypass. Travelling east, the route reaches the junction with the B3151 before bearing north east and rising upwards through Canegore Corner to reach the crest of Camel Hill at Eyewell. This section of the route is characterised by a single carriageway road, with double white lines negating overtaking and subject to a 50mph speed limit. There are several priority junctions along the route giving access to the settlements of Queen Camel and West Camel to the south and Downhead to the north, as well as several farm accesses and parking laybys.

¹ Highways Agency (2009) Design Manual for Roads and Bridges (DMRB) Volume 11 ‘Environmental Assessment’.

² The Planning Inspectorate (2015) Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping [online] available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/03/Advice-note-7v4.pdf> (last accessed September 2017).

- 1.2.3 From the crest of Camel Hill, the route descends to meet the roundabout at the western limit of the dual carriageway Sparkford Bypass ('Hazlegrove Roundabout'). This section comprises two lanes in the westbound direction, one lane in the eastbound direction and is also subject to a 50mph speed limit. Hazlegrove Roundabout forms a junction between the A303 and the A359 which runs south through Queen Camel and north-east through Sparkford. The roundabout also provides access to a service station, and to a school at Hazlegrove House.
- 1.2.4 The section of the A303 that is to be upgraded is approximately 5km long.
- 1.2.5 The extents of the Scheme are illustrated in Figure 1.1. This figure also illustrates the line of the proposed route. The Draft Red Line Boundary for the Scheme can be seen in Appendix B, this includes all land required to construct the Scheme.

Figure 1.1: Scheme Extents



Source: MMSJV

Scheme Proposals

- 1.2.6 The Scheme is to provide a continuous dual carriageway on the A303 linking Podimore Bypass and the Sparkford Bypass. The Scheme would involve the removal of at-grade junctions and direct accesses. Any new junctions would be constructed to grade-separated standards, or to compact grade-separated standards depending upon anticipated traffic flows. A detailed description of the Scheme is provided within Section 2.5, and a plan containing the proposed draft Red Line Boundary (RLB) is contained within Appendix B.
- 1.3 **Legislative Context and the Need for Environmental Impact Assessment**
- 1.3.1 The Scheme is classified as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 Section 22 as amended by The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013 by virtue of the fact that it meets the following criteria taken from Section 3 of the Order:

- The Scheme would involve the alteration of a highway that is wholly within England for which the Secretary of State is the highway authority; and,
- (4)(b) In relation to the construction or alteration of a highway, other than a motorway, where the speed limit for any class of vehicle is expected to be 50 miles per hour or greater, is 12.5 hectares.

1.3.2 The Scheme falls within Schedule II of the Infrastructure Planning (EIA) Regulations 2017. By virtue of the fact that the potential for significant adverse environmental effects was identified, an ES will be prepared to accompany the Development Consent Order (DCO) application to PINS. The Regulation 8(1)(b) notice was submitted to PINS on the 27 November 2017.

1.3.3 The ES will meet the requirements of Regulation 14 of the Infrastructure Planning (EIA) Regulations 2017.

1.4 Planning Policy Context

National Policy Statement for National Networks

1.4.1 The National Policy Statement for National Networks (NPSNN)³ sets out the need for, and Government's policies to deliver development of, NSIPs on the national road network in England and sets out the primary basis for making decisions of development consent for NSIPs in England. The Government recognises in the Appraisal of Sustainability accompanying the NPSNN that some developments will have some adverse local impacts on noise, emissions, landscape/visual amenity, biodiversity, cultural heritage and water resources. The significance of these effects and the effectiveness of mitigation is uncertain at the strategic and non-locational specific level of the NPSNN. Therefore, whilst applicants should deliver developments in accordance with Government policy and in an environmentally sensitive way, including considering opportunities to deliver environmental benefits, some adverse local effects of development may remain.

1.4.2 Evidence demonstrating compliance of the Scheme with the NPSNN will be provided within the National Policy Statement for National Networks Accordance Table which will be submitted as part of the DCO application. Any environmental assessment principles outlined in the National Networks National Policy Statement will be taken into account within the ES.

1.4.3 The ES will also confirm within each of the environmental discipline chapters how the requirements of the NPSNN will be met.

National Planning Policy Framework

1.4.4 The National Planning Policy Framework (NPPF)⁴ sets out the Government's planning policies for England and the requirements for the planning system. It

³ Department for Transport (2015) National Policy Statement for National Networks [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed September 2017).

⁴ Communities and Local Government (2012) National Planning Policy Framework [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf (last accessed September 2017).

provides a framework within which local authorities and residents can produce local and neighbourhood plans reflecting the needs and priorities of communities.

- 1.4.5 The NPPF seeks to promote a strong and competitive economy with Local Plans identifying *'priority areas for economic regeneration, infrastructure provision, and environmental enhancement'*. In addition, the NPPF seeks to promote sustainable transport by encouraging solutions which support reductions in greenhouse gas emissions and reduces congestion.
- 1.4.6 The NPPF does not contain specific policies for NSIPs for which particular considerations apply. NSIPs are determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant National Policy Statements for major infrastructure. For highways schemes, the relevant National Policy Statement is the NPSNN, as described above.

2 The Scheme

2.1 Road Investment Strategy

- 2.1.1 In December 2014, the Department for Transport (DfT) published the Road Investment Strategy (RIS) for 2015-2020⁵. The RIS sets out the list of schemes that are to be developed by Highways England over the period covered by the RIS.
- 2.1.2 Highways England, as the strategic highways company and appointed by the Secretary of State must, in exercising its functions and complying with its legal duties and other obligations, act in a manner which it considers best calculated to, among others:
- Minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment; and,
 - Conform to the principles of sustainable development.

2.2 Need for the Scheme

- 2.2.1 Dualling of the A303 between Sparkford and Ilchester was announced in the RIS: for the 2015/16 to 2019/20 Road Period⁶.
- 2.2.2 The single carriageway section of the A303 between Sparkford and Ilchester suffers from congestion and queuing, particularly during the summer months and at weekends. It also suffers from higher than national average accident rates for single carriageway A -class trunk roads. Numerous at-grade junctions, accesses, and non-motorised user (NMU) crossing points and limited space for road workers during maintenance create hazards for all road user groups.
- 2.2.3 An assessment of alternative modal solutions will be contained within the National Policy Statement for National Networks Accordance Table to be submitted as part of the Development Consent Order (DCO) application.
- 2.2.4 Early consultation with statutory stakeholders has found unanimous agreement that there is a need to upgrade this section of the A303 to increase traffic capacity, reduce congestion and improve motorised and NMU accessibility for local communities.
- 2.2.5 Dualling of the A303 between Sparkford and Ilchester is therefore an appropriate solution which would meet the objectives of the DfT (see Section

⁵ Department for Transport (2015) Road Investment Strategy: for the 2015/16 – 2019/20 Road Period [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf (last accessed October 2017).

⁶ Department for Transport (2015) Road Investment Strategy: for the 2015/16 – 2019/20 Road Period [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf (last accessed October 2017).

2.3 Scheme Objectives below) and overcome the existing traffic problems on this section of road.

2.3 Scheme Objectives

DfT Objectives

2.3.1 The DfT has an aspiration for the Strategic Road Network (SRN) to be smoother, smarter and sustainable by 2040 (see Part 1 Chapter 2 of the RIS⁷). The DfT aims to achieve this by focussing on eight key performance areas as set out in Part 3 Chapter 1 of the RIS. These are:

- Making the network safer;
- Improving user satisfaction;
- Supporting the smooth flow of traffic;
- Encouraging economic growth;
- Delivering better environmental outcomes;
- Helping cyclists, walkers and other vulnerable users of the network;
- Achieving real efficiency; and,
- Keeping the network in good condition.

2.3.2 Further information is available in the RIS⁸.

Highways England Objectives

2.3.3 The Scheme will be developed as a high-quality two-lane dual carriageway making an essential contribution to the 'expressway' link between the south east and south west. It is anticipated that future enhancements would make this section 'expressway' compatible, to support the long-term aspirations of the RIS.

2.3.4 The specific transport objectives identified at the Value Management Workshop are:

- Safe and serviceable network;
- More Free Flowing network;
- More accessible and integrated network; and,
- Improved environment.

2.3.5 More specific objectives agreed during a Value Management workshop are:

- To contribute to regeneration and sustainable economic growth;

⁷ Department for Transport (2015) Road Investment Strategy: for the 2015/16 – 2019/20 Road Period [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf (last accessed October 2017).

⁸ Department for Transport (2015) Road Investment Strategy: for the 2015/16 – 2019/20 Road Period [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf (last accessed October 2017).

- To support employment and residential development opportunities.
- To improve the safety, operation and efficiency of the transport network;
- Improve network reliability and reduce journey times;
 - To deliver capacity enhancements to the SRN.
- Supporting the use of sustainable modes of transport;
- Delivering better environmental outcomes; and,
- To improve local and strategic connectivity.

2.4 Scheme Location

- 2.4.1 The Scheme would provide a dual carriageway on the A303 between Sparkford and Ilchester in Somerset, connecting the existing dual carriageway sections to the east and west between Hazlegrove roundabout and Podimore roundabout. The location of the Scheme can be seen in the Environmental Constraints Plan contained in Appendix A and the proposed draft Red Line Boundary (RLB) contained on the plan within Appendix B.
- 2.4.2 The landscape surrounding this section of the A303 between Sparkford and Ilchester is largely rural with field patterns and intermittent individual properties. Settlements in a rural environment lie to the south at West Camel and Queen Camel. The existing A303 runs along the top of the partially wooded ridge of Camel Hill, before descending to Sparkford. The land to the west of Sparkford is a level area drained by a series of ditches leading to the Dyke Brooke and westward to the River Cary, whilst the field pattern in this area comprises large geometric, narrow lands and thick hedgerows. Blocks of woodland occasionally punctuate the field pattern and are partially prominent on the western section from Camel Hill to Sparkford. At Podimore, the topography comprises flat low-lying level agricultural land, with the rising ground of Annis Hill to the east of Podimore forming a minor feature which is capped, before rising towards Camel Hill which is characterised by its sloping sides and blocks of woodland.
- 2.4.3 In terms of Statutory Environmental Designations, there are two scheduled monuments (Romano-British settlement immediately south west of Camel Hill Farm and Medieval settlement remains 100m and 250m north of Downhead Manor Farm) within 1km of the Scheme, one Site of Special Scientific Interest (SSSI) (Sparkford Wood) 1.3km north-east, two Conservation Areas (Queen Camel and West Camel) within 1km of the Scheme, numerous grade I, grade II and Grade II* listed buildings within 1km, and three Special Areas of Conservation (SACs) (Mells Valley SAC, North Somerset and Mendip Bats SAC, and Bracket's Coppice SAC) designated for bat populations within 30km of the Scheme. The eastern end of the Scheme would pass through the southern third of Hazlegrove House (Grade II Listed) Registered Park and Garden. There are also five designated ecological sites within 200m of the air quality Affected Road Network (ARN), including Stockton Wood and Down SSSI.
- 2.4.4 In terms of Non-Statutory Environmental Designations, there are 15 Local Wildlife Sites (LWSs) within 2km of the Scheme, as well as two Local Geological Sites (LGSs) within 1km of the Scheme. All of the environmental designations located within 2km of the Scheme extents, or just outside, are

shown on the plan contained within Appendix A. In terms of material assets, there are a number of British Geological Survey (BGS) Mineral Sites in close proximity to the current A303, as well as a Mineral Safeguarding Site, and several landfills.

- 2.4.5 The ES will provide a series of constraints maps at differing scales to ensure all of the constraints listed above and in the below chapters are shown.

2.5 Scheme Description

Introduction

- 2.5.1 The preferred route for the proposed Scheme was confirmed by the Secretary of State in October 2017. The Scheme follows the existing corridor of the A303 very closely. It is generally considered to be an online solution although is often deliberately aligned just to the side of the existing carriageway to allow re-use of the existing route for local access, avoid property or facilitate construction. At its maximum offset, the route is typically 100m either north or south of the existing A303, and the section of the A303 that is to be upgraded is approximately 5km in length.
- 2.5.2 The maximum parameters (size and scale) of the Scheme are unknown at this stage. However, the ES will define these, along with any limits of deviation, and the description will reflect the description of the Scheme within the draft DCO submission. The ES will be supported by appropriate figures and design drawings.

Proposed Scheme Components

- 2.5.3 The Scheme consists of the following principal elements, which are described in further detail in the below sections:
- A new length of dual two-lane carriageway highway, generally following the existing corridor, between Sparkford and Podimore;
 - The new length of dual carriageway is generally considered to be an online solution, but is deliberately aligned to the side of the existing carriageway in places, to allow use of the existing route for local access;
 - A new all movements grade-separate junction north-west of Hazlegrove Roundabout accommodating free-flowing A303 traffic movements
 - A limited movement junction in the vicinity of Downhead;
 - A connection would be provided between local roads to the north and south of the route in the vicinity of Canegore Corner via an overbridge; and,
 - Closure of the existing westbound slip road to Podimore village. Access to Podimore village will therefore be via the A303/A37 junction ('Podimore Roundabout').

Description (Mainline)

- 2.5.4 At its western limits, the Scheme ties in with the existing dual carriageway A303 Podimore Bypass. Travelling eastwards, the route initially follows the existing A303 closely until the B3151 before moving north of the existing carriageway and rising up to the south of Downhead before crossing over the existing A303 at Canegore Corner. This would pass very close to the Noise Important Area (NIA) at the West Camel Methodist Church (see Appendix A for the location of this NIA). The route would then take a southerly alignment briefly before meeting up with the existing road again to pass between a scheduled monument and a Ministry of Defence (MOD) signal station at the crest of Camel Hill. Finally, the route would then bypass the existing Hazlegrove Roundabout to the north through a Registered Park and Garden associated with Hazlegrove House, before tying into the existing A303 north of Sparkford Village.

Description (Junctions)

- 2.5.5 A new all movements grade-separated junction would be provided in the vicinity of the Hazlegrove Roundabout, which will give priority to traffic on the A303. The junction will incorporate entry and exist slip roads in both directions providing connections to Hazlegrove House, the A359, access to villages south of the route and access to properties at Camel Hill to the north of the Scheme. A limited movements junction, comprising eastbound slips only will be provided in the vicinity of Downhead. A limited movement junction will be provided in the vicinity of the junction with the B3151 comprising westbound exit and entry slip roads.

Description (Side Roads)

- 2.5.6 A connection would be provided between local roads to the north and south of the route in the vicinity of Canegore Corner via an overbridge, incorporating a link to the A303 eastbound via the junction at Downhead. At the western end of the Scheme the existing westbound slip road to Podimore village will be closed. Access to Podimore village will therefore be via the A303/A37 junction ('Podimore Roundabout').

Additional Features

- 2.5.7 In addition to the above principal elements, additional features associated with the Scheme will include drainage, landscaping, environmental mitigation, lighting, gantries, signage, and utility diversions. Details of these additional features will be provided within the ES once further design information is made available.

Land Take

- 2.5.8 It has been estimated that Scheme would require approximately 400,000m² of permanent third-party land acquisition. However, the area of land required temporarily during construction is currently unknown in the absence of information on the construction footprint, construction compound and haul routes. This information will be developed as part of the detailed design stage and will be included as part of the ES.

Demolition

- 2.5.9 It is anticipated that the Scheme would require the demolition of one farm building adjacent to the A303 approximately 850m to the east of Podimore. More details on the anticipated demolition will be provided within the ES and the location will also be indicated on a plan within the ES.

Scheme Construction

- 2.5.10 As part of the proposed Scheme, the following elements are likely to be required during construction:

- Temporary traffic management areas, temporary working and storage areas, material stockpiles, construction compounds, haul roads, and provision for site compounds to be used during the construction period; and,
- Enabling works including utility diversions as required.

- 2.5.11 For this report, assumptions associated with the types of construction works required have been made within each of the environmental discipline chapters to inform the assessment of likely significant effects. The types of construction elements that are likely to form part of the Scheme include the following:

- Pre-construction and mobilisation activities e.g. establishing site compounds, works areas, topsoil storage etc.;
- Earthworks to include noise attenuation bunds;
- Diversion of Statutory Undertakers (SU) and Other Apparatus;
- Installation of attenuation features;
- Ground water management;
- Site clearance;
- General excavation;
- Backfilling and compaction of soil;
- Earthworks, i.e. the construction of embankments and the relocation of spoil;
- Placing concrete foundations, may include piling;
- Laying of asphalt;
- Installation of drainage, which will include excavation and placement of pipes and chambers; and,
- Construction of a structures, which may include lifting of beams into place.

- 2.5.12 Details of the construction methodology will be included as part of the ES, once it has been developed. The ES will also describe any phased approach to construction, the likely duration and location of construction activities, the need for night time working, and the anticipated numbers and types of vehicle movements associated with the construction phase.

The development of the construction strategy will aim to ensure that adverse effects are reduced to sensitive receptors as far as possible.

3 Assessment of Alternatives

3.1 Assessment Methodology

- 3.1.1 Initial option sifting was undertaken in accordance with the Transport Analysis Guidance – The Transport Appraisal Process or ‘WebTAG’. The sift used the Early Assessment Sifting Tool (EAST)⁹, which forms part of Step 6 of WebTAG – Initial Sifting. However, as EAST does not provide a numeric score, the assessment team produced a scoring mechanism to allow each option to be directly compared and ranked.
- 3.1.2 An Environmental Scoping Report was produced to the Design Manual for Roads and Bridges (DMRB) Scoping Level for four Scheme options, which were then reduced to two Scheme options, for which another Environmental Scoping Report was prepared. An Environmental Assessment Report was then produced for the two Scheme options, that built on the information within the Environmental Scoping Report and provided a DMRB Simple level assessment for each of the environmental factors scoped in. The purpose of producing the Environmental Assessment Report was to support the comparison of environmental effects, to support the option selection.

3.2 Alternative Options Considered

- 3.2.1 Thirteen potential route options were originally identified to ensure a broad range of possibilities were considered. These can be broadly classified as central, northern, or southern routes:
- Central: Option A1, Option A1 (South), and Option A2 (became Option 1);
 - Northern: Option B2, Option B4, Option D1, Option E1, Option E2, Option E4, Option F1 (became Option 2), and Option G1; and,
 - Southern: Southern Route (i), Southern Route (ii).

Sifting of Options

- 3.2.2 Initial option sifting was undertaken in accordance with WebTAG. The sift used the EAST, which forms part of Step 6 of WebTAG – Initial Sifting. At the end of the EAST sifting process, there were 11 remaining routes, which were further reduced to the following shortlist that were taken forward for further assessment:
- Option B4;
 - Option F1 (became Option 2);
 - Option A2 (became Option 1); and,
 - Option E4.
- 3.2.3 The four shortlisted options were then subject to a technical appraisal, which concluded that one central and one northern route option should be taken

⁹ Department for Transport (2011) Early Assessment Sifting Tool (EAST) (online) available at: <https://www.gov.uk/government/publications/transport-business-case> (last accessed October 2017).

forward to the non-statutory public consultation which was held in February and March 2017. These two options, Option 1 and Option 2, were subject to further environmental, economic, and technical assessment. The results of these assessments, along with the outcomes of consultation, were used to inform the identification of the Preferred Route, which was announced as Option 1 in October 2017. This Environmental Impact Assessment Scoping Report has therefore been prepared for Option 1, and a Preliminary Environmental Information (PEI) Report and Environmental Statement (ES) will be produced in accordance with the Scoping Opinion.

- 3.2.4 The Assessment of Alternatives presented within the ES will examine the design variations of the preferred route, including *'a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'*, in line with the Infrastructure Planning (EIA) Regulations 2017. This will demonstrate the rationale and decisions made for the final preliminary design to be submitted as part of the Development Consent Order (DCO) application.

4 Consultation

4.1 Environmental Consultation Undertaken to Date

Engagement with Statutory and Non-Statutory Environmental Bodies

4.1.1 In addition to engagement with local authorities, landowners, hard to reach groups, and the community, Highways England has engaged with the following Statutory Environmental Bodies (SEBs) during the Scheme options development and during the public consultation period:

- Environment Agency;
- Natural England; and,
- Historic England.

4.1.2 A summary of the meetings is provided in Table 4.1. In addition, Highways England has also engaged with the South West Heritage Trust (County Archaeologist) and the National Trust. Stakeholders were engaged by group meetings, telephone discussions and emails.

Table 4.1: Meetings with Environmental Bodies

Date	Stakeholders	Meeting type	Discussion / topics raised	Influence
4 December 2015	National Trust, Environment Agency, and Natural England.	Key stakeholder group.	Introduction to the Scheme and route options, DCO process, Scheme timescales and engagement methodology.	Representatives confirmed their interest in the Scheme and engagement approach. Initial discussions about proposed Scheme options.
22 March 2016	National Trust, Environment Agency, South West Heritage Trust and Natural England.	Key stakeholder group.	Scheme update and public consultation strategy discussion.	Discussions about development of public consultation strategy, specific stakeholder identification and engagement activities. Discussion about communication channels to be employed.
13 July 2016	National Trust, Environment Agency, South West Heritage Trust and Natural England.	Key stakeholder group.	Stakeholder engagement progress meeting. Discussion about public consultation activities timing.	Feedback regarding the route options presented. Discussion about planned public.

Date	Stakeholders	Meeting type	Discussion / topics raised	Influence
				consultation programme.
11 November 2016	National Trust, Environment Agency, South West Heritage Trust and Natural England.	Key stakeholder group.	Stakeholder engagement progress meeting. Update about public consultation activities planned.	Consideration of specific stakeholder groups including, landowners, parish councils, local authority politicians and Members of Parliament.
22 March 2017	Historic England and South Somerset District Council.	Environmental stakeholder discussion.	Site visit to view Hazlegrove House (Grade II) Registered Park and Garden and potential design options in their locality.	Discussion around the level of potential impact of the Scheme options in this area, as well as potential mitigation. The requirement for further environmental assessment was discussed.
2 May 2017	Natural England	Environmental stakeholder discussion.	Survey effect to date and going forward. Methodology for bat surveys (in light of emerging Natural England guidance). Future engagement and EIA process. Ghost licences.	Advice received on conducting bat surveys prior to Development Consent Order (DCO) submission, including scope of those surveys. Broad agreement on scope for remainder of surveys. Natural England now have an awareness of the overall programme and requirement for ongoing engagement.
4 July 2017	Environment Agency	Environmental stakeholder discussion	Survey effect to date and going forward. Proposed drainage design and runoff rates. Flood risk assessment and Water Framework Directive assessment.	Survey and assessment focus and ongoing consultation requirements.

4.2 Proposed Consultation

- 4.2.1 The Preferred Route Announcement (PRA) took place on 24 October 2017. The selection of the preferred route has been influenced by a number of factors including traffic capacity, engineering, safety, economic, social and environmental. Feedback received from the non-statutory route options public consultation that took place in March 2017 was also a contributing factor.
- 4.2.2 The Scheme is progressing towards a period of statutory engagement and consultation. Engagement with the Environment Agency, Natural England, Historic England, Somerset County Council and South Somerset District Council, as well as any other relevant environmental organisations will continue, through the format of an Environmental Technical Working Group (TWG).
- 4.2.3 The Environmental TWG will be responsible for studying specific Scheme issues, agreeing the proposed environmental assessment methodologies, considering appropriate scheme solutions and agreeing statements of common ground (SoCGs) on environmental matters between Highways England and key stakeholders. The Environmental TWG will also be responsible for the technical review of the Environmental Impact Assessment (EIA) and associated surveys, development and review of environmental design, mitigation requirements and environmental opportunities and enhancements. The group will report its findings to the Key Stakeholder Group.
- 4.2.4 In January and February 2018 Highways England will hold a statutory public consultation, seeking views, comments and feedback on the Scheme. A series of public events and invitation only meetings will be held with key stakeholders, the local community and landowners. Members of the project team will be available at events to discuss the Scheme with members of the public. In addition, a Preliminary Environmental Information (PEI) Report will be available for statutory consultees to comment on.
- 4.2.5 The public events will be advertised in advance of the consultation and in accordance with the published Statement of Community Consultation (SoCC). A full copy of the SoCC will be made available ahead of the statutory consultation, in accordance with the Planning Act 2008.
- 4.2.6 The following consultation material will be made available at all meetings and events, on the Scheme website and at public information points:
- Consultation Scheme brochure;
 - Consultation Scheme questionnaire and freepost envelope; and,
 - Poster detailing public events and Scheme website.
- 4.2.7 All feedback and formal responses received during the statutory public consultation period will be recorded and will appear in summary as part of a Consultation Report.
- 4.2.8 The feedback and formal responses received during this statutory consultation may influence the final design of the Scheme, ahead of submitting a DCO application to the Secretary of State.

5 Environmental Assessment Methodology

5.1 Approach to Assessment

5.1.1 This Environmental Impact Assessment Scoping Report considers the following factors contained in Regulation 5(2) of the Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations. These include:

- (a) Population and human health;
- (b) Biodiversity;
- (c) Land, soil, water, air and climate;
- (d) Material assets, cultural heritage and the landscape; and,
- (e) The interaction between the factors referred to in sub-paragraphs (a) to (d).

5.1.2 The assessment for each of these factors are covered in one or more environmental assessment chapters in this report. The chapters have been written in accordance with the requirements presented in the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3¹⁰ and Interim Advice Note (IAN) 125/15¹¹, for each of the relevant environmental factors (topics). This is shown in Table 5.1 below.

Table 5.1 Environmental factors and respective DMRB environmental topics

Factors contained within Regulation 5(2) of the Infrastructure Planning (EIA) Regulations	DMRB Topic
(a) Population and human health	Chapter 6 Air Quality; Chapter 12 Noise and Vibration; Chapter 13 People and Communities; and, Chapter 14 Road Drainage and the Water Environment.
(b) Biodiversity	Chapter 10 Biodiversity
(c) Land, soil, water, air and climate	Chapter 6 Air Quality; Chapter 9 Geology and Soils; Chapter 14 Road Drainage and the Water Environment; and, Chapter 15 Climate.
(d) Material assets, cultural heritage, and the landscape	Chapter 7 Cultural Heritage; Chapter 8 Landscape and Visual Effects; and, Chapter 11 Materials.
(e) The interaction between the factors referred to in sub-paragraphs (a) to (d).	Chapter 16 Combined and Cumulative Effects

¹⁰ Highways England (2015) Design Manual For Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques.

¹¹ Highways England (2015) Interim Advice Note (IAN) 125/15 Environmental Assessment Update [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian125r2.pdf> (last accessed November 2017).

- 5.1.3 Each topic has considered the potential environmental effects associated with the construction and operational phases of the Scheme. The Scheme would be unlikely to be decommissioned as it would form an integral part of the SRN. As such, decommissioning has not been considered within this Environmental Impact Assessment Scoping Report, and it is proposed that decommissioning is scoped out of the ES.

Population and Human Health

- 5.1.4 There is no consolidated methodology or practice for the assessment of Population and Human Health, however the scope of the assessment is considered to be covered by existing Highways England Guidance as set out below. This recognises the specific requirements of the National Policy Statement for National Networks (NPSNN)¹² for consideration of health, specifically within paragraphs 4.79 - 4.82. This will address health by utilising the following guidance:
- Air Quality: HA 207/07¹³, IAN 185/15¹⁴, IAN 175/13¹⁵, IAN 174/13¹⁶, IAN 170/12¹⁷;
 - Noise and vibration: HD 213/11¹⁸, IAN 185/15¹⁹;
 - Road Drainage & The Water Environment: HD 45/09²⁰; and,
 - Equestrians, Cyclists, and Community Effects: DMRB Volume 11 Section 3 Part 8²¹.
- 5.1.5 Reporting of Population and Human Health effects will be provided within the relevant environmental factor chapters. The Environmental Statement (ES) will

¹² Department for Transport (2015) National Policy Statement for National Networks [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed September 2017).

¹³ Highways England (2008) DMRB Volume 11 Section 2 Part 1 HA207/07 'Air Quality'.

¹⁴ Highways England (2015) IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11 Section 3 Part 1 Air Quality and Volume 11 Section 3 Part 7 Noise' [online] available at:

<http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf> (last accessed October 2017).

¹⁵ Highways England (2013) IAN 175/13 'Updated air quality advice on risk assessment related to compliance with the EI Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 Air Quality' [online] available at:

<http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf> (last accessed October 2017).

¹⁶ Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at:

<http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

¹⁷ Highways England (2013) IAN 170/12 v3 'Updated air quality advice on the assessment of future Nos and NO2 projections for users of DMRB Volume 11, Section 2, Part 1 Air Quality' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170v3.pdf> (last accessed October 2017).

¹⁸ Highways England (2011) DMRB Volume 11 Section 3 Part 7 HD 213/11 Noise and Vibration.

¹⁹ Highways England (2015) IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11 Section 3 Part 1 Air Quality and Volume 11 Section 3 Part 7 Noise' [online] available at:

<http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf> (last accessed October 2017).

²⁰ Highways England (2008) DMRB Volume 11 Section 3 Part 10 HD 45/09 Road Drainage and the Water Environment.

²¹ Highways England (2008) DMRB Volume 11 Section 3 Part 8 'Pedestrians, Cyclists, Equestrians and Community Effects'.

set out the methodology recognising the requirements of the NPSNN, including how significance of effects are to be determined.

- 5.1.6 It is considered that these assessments, conducted principally in isolation as is required by their methodologies, will not provide a sufficient analysis of the effects of the Scheme. To enable such conclusions to be drawn, a qualitative assessment of information collated via each of the environmental factors listed in Section 5.1.4 above will be undertaken and presented within the Combined and Cumulative Effects chapter of the ES.

Major Accidents and Disasters

- 5.1.7 The Infrastructure Planning (EIA) Regulations 2017 require an assessment of *'the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned'*.

- 5.1.8 The scope of the assessment will cover:

- Vulnerability of the project to risks of major accidents and/or disasters; and,
- Any consequential changes in the predicted effects of that project on environmental factors.

- 5.1.9 To address the requirements of the Infrastructure Planning (EIA) Regulations 2017, the factor of Major Accidents and Disasters will be assessed as part of the ES. In considering the elements of vulnerability, professional judgement will be applied to develop project specific definitions of major events. Major events, both man-made and naturally occurring, will be identified and any potential effects and likely mitigation measures will be included as part of the assessment. The conclusions of this assessment will be included within each of the individual environmental chapters of the ES.

5.2 Heat and Radiation

- 5.2.1 Due to the nature of the Scheme, it is considered unlikely that heat and radiation effects associated with the proposals are likely to arise. Further assessment as part of the ES has therefore been scoped out.

5.3 Future Baseline Scenario

- 5.3.1 A description of the relevant aspects of the current state of the environment (baseline scenario) is included for each environmental factor within Chapters 6 to 16 of this Scoping report. Within the ES, an outline of the likely evolution of the baseline and future baseline scenarios, without implementation of the Scheme and appraising only natural changes, will be included. This will make use of readily available information such as that available from Local Development Plan documents.

5.4 Surveys and Predictive Techniques and Methods

- 5.4.1 Information gathered through desk top studies, environmental walkovers and surveys have been collated to inform this report. The environmental constraints identified within this report have been mapped and are included in Appendix A.

5.5 General Assessment Assumptions and Limitations

- 5.5.1 There are several assumptions associated with the traffic modelling that has taken place as part of the Scheme, described below. Topic-specific assumptions and limitations have been outlined in each of the individual environmental topic chapters (Chapters 6 to 16).
- 5.5.2 Should any guidance be updated prior to the DCO submission, consideration will be given to applying the new guidance, in agreement with relevant consultees and also if sufficient time allows for this to be done, and a justification provided in the ES.
- 5.5.3 Conclusions and recommendations may be revised within the ES, on the basis of updated information following further research, survey, and investigation. Any changes would be agreed with the relevant consultees.

Scheme Design

- 5.5.4 This report is based on the Scheme design provided in October 2017 (refer to the Scheme description in Section 2.5).

South West Regional Traffic Model (SWRTM) Assumptions

- 5.5.5 The base model is for a March 2015 weekday (excluding school holidays and bank holidays). The base model is an average hour model, with the AM model representing an average hour in the period 7am-10am, the inter-peak (IP) an average hour from 10am-4pm, and the PM an average hour from 4pm-7pm.
- 5.5.6 **The model was built using SATURN.**

Base Model Assumptions

- 5.5.7 Based on SWRTM base model and the A303 Sparkford to Ilchester / A358 Taunton to Southfields Stage 1 local traffic models, and represents average March 2015 weekday as per the SWRTM.
- 5.5.8 All model parameters are kept consistent with SWRTM unless stated otherwise in the Combined Modelling and Appraisal Report.
- 5.5.9 The base model will be calibrated in line with WebTAG Unit M3.1²².

²² Department for Transport (January 2014) TAG Unit M3.1: Highway Assignment Modelling [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment-modelling.pdf (last accessed August 2017).

Forecast Model Assumptions

- 5.5.10 An Opening Year of 2023 and a Design Year of 2038 will be used.
- 5.5.11 An Uncertainty Log covering future network and developments will be formed using the Uncertainty Work generated as part of the early assessment work and any updates received from Local Authorities and Highways England.
- 5.5.12 Forecast car and rail growth are based on TEMPRO 7.2 and Light Good Vehicle (LGV) / Heavy Goods Vehicle (HGV) growth are derived using Road Traffic Forecasts (RTF) 2015²³. Development trip generation is based on TEMPRO and TRICS. Variable Demand Modelling (VDM) is consistent with WebTAG M2²⁴ and based on DIADEM/HEIDI as per the SWRTM.

5.6 Significance Criteria

- 5.6.1 The output of the environmental assessment is to report the likely significance of effects using established significance criteria, as presented within the DMRB Volume 11, Section 2, Part 5²⁵. This requires an assessment of the receptor or resource's environmental value (or sensitivity) and the magnitude of project's impacts (change).
- 5.6.2 The DMRB states that the approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. For some factors, predicted effects may be compared with quantitative thresholds and scales in determining significance. Each environmental assessment chapter within the ES will describe the specific thresholds/criteria used to determine value/magnitude/sensitivity and will align within the general methodology described within this section.
- 5.6.3 Assigning each effect to one of the five significance categories enables different environmental factor issues to be placed upon the same scale, to assist the decision-making process at whatever stage the project is at within that process. These five significance categories are set out in Table 5.2 below.

²³ Department for Transport (2015) Road Traffic Forecasts 2015 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/411471/road-traffic-forecasts-2015.pdf (last accessed August 2017).

²⁴ Department for Transport (March 2017) TAG Unit M2: Variable Demand Modelling. [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/603266/webtag-tag-unit-m2-variable-demand-modelling-march-2017.pdf (last accessed August 2017).

²⁵ Highways England (2008) DMRB Volume 11, Section 2, Part 5 HA 205/08 'Assessment and Management of Environmental Effects'.

Table 5.2: Descriptions of the Significance of Effect Categories

Significance Category	Typical Descriptors of Effects
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are very important considerations and are likely to be material in the decision-making process
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds or variation or within the margin of forecasting error.

Source: DMRB Volume 11, Section 2, Part 5, Table 2.3

- 5.6.4 The environmental value will be identified for each of the receptors identified within the individual environmental factor that have been carried forward from the Scoping exercise for further environmental assessment, along with the magnitude of change. Five significance categories can result from the assessment, as defined in Table 5.3. It is important to note that significance categories are required for positive (beneficial) as well as negative (adverse) effects. The greater the magnitude of impact, the more significant the effect. For example, the consequences of a highly valued environmental resource suffering a major detrimental impact would be a significant adverse effect. Impacts that are Moderate Beneficial/ Adverse or above will be considered significant.

Table 5.3: Assessing Significance of Potential Effects

		Magnitude of Potential Impact (Degree of Change)				
Environmental Value (Sensitivity)		No change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: DMRB Volume 11, Section 2, Part 5, Table 2.4

5.7 Duplication of Assessment

- 5.7.1 The ES will be prepared with reference to environmental assessment that has been carried out, or is ongoing, for nearby Schemes. In this way, duplication of assessment or survey effort can be avoided and consistency of approach, unless Scheme-specific factor determine otherwise, can be assured. See Chapter 16 Combined and Cumulative Effects, for further details.

5.8 Proposed Structure of the Environmental Statement

- 5.8.1 The ES will comprise four volumes:

- Volume 1 – Non-Technical Summary;
- Volume 2 – Main ES Text;
- Volume 3 – ES Figures; and,
- Volume 4 – ES Appendices.

- 5.8.2 Volume 2 of the ES is currently anticipated to be structured as below, subject to further discussion with the Statutory Environmental Bodies (SEBs):

- Chapter 1 – Introduction;
- Chapter 2 – The Scheme;
- Chapter 3 – Assessment of Alternatives;
- Chapter 4 – Consultation;
- Chapter 5 – Environmental Assessment Methodology;
- Chapter 6 – Air Quality;
- Chapter 7 – Cultural Heritage;
- Chapter 8 – Landscape and Visual Effects;
- Chapter 9 – Geology and Soils;
- Chapter 10 – Biodiversity;
- Chapter 11 – Materials;
- Chapter 12 – Noise and Vibration;
- Chapter 13 – People and Communities;
- Chapter 14 – Road Drainage and the Water Environment;
- Chapter 15 – Climate;
- Chapter 16 – Combined and Cumulative Effects;
- Chapter 17 – Conclusions; and,
- Chapter 18 – Glossary.

- 5.8.3 A number of plans would be produced that would support the preparation of the ES and the results presented therein and would also be a mechanism for securing the required mitigation. These are likely to include:

- An Outline Environmental Management Plan (OEMP); and,
- Environmental Masterplan.

6 Air Quality

6.1 Introduction

- 6.1.1 This chapter presents the baseline air quality in the vicinity of the Scheme and describes the proposed approach for the assessment of air quality.
- 6.1.2 This chapter has been prepared in accordance with the requirements of the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 4 (HA 204/08)²⁶, DMRB Volume 11, Section 3, Part 1 (HA 207/07)²⁷, and associated Interim Advice Notes (IANs), namely IANs 170/12v3²⁸, 174/13²⁹, 175/13³⁰ and 185/15³¹, with assessment undertaken to a Scoping level. This chapter encompasses two sub-topics, as follows:
- Local air quality – concerned principally with emissions of pollutants that are of concern in relation to human health and ecosystems, at a local level; and,
 - Regional air quality – concerned with total emissions of pollutants that can disperse over longer distances, affecting both human health and ecosystems.
- 6.1.3 The relevant air quality objectives and limit values are described and how the assessment be undertaken in accordance with the National Policy Statement for National Networks (NPSNN)³².
- 6.1.4 The potential requirement for further assessment to either DMRB Simple or Detailed level will be identified within this chapter. Where necessary, further assessment will be presented within the Environmental Statement (ES).

²⁶ Highways England (2008) DMRB Volume 11 Section 2 Part 4 HA204/08 'Scoping of Environmental Impact Assessments'.

²⁷ Highways England (2008) DMRB Volume 11 Section 2 Part 1 HA207/07 'Air Quality'.

²⁸ Highways England (2013) IAN 170/12 v3 'Updated air quality advice on the assessment of future Nos and NO2 projections for users of DMRB Volume 11, Section 2, Part 1 Air Quality' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170v3.pdf> (last accessed October 2017).

²⁹ Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

³⁰ Highways England (2013) IAN 175/13 'Updated air quality advice on risk assessment related to compliance with the EI Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 Air Quality' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf> (last accessed October 2017).

³¹ Highways England (2015) IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11 Section 3 Part 1 Air Quality and Volume 11 Section 3 Part 7 Noise' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf> (last accessed October 2017).

³² Department for Transport (2015) National Policy Statement for National Networks [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed September 2017).

6.2 Study Area

- 6.2.1 The study area for the local air quality assessment covers human health receptors and nationally designated ecological sites within 200m of roads that are likely to be affected by the Scheme.
- 6.2.2 Under DMRB Volume 11, Section 3, Part 1(HA 207/07)³³, affected roads are defined where:
- Road alignment will change by 5m or more; or,
 - Daily traffic flows will change by 1,000 ADT or more; or,
 - Heavy Duty Vehicle (HDV) flows will change by 200 Annual Average Daily Traffic (AADT) or more; or,
 - Daily average speed will change by 10km/hr or more; or,
 - Peak hour speed will change by 20km/hr or more.
- 6.2.3 The local air quality assessment involves estimating the change in pollutant concentrations at sensitive receptors resulting from the operation of the Scheme. The regional air quality assessment assesses the change in emissions resulting from the Scheme. This is required as emissions not only affect local air quality, but also affect regional, national and international scale. Affected roads for the assessment of regional air quality include those that meet the following criteria:
- A change of more than 10% AADT; or,
 - A change or more than 10% to the number of HDVs; or,
 - A change in the daily average speed of more than 20km/hr.
- 6.2.4 While traffic forecasts are currently unavailable as they are being updated, the affected road network (ARN) identified for previous environmental assessment undertaken during option selection covered a 90km section of the A303 from Winterbourne Stoke to Buckland St Mary. Due to the nature of the updates which will be applied to traffic forecasts (mostly updating the committed developments within the uncertainty log), it is anticipated the ARN for the proposed Scheme will cover a similar extent to that used previously.

6.3 Baseline Conditions

- 6.3.1 Information on air quality in the UK to inform this chapter has been obtained from a variety of sources including Local Authorities, national network monitoring sites and other published sources. For this assessment, data has been obtained from South Somerset District Council, Department for Environment, Food and Rural Affairs (Defra), and Highways England. The most recent full year of bias adjusted monitoring data available from South Somerset District Council is for 2016.

³³ Highways England (2008) DMRB Volume 11 Section 2 Part 1 HA207/07 'Air Quality'.

Local Authority Review and Assessment

- 6.3.2 In 2002/3, South Somerset District Council declared an Air Quality Management Area (AQMA) in Yeovil due to monitored and modelled exceedances of the nitrogen dioxide (NO₂) annual mean air quality objective. These exceedances were primarily associated with the A30 and A37 but the whole town of Yeovil was declared an AQMA as “a town wide action plan would be required to manage the local and through traffic.”
- 6.3.3 The Yeovil AQMA is located approximately 7km south of the Scheme and in earlier assessments, did not intersect with the ARN for the Scheme developed. Therefore, changes in traffic characteristics that may lead to a significant air quality effect are not expected to occur within Yeovil. This will be reviewed as part of the ES, once the updated traffic data is available.

Automatic Monitoring

- 6.3.4 South Somerset District Council does not currently undertake any automatic monitoring.
- 6.3.5 The nearest automatic monitoring site to the Scheme is the Defra Automatic Urban and Rural Network (AURN) rural background site at Charlton Mackrell, approximately 5km northwest of the Scheme. This monitoring site is considered representative of background concentrations at the Scheme. For the past three years, annual and hourly NO₂ concentrations at this site have been well below their respective objectives.

Diffusion Tube Monitoring

- 6.3.6 South Somerset District Council currently undertakes diffusion tube monitoring at 20 sites to assess compliance with the annual mean NO₂ air quality objective. These monitoring sites are located approximately 7 to 10km south of the Scheme within the Yeovil AQMA. Exceedances of the annual mean NO₂ objective were found at five sites in 2016.
- 6.3.7 A six-month NO₂ diffusion tube monitoring survey was undertaken by Mouchel on behalf of Highways England from January 2016 to June 2016. Monitoring was carried out and reported at 16 locations along roads near the Scheme as well as at the Charlton Mackrell AURN.
- 6.3.8 The Scheme-specific monitoring survey concluded that NO₂ concentrations within the vicinity of the Scheme are well below the annual mean NO₂ air quality objective. The greatest annual mean NO₂ concentration of 29.7µg/m³ was recorded near to a Bed & Breakfast (B&B), on the existing A303.

Defra Projected Background Concentrations

- 6.3.9 Defra provides estimates of background pollution concentrations for nitrogen oxides (NO_x), NO₂ and PM₁₀ across the UK for each 1km grid square, for every year from 2013 to 2030. The maximum background concentrations of NO₂ (7.7µg/m³) and PM₁₀ (16.1µg/m³) for the area covered by the proposed Scheme alignment are well below the respective air quality objectives in the year 2016.

EU Limit Value Compliance

- 6.3.10 Defra's Pollution Climate Mapping (PCM) is used to report compliance with the EU limit values and provides NO₂ concentrations for a number of roads across the UK for the years 2017 to 2030. The PCM model was updated in August 2017 following the release of Defra's Air Quality Action Plan and has a reference year of 2015.
- 6.3.11 Based on roadside NO₂ concentrations projected by the Baseline PCM Model, there are no PCM links within 10km of the proposed Scheme exceeding 40µg/m³ for the year of 2015. The PCM link closest to the proposed Scheme (on the A359, north of Yeovil) predicts a 2015 annual NO₂ concentration of 21µg/m³, which is well below the annual mean limit value of 40µg/m³ for NO₂. The ES will identify ARN links that overlap with the most recent version of the PCM model to assess compliance with the limit values in accordance with IAN 175/1334.

Summary of the Baseline Conditions

- 6.3.12 A summary of the existing baseline for the areas covered by the Scheme alignment with respect to air quality is presented below:
- No AQMAs are located within 200m of the Scheme. The nearest AQMA is 7km south of the Scheme at Yeovil;
 - South Somerset District Council currently undertakes monitoring at 20 NO₂ non-automatic sites in the Yeovil AQMA. The most recent data for these sites found exceedances of the annual mean NO₂ air quality objective at five monitoring sites;
 - There is an AURN monitoring site at Charlton Mackrell, located 5km northwest of the Scheme. This is a rural background monitoring site and has recorded annual and hourly mean NO₂ concentrations for the past three years, which are well below their respective NO₂ air quality objectives;
 - A Highways England diffusion tube monitoring survey found that NO₂ concentrations within the vicinity of the Scheme are well below the annual NO₂ air quality objective;
 - There are no nationally designated ecological sites within 200m of the Scheme. The nearest nationally designated ecological site is Sparkford Wood Site of Special Scientific Interest (SSSI) which is located approximately 1.2km north east of the Scheme; and,
 - There are approximately 200 residential properties within 200m of the Scheme.

³⁴ Highways England (2013) IAN 175/13 'Updated air quality advice on risk assessment related to compliance with the EI Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 Air Quality' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf> (last accessed October 2017).

6.4 Assumptions and Limitations

6.4.1 Air quality modelling predictions will be based on the most reasonable, robust and representative methodologies in accordance with best practice guidance. However, there is an inherent level of uncertainty associated with the screening model predictions, including:

- Uncertainties with traffic forecasts;
- Uncertainties with vehicle emission predictions;
- Uncertainties with background air quality data; and,
- Simplifications made within screening tool calculations or post processing of the data that represent atmospheric dispersion or chemical reactions.

6.4.2 To best manage these uncertainties, the air quality assessment to be undertaken as part of the ES will be verified using the air quality measurements from the Highways England monitoring survey and any local authority or AURN data that is within the ARN study area and has suitable data capture. The verification process will be undertaken in line with Defra's Local Air Quality Management Technical Guidance (TG16)³⁵.

6.5 Guidance and Best Practice

6.5.1 The air quality assessment will take into account the best practice guidance provided by Volume 11, Section 3, Part 1 of DMRB HA207/01³⁶, Defra's TG16³⁷, and the following Interim Advice Notes (IANs) published by Highways England:

- IAN 170/12 'Updated air quality advice on the assessment of Future NO_x and NO₂ projections for users of DMRB Volume 11, Section 3, Part 1, Air Quality'³⁸;
- IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality'³⁹;
- IAN 175/13 'Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of

³⁵ Department for Environment Food and Rural Affairs (2016) Local Air Quality Management Technical Guidance [online] available at: <https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf> (last accessed October 2017).

³⁶ Highways England (2007) DMRB Volume 11 Section 3 Part 1 HA 207/07 'Air Quality'.

³⁷ Defra (2016) Local Air Quality Management Technical Guidance (TG16) [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69334/pb13081-tech-guidance-laqm-tg-09-090218.pdf (last accessed September 2017).

³⁸ Highways England (2013) IAN 170/12 'Updated air quality advice on the assessment of future NO_x and NO₂ projections for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170v3.pdf> (last accessed October 2017).

³⁹ Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)⁴⁰; and,

- IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of traffic data into speed-bands for users of DMRB Volume 11, Section 3 Part 1 Air Quality'⁴¹.

6.5.2 Further updates to the IANs may be published before work commences on the environmental assessment; the assessment will be undertaken in accordance with the latest IANs available at the time.

6.5.3 Table 6.1 below presents the relevant air quality objectives that the Scheme will be assessed against.

Table 6.1: Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Air Quality Objectives and Limit Values		Attainment Date	
		Concentration	Allowance	Air Quality Objectives	EU Limit Values
Nitrogen dioxide (NO ₂)	Annual	40 µg/m ³	-	31 December 2005 ^{(a)(b)}	1 January 2010 ^(c)
	1 Hour	200 µg/m ³	18	31 December 2005 ^{(a)(b)}	1 January 2010 ^(c)
Nitrogen Oxides (NO _x) ^(d)	Annual	30 µg/m ³	-		31 December 2000 ^(c)
Particulates (PM ₁₀)	Annual	40 µg/m ³	-	31 December 2004 ^{(a)(b)}	1 January 2005 ^(c)
	24 Hour	50 µg/m ³	35	31 December 2004 ^{(a)(b)}	1 January 2005 ^(c)

Notes: (a) Air Quality (England) Regulations 2000 as amended in 2002.

(b) Air Quality Strategy 2007.

(c) EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO₂ limit values in some zones/agglomerations.

(d) Designated for the protection of vegetation and ecosystems and referred to as the 'critical level' for NO_x.

⁴⁰ Highways England (2013) IAN 175/13 'Updated air quality advice on risk assessment related to compliance with the EI Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 Air Quality' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf> (last accessed October 2017).

⁴¹ Highways England (2015) IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11 Section 3 Part 1 Air Quality and Volume 11 Section 3 Part 7 Noise' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf> (last accessed October 2017).

6.6 Consultation

- 6.6.1 Initial consultation with South Somerset District Council has been progressed through the key stakeholder engagement exercises (refer to Chapter 4 for further details).

6.7 Potential Impacts

Construction

Human Health and Wellbeing

- 6.7.1 The proposed construction works duration for the Scheme would be approximately two and a half years. The main impacts to sensitive receptors during the construction stage include on-site dust emissions arising from construction activities and vehicle movements. Dust can be mechanically transported (either by wind or re-suspension by vehicles). It can also arise from wind erosion on material stock piles, earth moving etc.

Ecological Effects

- 6.7.2 There are no nationally designated ecological sites within 200m of the Scheme and therefore no air quality effects on ecology from the construction phase are anticipated. However, the potential impacts will be reassessed as part of the ES, once the location of the site compound(s) are known in relation to any nearby designated sites.

Operation

Human Health and Wellbeing

- 6.7.3 The operational phase of the Scheme has the potential to directly affect ambient concentrations of NO₂ and PM₁₀ as:
- The change in road alignment associated with the Scheme has the potential to introduce a new source of traffic pollution within 200m of receptors. There are approximately 200 residential receptors within 200m of the Scheme; and,
 - The Scheme has the potential to affect traffic flows and speeds on the road network, and so affect local and regional air quality beyond the physical extent of the Scheme. While traffic forecasts are currently unavailable, the ARN used for previous environmental assessment work primarily covered a 90km section of the A303 from Winterbourne Stoke to Buckland St Mary.

Ecological Effects

- 6.7.4 As a result of the Scheme, there would potentially be a 'small' increase (as per IAN 174/13⁴²) in NO_x concentrations above the NO_x annual objective in a small area of the Stockton Wood and Down SSSI. Therefore, there is potential for adverse effects to occur at this site as a result of the Scheme.

6.8 Design, Mitigation and Enhancement Measures

Construction

- 6.8.1 To mitigate against construction dust effects at receptors, the Contractor shall carry out construction works in accordance with the Best Practicable Means (BPM), as described in Section 79(9) of the Environmental Protection Act 1990, to reduce emissions which may affect air quality. This could include, but not be limited to, the following mitigation measures that will be included within the Construction Environmental Management Plan (CEMP):

- Avoid double handling of materials;
- Minimise height of stockpiles and profile to minimise wind-blown dust emissions and risk of pile collapse;
- Locate stockpiles out of the wind (or cover, seed or fence) to minimise the potential for dust generation;
- Ensure that all vehicles with open loads of potential dusty materials are securely sheeted or enclosed;
- Provide a means of removing mud and other debris from wheels and chassis of vehicles leaving the site. This may involve a simple coarse gravel running surface or jet wash, or in the case of a heavily used exit point, wheel washers;
- Maintain a low speed limit on site to prevent the generation of dust by fast moving vehicles;
- Damp down surfaces in dry conditions;
- Water should be sprayed during cutting / grinding operations (i.e. cutting kerbs); and,
- All vehicle engines and plant motors shall be switched off when not in use.

Operation

- 6.8.2 No operational air quality specific mitigation measures have been designed into the Scheme, as it is not anticipated that any will be required.

⁴² Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

6.9 Description of the Likely Significant Effects

Construction

Human Health and Wellbeing

- 6.9.1 With the implementation of the mitigation measures described in Section 6.8 above, air quality effects on human health and wellbeing from the construction phase of the Scheme are not likely to be significant. However, an assessment to DMRB Simple level is recommended as part of the ES following receipt of updated traffic data.

Ecological Effects

- 6.9.2 There are no nationally designated ecological sites within 200m of the Scheme and therefore the air quality effects on ecology from the construction phase are unlikely to be significant. However, this will be reassessed once the location of the site compound(s) are known in relation to any nearby designated sites, and an assessment to DMRB Simple level included within the ES.

Operation

Human Health and Wellbeing

- 6.9.3 With the implementation of the mitigation measures, air quality effects to human health and wellbeing during operation are not likely to be significant. However, an assessment to DMRB Simple level is recommended as part of the ES following receipt of updated traffic data.

Ecological Effects

- 6.9.4 Once operational, there is potential for significant effects at Stockton and Wood and Down SSSI as a result of the Scheme. It is recommended that this is further assessed to a DMRB Simple level in the ES using updated traffic data.
- 6.9.5 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

6.10 Proposed Level and Scope of Assessment

- 6.10.1 The scope of assessment during the construction phase will include emissions of NO₂ and PM₁₀ from construction plant and vehicles, and dust arising from construction activities. A qualitative assessment of construction phase effects will be undertaken.
- 6.10.2 For the operational stage effects, a DMRB Simple level assessment will be undertaken, once updated traffic modelling data is available. This has been deemed sufficient as no exceedances of the air quality objectives/EU Limit Values have been identified within the vicinity of the Scheme and the previous

environmental assessment work undertaken indicated that effects were not likely to be significant in accordance with IAN 174/13⁴³.

- 6.10.3 In accordance with DMRB⁴⁴ and IAN 174/13²⁸, further assessment will be undertaken for the Stockton Wood and Down SSSI to assess NOx concentrations and if required, nitrogen deposition rates in the designated site and therefore the likelihood of significant effects at the site.

6.11 Proposed Assessment Methodology including Significance

Construction Phase

- 6.11.1 Key stages of the construction phase and the locations and types of sensitive receptors will be identified in accordance with DMRB 207/07. Appropriate mitigation measures will be identified in accordance with Best Practicable Measures (BPM) which would be incorporated into the CEMP will be identified.
- 6.11.2 If construction traffic is predicted to last for longer than six months, traffic management measures and the effect of additional construction vehicles will be assessed qualitatively.

Operational Phase

- 6.11.3 A Simple level assessment will be undertaken in accordance with the DMRB Volume 11, Section 3, Part 1⁴⁵ and associated IANs (see Section 5.5), and Defra's TG16⁴⁶, which will include:
- An assessment of air quality using ADMS Roads;
 - Verification of model outputs with local monitoring data; and,
 - Prediction of NO₂ and PM₁₀ concentrations in the 'Base Year' and opening year 'Do-Minimum' and 'Do-Something' scenarios at sensitive human health receptors and Designated Sites.
- 6.11.4 For regional air quality effects, the change in mass emissions that would result from the operation of the Scheme will be quantified. Emissions with and without the Scheme will be compared for opening year and design year (Opening year + 15 years) as well as the base year scenario.

Determination of Significant Effects

- 6.11.5 IAN 174/13⁴⁷ provides advice for evaluating significant local air quality effects for public exposure and designated sites. Evaluation of the significance of local

⁴³ Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

⁴⁴ Highways England (2008) DMRB Volume 11 Section 2 Part 1 HA207/07 'Air Quality'.

⁴⁵ Highways England (2008) DMRB Volume 11 Section 2 Part 1 HA207/07 'Air Quality'.

⁴⁶ Defra (2016) Local Air Quality Management Technical Guidance (TG16) [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69334/pb13081-tech-guidance-laqm-tg-09-090218.pdf (last accessed September 2017).

⁴⁷ Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

air quality effects will be undertaken in accordance with IAN 174/13⁴⁸, a summary of which is provided here.

- 6.11.6 Receptors that have a reasonable risk of exceeding an air quality threshold will be assessed in both a Do-Minimum and Do-Something scenario. The difference in pollutant concentration between the two scenarios is used to describe the magnitude of change in accordance with Table 6.2.

Table 6.2: Magnitude of Change Criteria

Magnitude of Change in Concentration	Value of Change in Annual Average NO ₂ and PM ₁₀
Large (>4)	Greater than full MoU value of 10% of the air quality objective (4µg/m ³)
Medium (>2 to 4)	Greater than half of the MoU (2 µg/m ³), but less than the full MoU (4 µg/m ³) of 10% of the air quality objective
Small (>0.4 to 2)	More than 1% of objective (0.4 µg/m ³) and less than half of the MoU i.e. 5% (2 µg/m ³). The full MoU is 10% of the air quality objective (4 µg/m ³)
Imperceptible (<= 0.4)	Less than or equal to 1% of objective (0.4 µg/m ³)

Source: IAN 174/13

Notes: MoU = Measure of Uncertainty (10% of the objective)

- 6.11.7 The number of receptors where changes are greater than imperceptible, and where concentrations exceed the air quality objectives in the Do-Minimum or Do-Something scenario will be compared to the guideline bands presented in Table 6.3.

Table 6.3: Guideline to Number of Properties Constituting a Significant Effect

Magnitude of Change in Concentration	Number of Receptors With:	
	Worsening of air quality objective already above objective or creation of a new exceedance	Improvement of an air quality objective already above objective or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2 to 4)	10 to 30	10 to 30
Small (>0.4 to 2)	30 to 60	30 to 60

Source: IAN 174/13

- 6.11.8 Table 6.3 presents guideline bands, setting an upper level of likely non-significance and a lower level of likely significance, for the number of receptors affected by the Scheme. Between these two levels are the ranges where likely significance is more uncertain, therefore professional judgment would be required. If a scheme is above the lower level of likely significance, consideration should be given to all the evidence that may support or detract

⁴⁸ Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

from the conclusion of a significant effect. The information compiled to complete Table 5.8 will then been used along with the following key criteria to determine the overall evaluation of local air quality significance:

- Is there a risk that environmental standards would be breached?
- Is there a high probability of the effect occurring?
- Would there be a large change in environmental conditions?
- Would the effect continue for a long time?
- Would many people be affected?
- Is there a risk that protected sites, areas, or features would be affected?
- Would it be difficult to avoid, or reduce, or repair, or compensate for the effect?

6.11.9 The Scheme's compliance with EU limit values will be assessed using the latest version of IAN 175/13⁴⁹.

Human Health and Wellbeing

6.11.10 The potential effects to human health and wellbeing will be assessed through the determination of significance of effects as part of the Environmental Statement. This assessment will account for the changes in air quality and where, if any, air quality thresholds specified for the protection of human health are exceeded.

Ecological Effects

6.11.11 The potential effects to Designated Sites will be assessed through the determination of significance of effects as part of the Environmental Statement. If the assessment of predicted NO_x concentrations indicates a potential significant effect at a Designated site, nitrogen deposition rates will be calculated to further evaluate significance. If following this, it is concluded that there may still be a significant effect, a briefing note will be prepared with the Scheme ecologist and submitted to Highways England and Natural England in accordance with IAN 174/13⁵⁰.

6.12 Conclusion

6.12.1 The proposed scope of the ES is contained within Table 6.4, and further summarised in the below text.

⁴⁹ Highways England (2013) IAN 175/13 'Updated air quality advice on risk assessment related to compliance with the EI Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 Air Quality' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf> (last accessed October 2017).

⁵⁰ Highways England (2013) IAN 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf> (last accessed October 2017).

Table 6.4: Proposed Scope of the Air Quality chapter of the ES

Stage	Scoped In	Scoped Out
Construction	<ul style="list-style-type: none"> Human Health and Wellbeing – to DMRB Simple Level. Ecological Effects – to DMRB Simple Level. 	N/A
Operation	<ul style="list-style-type: none"> Human Health and Wellbeing – DMRB Simple Level. Ecological Effects – DMRB Simple Level. 	N/A

- 6.12.2 During construction, air quality effects on human health and wellbeing and ecological effects are not anticipated to be significant. However, an assessment to DMRB Simple level is recommended as part of the ES, following receipt of updated traffic data and confirmation of the location of site compounds in relation to any ecological designated sites.
- 6.12.3 The operational air quality effects on human health and wellbeing will be determined through a DMRB Simple level assessment as part of the ES, as no exceedances of air quality objectives/EU Limit Values were identified within previous environmental assessment work. This will be reviewed once updated traffic data is available and the ARN for the Scheme has been determined.
- 6.12.4 The operational air quality effects on designated sites will be assessed to a DMRB Simple level within the ES with the updated traffic data. If following this assessment there is the potential for significant effects at any designated sites due to exceedances of the NO_x annual mean objective, further assessments of significance (including calculation of nitrogen deposition rates) will be undertaken in accordance with IAN 174/13³⁴.

7 Cultural Heritage

7.1 Introduction

- 7.1.1 This chapter provides an explanation of the likely significant effects of the Scheme upon all heritage assets within the study area, including listed buildings, scheduled monuments, registered parks and gardens, and conservation areas, along with non-designated buildings, historic landscapes, and buried archaeological features and deposits, during both construction and operation.
- 7.1.2 This chapter has been prepared in accordance with DMRB Volume 11, Section 2, Part 4⁵¹, and DMRB Volume 11, Section 3, Part 2⁵², to a Scoping Level. The potential requirement for further assessment to either Simple or Detailed level will be identified. Further assessment will be presented within the Environmental Statement (ES).

7.2 Study Area

- 7.2.1 The cultural heritage assessment is based on a 1km study area. The study area will be agreed with relevant consultees (Historic England, South West Heritage Trust and the South Somerset Conservation Officer) prior to commencement of the ES. This study area allows a full understanding of the context and setting of the heritage assets identified; facilitating an assessment of the potential effects of the Scheme during construction and operation upon heritage assets. The extent of the study area is based upon the guidance provided in DMRB Volume 11, Section 3, Part 2, though the 1km area is larger than that advised in order to include impacts on setting from the erection of new structures.

7.3 Baseline Conditions

Archaeological and Historical Background

- 7.3.1 Information on nationally designated cultural heritage in the UK has been obtained from Historic England's National Heritage List⁵³. For designated and non-designated local heritage assets, the Somerset Historic Environment Record (HER) has been used.

Designated Assets

- 7.3.2 There are two scheduled monuments located within 1km of the Scheme. The scheduled Romano-British settlement immediately south west of Camel Hill Farm is located adjacent to the Scheme, on the northern side of the A303, and the scheduled monument "Medieval settlement remains 100m and 250m north of Downhead Manor Farm" is located 410m to the north.

⁵¹ Highways England (2008) DMRB Volume 11 Section 2 Part 4 HA 204/08 Scoping of Environmental Impact Assessments.

⁵² Highways England (2008) DMRB Volume 11 Section 3 Part 2 HA 208/07 Cultural Heritage.

⁵³ Historic England (2017) The National Heritage List for England [online] available at: <https://www.historicengland.org.uk/advice/hpg/heritage-assets/nhle/> (last accessed October 2017).

7.3.3 There are 90 listed buildings within 1km of the Scheme, comprising:

- Three grade I listed buildings, all churches:
 - Church of All Saints (NHLE 1056769), West Camel, 740m south of the Scheme;
 - Church of St Barnabas (NHLE 1249203), Queen Camel, 730m south of the Scheme; and,
 - Church of St Peter (NHLE 1295400), Podimore, 170m south of the Scheme.
- Six grade II* listed buildings:
 - The Rectory (NHLE 1175050), West Camel, 770m south of the Scheme;
 - Swadel chest tomb, 8 metres to south of the south door of the chancel, Church of St Peter (NHLE 1175211), Podimore, 240m south of the Scheme;
 - Wales Farmhouse (NHLE 1248859), 800m south of the Scheme;
 - Wales Cottages, row of cottages about 10 metres north east of Wales Farmhouse (NHLE 1248860), 780m south of the Scheme;
 - Triumphal arch gateway to Hazlegrove House (NHLE 1272919), 110m east of the eastern end of the Scheme; and,
 - Nash's Farm house, with front boundary wall and gate piers (NHLE 1345993), 630m south of the Scheme, at West Camel.
- 81 grade II listed buildings, including one 19th century milestone (NHLE1345996) which lies directly adjacent to the Scheme. The majority of the remaining 80 listed buildings which are situated within historic settlements, away from the Scheme alignment.

7.3.4 The Scheme would pass through the southern extent of the Hazlegrove House (grade II listed) Registered Park and Garden.

7.3.5 There are two conservation areas located within the study area; West Camel conservation area and Queen Camel conservation area, both on the southern flank of Camel Hill. They lie approximately 575m and 650m respectively from the Scheme.

Non-designated assets

7.3.6 One area of Registered Common Land (The piece of land between All Saint's Church and Parsonage Road) is located 600m to the south of the Scheme.

7.3.7 There are numerous records of archaeological events and finds within 1km of the Scheme, many of which run along the existing A303. For the purpose of reporting the baseline, the description has been limited to outlining the principle assets located within, or directly adjacent to, the proposed Scheme. However, the assessment will not be limited to this, and will consider all assets likely to be affected by the Scheme.

7.3.8 The archaeological aerial survey identified traces of several possible funerary monuments in the area of the Camel Hill Services. The most likely of these is a

possible Bronze Age round barrow in the field opposite the filling station. This lies directly in the line of the Scheme. Previous geophysical survey in the south-eastern part of this field identified traces of what were thought to be three further possible barrow sites, although subsequent trial trenching yielded negative results (HER 11600, 11604).

- 7.3.9 An area of Iron Age settlement to the south-west of Camel Hill Farm (HER 11595) has been identified through geophysical survey and trial trenching on both sides of the A303.
- 7.3.10 The existing A303 roughly follows the line of the Roman road between Ilchester (Roman *Lindinis*), and Andover.
- 7.3.11 An early medieval inhumation cemetery is known at the former quarry site which is now partially occupied by the Camel Hill Services (between the A303 and Gason Lane) (HER 54429). The extent of the cemetery to the north, within the footprint of the Scheme, is unknown.
- 7.3.12 Areas of abandoned medieval and post-medieval settlement at Podimore extend beyond the limits of the current village, especially to the north and south (HER 54802).
- 7.3.13 Extensive areas of medieval (and possibly also post-medieval) ridge and furrow, as well as former field boundaries, are clearly visible across the study area on aerial photographs and lidar. These remains, which comprise both levelled and extant earthworks, were transcribed during the Historic Environment Appraisal aerial survey.
- 7.3.14 By far the most frequent post-medieval assets across the study area are the extensive former limestone quarry sites across the Camel Hill area. The closest historic quarry and limekiln sites to the proposed route are:
 - An area to the west of Camel Hill Farm, on the northern side of the A303. A small roadside portion of this area has subsequently been re-opened as a modern quarry. The Scheme would run alongside the southern edge of this area; and,
 - The area between Camel Hill Farm and Pepper Hill Cottage, on the northern side of the A303, which would be partially overlapped by the Scheme.
- 7.3.15 RNAS Yeovilton, which dates from WWII (HER 55405), lies to the south of the western end of the Scheme. Its northernmost extent lies just to the south of the current A303. The Scheme would partially overlap the northern extent of a former WWII Royal Observer Corp (ROC) radar station on Camel Hill (HER 56969), on the south-eastern side of the junction of the A303 with Traits Lane.
- 7.3.16 Further possible nearby WWII-related sites and features identified by the aerial survey include:
 - 11 rows of rectangular temporary structures alongside the A303 and B3151 roads (towards the western end of the Scheme); and,

- Four possible air raid shelters or bunkers.

Historic Landscape

- 7.3.17 The landscape through which this section of the A303 runs, is largely rural agricultural, comprising a roughly equal combination of anciently enclosed land modified between the 17th and 19th centuries, land enclosed between the 17th and 19th centuries, and land enclosed between the 18th and 21st centuries. There is a pocket of land enclosed prior to the 17th century, to the south of the scheduled monument at Downhead Manor. Pockets of woodland (replanted and semi-natural) are spread throughout the study area.

7.4 Assumptions and Limitations

- 7.4.1 The site visit undertaken was restricted to external visual inspection from publicly assessable areas only.
- 7.4.2 Non-intrusive or intrusive archaeological surveys have not been undertaken across the study area specifically for this Scheme; therefore, the archaeological potential along the Scheme cannot be considered to have been fully examined or determined as yet.
- 7.4.3 Non-designated built heritage assets are often not identified in HER data or other desk based resources. As such the extent of non-designated heritage assets along the Scheme cannot be considered to have been fully examined or determined as yet.
- 7.4.4 The assessment is based upon the preferred route alignment only. Detailed design is currently being progressed and will include associated features such as compound locations, drainage and landscaping. As such further development has the potential to alter the predicted effects of the construction and operation of the Scheme.
- 7.4.5 Information provided by HERs can be limited because it depends on random opportunities for research, fieldwork, and discovery. Where nothing of historic interest is shown in a particular area; this can be down to a lack of targeted research or investigation rather than the genuine absence of sub-surface archaeological deposits.
- 7.4.6 Documentary sources are rare before the medieval period, and many historic documents are inherently biased. Older primary sources often fail to accurately locate sites and interpretation can be subjective.
- 7.4.7 Where archaeological sites have been identified solely from aerial imagery without confirmation from archaeological excavation or supporting evidence in the form of find-spots etc., it is possible the interpretation may be revised in the light of further investigation. It should be noted that the absence of indications of archaeological features on aerial imagery does not confirm an absence of sub-surface archaeological deposits, as visibility from the air is dependent upon a complex combination of factors. These include:

- Unsuitable conditions at the time of image capture (such as lighting, ground moisture content and crops or other ground cover);
- Variable quality of photography;
- Variable type of photography, i.e. purpose-flown oblique imagery taken for archaeological purposes or 'blanket' vertical aerial photography which is usually at a much smaller scale; and,
- Underlying features being masked by alluvial build-up.

7.5 Guidance and Best Practice

7.5.1 The method for determining and appraising baseline conditions involved a desk-based study and was undertaken in accordance with the published standards and guidance set out below:

- DMRB Volume 11, Section 3, Part 2 Cultural Heritage;
- Historic England (2008) Conservation Principles: Policies and Guidance;
- Historic England (2015) Historic Environment Good Practice Advice in Planning Note 2 (GPA2) - Managing Significance in Decision-Taking in the Historic Environment;
- Historic England (2015) Historic Environment Good Practice Advice on Planning Note 3 (GPA3) - The Setting of Heritage Assets; and,
- Chartered Institute for Archaeologists (2017) Standard and Guidance for archaeological desk-based assessments.

7.5.2 If these become superseded during the assessment the most up to date guidance will be used.

7.6 Consultation

7.6.1 Consultation has been carried out with Historic England and the South West Heritage Trust as part of the key stakeholder engagement exercises (refer to Section 4.1). Consultation with the following stakeholders specifically regarding Hazlegrove House (grade II listed) Registered Park and Garden has also been undertaken:

- South Somerset District Council Conservation Officer;
- South Somerset District Council Landscape Architect;
- The Gardens Trust (formerly The Garden History Society, statutory consultee for registered parks and gardens);
- Historic England Inspector of Ancient Monuments;
- Historic England Heritage at Risk Landscape Architect; and,
- South West Heritage Trust (Archaeological Advisors to the Local Planning Authority).

7.6.2 The stakeholders were provided with information on the proposed Scheme options via the public consultation website, and were invited to a meeting on-site at Hazlegrove House registered park and garden on 22 March 2017. The Gardens Trust was to be represented at this meeting, but unfortunately the

representative was unable to attend at short notice. The South West Heritage Trust consultees chose not to attend this meeting, as it was focussed on the registered park and garden itself. This meeting was a preliminary discussion ahead of the non-statutory public consultation phase on this Scheme.

- 7.6.3 Consultation with Historic England and the South West Heritage Trust was undertaken in August 2017 regarding the geophysical survey.

7.7 Potential Impacts

Construction

- 7.7.1 The presence of construction plant, materials, machinery, construction compounds and the provision of construction lighting would potentially have direct adverse effects to the setting of both designated and non-designated assets during construction. These include Hazlegrove House (grade II listed) registered park and garden, with construction activities located within the southern third of the grounds, as well as to scheduled monuments and listed buildings within close proximity. A grade II listed early 19th century milestone would likely need relocating during construction to facilitate the works, which would result in a direct adverse effect due to the loss of this structure within the area and a change to the setting.
- 7.7.2 Additionally, construction activities would result in potential direct adverse effects on below ground archaeological remains from the prehistoric period onwards as they would be removed or truncated by any excavation work.

Operation

- 7.7.3 Below ground archaeological deposits would not be affected by the operation of the Scheme, and therefore no operational effects would be anticipated.
- 7.7.4 The presence of faster-moving traffic would have the potential to adversely affect the setting of some heritage assets, including listed buildings / structures, non-designated built heritage, as well as the Hazlegrove House (grade II listed) registered park and garden.

7.8 Design, Mitigation and Enhancement Measures

Construction

- 7.8.1 Where effects to heritage assets are unavoidable, mitigation would be included during the preliminary and detailed design. For setting effects this may include planting, screening, noise attenuation and appropriate lighting, with the aim of reducing the impact on heritage assets in the vicinity. Effects (both physical and setting) may be mitigated through alteration of the scheme design, or elements of it, such as the placement of bunds, drainage, ponds, landscaping, and planting. Preserving archaeological remains in-situ would be explored during the design process. Best practice measures to limit impacts on heritage assets would be employed during construction through the implementation of a Construction Environmental Management Plan (CEMP).

Operation

- 7.8.2 There are opportunities for enhancement measures to improve the setting of designated heritage assets, such as from the positive effect of screening vegetation. As noted above, measures such as the placement of bunds, noise attenuation screening and appropriate lighting would also contribute to both mitigation of the proposed changes, as well as the improvement of the current setting of designated heritage assets.

7.9 Description of the Likely Significant Effects

Construction

- 7.9.1 During construction, there is the potential for significant adverse effects to the setting of both designated and non-designated heritage assets, including Hazlegrove House (grade II listed) registered park and garden.
- 7.9.2 There is also the potential for significant adverse effects upon below-ground archaeology during construction.

Operation

- 7.9.3 Once operational, there is the potential for significant adverse effects upon the setting of designated and non-designated heritage assets.
- 7.9.4 Below-ground archaeological remains would not be affected by the operation of the Scheme, and therefore no operational effects would be anticipated and will be scoped out of the ES.
- 7.9.5 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

7.10 Proposed Level and Scope of Assessment

- 7.10.1 The ES will include an assessment of the construction effects due to the potential for significant effects upon buried archaeological remains. The ES will also include an assessment for the temporary setting effects on designated and non-designated heritage assets from construction activity including the presence of worksites and associated noise.
- 7.10.2 In addition, due to the presence of sensitive receptors within close proximity of the proposed Scheme, further assessment of operational effects is also required due to the potential for setting effects from visual intrusion and increased noise.
- 7.10.3 This assessment will be undertaken to a DMRB Detailed level and will be used to inform the design of an historic environment strategy. The Detailed assessment will include the results of a geophysical survey, which is likely to be followed by a trial trench evaluation. It is proposed that these surveys would be carried out prior to DCO submission and would inform the conclusions of the ES.

7.11 Proposed Methodology including Significance

- 7.11.1 The assessment will consider all heritage assets, both designated and non-designated, due to the presence of sensitive receptors within close proximity of the Scheme. These include scheduled monuments, listed buildings, registered parks and gardens, non-designated below-ground archaeological remains, locally recorded historically important buildings, locally important buildings or structure identified during survey work, historic landscapes and conservation areas.
- 7.11.2 This assessment will consider both temporary and permanent construction and operational effects on heritage assets. Temporary effects will be from construction-related activities; whereas permanent effects can be either: physical effects on the integrity of the asset; or effects on the setting.

Assessment of Value/Sensitivity

- 7.11.3 The value/sensitivity of historic environment receptors will be based upon Table 7.1 below. Assessment of value/sensitivity will be based on a combination of designated status and professional judgement. It will consider the Secretary of State's non-statutory criteria for the scheduling of ancient monuments, assessment criteria adopted by Historic England as part of the Monument Protection Programme (MPP), and the Secretary of State's Principles of Selection Criteria for Listed Buildings⁵⁴.
- 7.11.4 It will also recognise that occasionally some heritage assets have a lower or higher than normal value/sensitivity within a local context. Additionally; this assessment process should consider the component of the heritage asset that is being affected, and the ability of the heritage asset to absorb change without compromising the understanding or appreciation of the resource.

Table 7.1: Criteria for Assessing Value/Sensitivity

Value / Sensitivity	Typical criteria
Very High	World Heritage Sites, assets of acknowledged international importance, assets that can contribute significantly to acknowledged international research objectives.
High	Scheduled monuments, grade I and II* listed buildings, grade I and II* registered parks and gardens, registered battlefields, undesignated assets of schedulable quality, undesignated monuments, sites, or landscapes that can be shown to have specific nationally important qualities, and assets that can contribute significantly to national research objectives.
Medium	Grade II listed buildings, grade II registered parks and gardens, conservation areas, undesignated sites of high importance identified through research or survey, monuments or sites that can be shown to have important qualities in their fabric or historical association.
Low	Undesignated assets – buildings, structures, monuments or archaeological sites with a local importance for education or cultural appreciation, and which

⁵⁴ Department for Culture, Media and Sport (2010) Principles of Selection for Listed Buildings [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/137695/Principles_Selection_Listing_1_.pdf (last accessed October 2017).

Value / Sensitivity	Typical criteria
	add to local archaeological and historical research. Very badly damaged assets that are of such poor quality that they cannot be classed as high or medium, parks and gardens of local interest.
Negligible	Heritage resources identified as being of little historic, evidential, aesthetic or communal interest; and resources whose importance is compromised by poor preservation or survival, or by contextual associations to justify inclusion into a higher grade.

Source: Based on DMRB (Volume 11, Section 3. Part 2), 2007

Assessment of Magnitude of Impact

7.11.5 The degree of impact on the heritage asset from the Scheme will be assessed in accordance with the criteria presented in Table 7.2 below.

Table 7.2: Criteria for Assessing the Magnitude of Impact

Magnitude	Criteria
Major	Total loss or fundamental alteration to a heritage asset's significance and/or setting. Addition of new features that substantially alter the setting of a heritage asset.
Moderate	Partial loss or alteration a heritage asset's significance and/or setting. Addition of new features that partially alter setting of a heritage asset to the extent where the significance is impacted.
Minor	Minor loss of an element of a heritage asset and/or its setting. Addition of new features that form largely inconspicuous elements in the setting of a heritage asset to the extent that its significance is slightly impacted.
Negligible	Very minor loss of elements of a heritage asset and/or its setting. Addition of new features that do not alter the setting of a heritage asset.
No Change	No change to the heritage asset.

Source: Based on DMRB (Volume 11, Section 3, Part 2), 2007

Assessment of Significance of Effect

7.11.6 Effects will be evaluated by combining the assessment of both the value/sensitivity (heritage significance) of an asset, with the magnitude of the impact. This allows the prediction of the significance of the effect, as shown in Table 5.2. These effects can be beneficial or adverse; and temporary or permanent, depending on the nature of the development, the mitigation measures, and any enhancement measures proposed. In accordance with DMRB guidance, effects with an assessment of moderate, large or very large are considered to be significant.

7.12 Conclusion

7.12.1 The proposed scope of the ES is contained within Table 7.3, and further summarised in the below text.

Table 7.3: Proposed Scope of the Cultural Heritage chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Below ground archaeological remains – to DMRB Detailed level. Designated and non-designated heritage assets – to DMRB Detailed level.	N/A
Operation	Designated and non-designated heritage assets – to DMRB Detailed Level.	Below ground archaeological deposits.

7.12.2 The construction of the Scheme has the potential to result in significant effects to designated and non-designated heritage assets, including both direct effects as well as effects to the setting due to the presence of worksites, visual and noise intrusion. During construction, there is also the potential for significant physical effects on below-ground archaeological remains.

7.12.3 Due to the presence of sensitive receptors within close proximity of the Scheme and the potential for significant effects, the ES will assess operational effects. Below ground archaeology would not be affected by the operation of the Scheme, and therefore no operational effects would be anticipated and will be scoped out of the ES.

7.12.4 Further assessment to DMRB Detailed level will be carried out and will be presented within the ES.

8 Landscape and Visual Effects

8.1 Introduction

- 8.1.1 This chapter aims to identify the potential for significant effects of the Scheme upon the surrounding landscape and visual amenity. This chapter has been prepared in accordance with DMRB Volume 11, Section 2, Part 4⁵⁵, DMRB Volume 11, Section 3, Part 5⁵⁶, and IAN 135/10⁵⁷, to a Scoping Level. The potential requirement for further assessment to either DMRB Simple or Detailed level will be identified. Further assessment will be presented within the Environmental Statement (ES).

8.2 Study Area

- 8.2.1 To accord with the guidance given in DMRB Volume 11 Section 3 Part 5 Landscape Effects, the study area for the LVIA will extend 1km from the Scheme limits. However, the study area will be extended for any receptors sitting outside of the 1km which have the capacity to experience significant effects as a result of the Scheme (for example, views from Cadbury Castle and St Michael's Hill located on elevated ground affording views to site).

8.3 Baseline Conditions

- 8.3.1 Information relating to the landscape character within the local area is obtained from Natural England's National Character Area (NCA) profiles⁵⁸. Information relating to landscape designations can be found on Natural England's MAGIC interactive map⁵⁹, and local Conservation Areas are identified on SSDC's interactive map⁶⁰. Information relating to the local Public Rights of Way (PRoW) have also been obtained from South Somerset District Council's interactive map⁴.

Landscape Character – National and County Level

- 8.3.2 The Scheme is located within National Character Area (NCA) 140 Yeovil Scarplands. At a county level *The Landscape of South Somerset, 1993, South Somerset District Council*, identifies the Scheme as sitting within Visual Character Region 7 - Central Plain Moors and river basins, Area 3 Lower Lias Clay Vales, Rivers and Floodplains.

⁵⁵ Highways England (2008) DMRB Volume 11 Section 2 Part 4 HA 204/08 Scoping of Environmental Impact Assessments.

⁵⁶ Highways England (2008) DMRB Volume 11 Section 3 Part 5 Landscape Effects.

⁵⁷ Highways England (2010) IAN 135/10 'Landscape and Visual Effects'.

⁵⁸ Natural England (2014) National Character Area profile: 140. Yeovil Scarplands [online] available at: <http://publications.naturalengland.org.uk/publication/5731196449325056?category=587130> (last accessed July 2017).

⁵⁹ Natural England (2017) MAGIC Interactive Map [online] available at: <http://magic.defra.gov.uk/MagicMap.aspx> (last accessed November 2017).

⁶⁰ South Somerset District Council (2017) 'Your Area' Interactive Map [online] available at: <https://www.southsomerset.gov.uk/generic-map/> (last accessed November 2017).

Landscape Baseline- The Local Landscape

- 8.3.3 The local landscape character within the vicinity of the Scheme is heavily rural in character with the A303 forming a significant detracting feature dissecting the landscape as it runs on an east-west axis. Away from the existing A303, farmland dominates with fields of varying shapes and sizes. To the north of the existing A303, an open vale landscape is found with hedgerow field boundaries and woodland plots, some of which are ancient woodland. The low-lying landscape in this area is managed through land drains which cross the area. The open and expansive landscape allows long distance visual connectivity across the vale to gently rising land in the north. Settlement is sparse to the north of the A303 with isolated farmsteads within 1km of the existing A303.
- 8.3.4 To the south of the A303, the ground falls away from the ridgeline to a series of villages which run along the base of the ridge. This includes settlements of West Camel and Queen Camel which are designated conservation areas. A series of listed buildings are also located in these villages and beyond. The River Cam runs along the bottom of the ridgeline passing through open fields as well as local villages. Vegetation is limited to field boundaries in the most part, and traces alongside the River Cam. Arable farming practices dominate the land use elsewhere.

Landscape Designations

- 8.3.5 Relevant landscape designations are highlighted on the plan contained within in Appendix A. Table 8.1 below highlights key designations within the study area and their distance from site.

Table 8.1: Landscape Designations within 1km of the Scheme

Landscape Designations within 1km of the Scheme	Distance from the Scheme
Queen Camel conservation area	Approximately 450m south.
West Camel conservation area	Approximately 650m south.
Hazlegrove House (grade II) registered park and garden	Within the Scheme footprint.
Leland Trail long distance footpath	Approximately 650m south.
Listed buildings	Numerous within 1km; closest within just over 100m.
Scheduled monuments	Camel Hill Farm scheduled monument within 15m of the Scheme. Downhead scheduled monument within approximately 300m of the Scheme.

- 8.3.6 There are no Areas of Outstanding Natural Beauty (AONBs), National Parks, or Heritage Coasts located within 1km of the Scheme.

Visual Baseline

- 8.3.7 The detailed LVIA to be produced as part of the ES will address all potential visual receptors with the potential of experiencing significant adverse effects within the study area. Receptors will include residential properties, PRoW, local roads, schools and recreational facilities. In addition, several elevated views

exist outside of the defined study area, including views from St Michael's Hill to the south of Yeovil, and from Cadbury Castle to the east of the Scheme extent.

8.4 Assumptions and Limitations

- 8.4.1 This assessment scope has been informed by site visits which was restricted to publicly accessible areas only and from the curtilage of private properties/residential receptors.
- 8.4.2 Should construction and/or operational lighting be required as part of the Scheme, a night time assessment would be carried out as part of the ES.

8.5 Guidance and Best Practice

- 8.5.1 Guidance and best practice will be followed to industry standards, with particular reference to:
 - DMRB Volume 11 Section 3 Part 5 Landscape Effects;
 - Interim Advice Note 135/10 Landscape and Visual Effects Assessment⁶¹;
 - Guidelines for Landscape and Visual Impact Assessment⁶²; and,
 - Landscape and Seascape Character Assessments⁶³.

8.6 Consultation

- 8.6.1 In addition to the consultation described within Chapter 4, a Chartered Landscape Architect has been party to consultation with SEBs regarding the potential effects upon Hazlegrove House (grade II) registered park and garden. This included a site visit with landscape and conservation specialists from Historic England and South Somerset District Council where the potential effects and possible mitigation measures of the Scheme was discussed.
- 8.6.2 Specific consultation with South Somerset District Council will be required as part of the ES, to identify and agree key views and develop a robust landscape design and mitigation strategy for the Scheme. However, it should be noted that the National Trust, Historic England and a representative from South Somerset District Council have already noted the importance to consider several elevated viewpoints outside of the study area, which were subsequently visited during a site visit in March 2016. These viewpoints will continue to be included in the upcoming detailed LVIA to be included as part of the ES.

⁶¹ Highways England (2010) Interim Advice Note 135/10 Landscape and Visual Effects Assessment.

⁶² Landscape Institute and the Institute for Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment.

⁶³ Natural England and Defra (2014) Guidance: Landscape and Seascape character assessments [online] available at: <https://www.gov.uk/guidance/landscape-and-seascape-character-assessments> (last accessed October 2017).

8.7 Potential Impacts

Construction

Visual Effects

- 8.7.1 Clearance of vegetation during construction has the potential to directly alter the visual baseline for visual receptors as a result of the Scheme. The removal of trees and screening vegetation may result in the opening up of views of the road to nearby receptors, including a number of residential properties and PRow users, with the potential for adverse visual effects during construction. In addition, there would be the potential for adverse effects to receptors that have elevated far reaching views, such as from St Michael's Hill to the south of Yeovil, and from South and North Cadbury. There would also be the potential for adverse direct visual effects afforded by road users during construction.

Landscape Character

- 8.7.2 The presence of construction plant, materials, machinery, construction compounds and the provision of construction lighting would potentially have a direct adverse effect on the local landscape character for a temporary period, due to the existing setting comprising a predominantly rural undeveloped landscape interspersed with individual farm house dwellings and small villages. Similarly, the removal of vegetation, such as from woodland areas where it is required to facilitate the works, has the potential to create direct adverse effects on the local landscape character within the study area.

Operation

Visual Effects

- 8.7.3 Due to the sensitivity of visual receptors within a predominantly rural setting, the introduction of the Scheme has the potential for adverse effects. These would be as a result of the removal of existing vegetation, the introduction of a dual carriageway, associated infrastructure, and passing traffic.

Landscape Character

- 8.7.4 During operation, the introduction of highway features associated with the Scheme would be at odds with the wider landscape character. There would also be a loss of existing landscape features such as vegetation which would further result in adverse effects upon the local landscape character.

8.8 Design, Mitigation and Enhancement Measures

Construction

- 8.8.1 Mitigation measures of relevance during construction, to be included within the Construction Environmental Management Plan (CEMP) include the following:
- Keeping a well ordered and tidy site, including keeping stockpiles to a minimum, with delivery of goods on an as needed basis;

- Works should be limited to daylight hours in the most part, with any night works to be kept to a minimum;
- Minimal, low level and directional lighting should be used for compound security and night works, whilst successfully meeting safety requirements; and,
- Existing trees and vegetation to be retained should be protected during the construction phase with protective fencing, where deemed necessary and should be in accordance with BS 5837:2012.

Operation

- 8.8.2 Design interventions to limit operational effects would include the lowering of the vertical alignment of the route including junctions, wherever practicable, keeping the Scheme settled within the surrounding landscape as much as possible. This could be strengthened with the use of earth bunds as appropriate, as well as planting to aid the integration of the Scheme with the surrounding landscape. Native hedgerows, hedgerows with trees, and blocks of planting would sit well within the vernacular land cover, reducing the visibility of the Scheme.
- 8.8.3 Lighting columns, whilst only proposed at key junctions, should be kept to a minimum height and be directional to minimise impact on nearby properties and the wider night sky.
- 8.8.4 Finally, any new structures should have a low solid to void ratio and consideration given to colour, form, and materials to minimise the visual prominence of these new features.
- 8.8.5 Enhancement measures for landscape and visual effects will be considered as part of the Detailed assessment within the ES.

8.9 Description of the Likely Significant Effects

Construction

Visual Effects

- 8.9.1 During construction, there is the potential for significant adverse visual effects to receptors within the 1km study area, as well as elevated far reaching views beyond (this would include but not be limited to residential receptors, PRoW, and road users), with mitigation measures in place as described in Section 8.8. Further assessment will be undertaken as part of the ES.

Landscape Character

- 8.9.2 There is the potential for significant adverse effects upon the local landscape character for a temporary period during construction, with mitigation measures in place as described in Section 8.8. Further assessment will be undertaken as part of the ES.

Operation

Visual Effects

- 8.9.3 Once operational, there is the potential for significant adverse effects to visual receptors as a result of the Scheme. Mitigation such as screening planting and earth bunds (as described in Section 8.8) may go some way to minimise visual effects for the proposed Scheme, but it is not considered that this would provide adequate screening until Year 15 when planting has matured. Further assessment will be undertaken as part of the ES.

Landscape Character

- 8.9.4 Once operational, there is the potential for significant adverse effects upon the landscape character. Mitigation such as screening planting and earth bunds, as well as the re-introduction of landscape features lost during construction, for example hedgerow field boundaries (see Section 8.8 for further information), may go some way to integrating the Scheme within the local landscape. Significant adverse effect anticipated in the initial years of operation would reduce over time as mitigation planting establishes. Further assessment will be undertaken as part of the ES.
- 8.9.5 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

8.10 Proposed Level and Scope of Assessment

- 8.10.1 Given that significant effects upon both landscape character and visual amenity are likely during both construction and operation, the Scheme meets the criteria set out in IAN 135/10 Landscape and Visual Effects Assessment. It is therefore considered necessary to undertake an assessment to DMRB Detailed level to better understand the potential effects.

8.11 Proposed Methodology including Significance

- 8.11.1 No single prescribed methodology exists for assessing landscape and visual effects; however, the assessment will follow best practice guidelines as set out in Section 8.5 above.
- 8.11.2 A desktop study and walkover survey will be undertaken to review and update the baseline information gathered in previous assessments. This will clarify both the study area and zone of theoretical visibility (ZTV), and allow the project Landscape Architect to undertake a local character assessment to understand the landscape value and associated sensitivity to change of each character area.
- 8.11.3 The significance of effect upon landscape character will consider the combination of the magnitude of change against the quality, value and sensitivity to change of the affected landscape.

8.11.4 The criteria for assessing landscape sensitivity is presented in Table 8.2, and the criteria for assessment magnitude of impact on landscape is presented in Table 8.3.

Table 8.2: Criteria for Assessing Landscape Sensitivity

Potential Value	Typical Descriptors
High	<p>Landscapes, which by nature of their character, would be unable to accommodate change of the type proposed. Typically, these would be:</p> <ul style="list-style-type: none"> • Of high quality with distinctive elements and features making a positive contribution to character and sense of place; • Likely to be designated e.g. National Park and AONB, but the aspects which underpin such value may also be present outside designated areas, especially at the local scale; • Areas of special recognised value through use, perception or historic and cultural associations; and, • Likely to contain features and elements that are rare and could not be replaced.
Moderate	<p>Landscapes, which by nature of their character, would be able to partly accommodate change of the type proposed. Typically, these would be:</p> <ul style="list-style-type: none"> • Comprised of commonplace elements and features creating generally unremarkable character but with some sense of place; • Locally designated, or their value may be expressed through non-statutory local publications; • Containing some features of value through use, perception or historic and cultural associations; and, • Likely to contain some features and elements that could not be replaced.
Low	<p>Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically, these would be:</p> <ul style="list-style-type: none"> • Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place; • Not designated; • Containing few, if any, features of value through use, perception or historic and cultural associations; and, • Likely to contain few, if any, features and elements that could not be replaced.

Source: IAN 135/10

Table 8.3: Criteria for Assessing Magnitude of Impact on Landscape

Magnitude	Description
Major Adverse	Total loss or large-scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements.
Moderate Adverse	Total loss or large-scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements.
Minor Adverse	Slight loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
Negligible Adverse	Barely noticeable loss or damage to existing character of features and elements, and/or the addition of new but uncharacteristic features and elements.
No Change	No noticeable loss, damage or alteration to character or features or elements.
Negligible Beneficial	Barely noticeable improvement of character or views by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Minor Beneficial	Slight improvement of character or views by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Moderate Beneficial	Partial or noticeable improvement of character or views by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.
Major Beneficial	Large scale improvement of character or views by the restoration of existing features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.

Source: IAN 135/10

- 8.11.5 Likewise, visual receptors will be visited to identify the nature of existing view and the likely magnitude of change upon that receptor as result of the Scheme.
- 8.11.6 Visual effect significance will be determined by combining the sensitivity of the visual receptor, in conjunction with the magnitude of change, using Table 8.5. Magnitude will be assessed on the basis of the scale of the change in view, as well as the duration and distance of visual receptors concerned from the proposed works.
- 8.11.7 The criteria for assessing visual sensitivity is presented in Table 8.4 and the criteria for assessment magnitude of impact on visual amenity is presented in Table 8.5.

Table 8.4: Criteria for Assessing Visual Sensitivity

Sensitivity	Typical Receptors
High	Residential properties. Users of PROWs or other recreational trails (e.g. National Trails, footpaths, bridleways etc.). Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. Country Parks, National Trust or other access land etc.).
Moderate	Outdoor workers. Users of scenic roads, railways or waterways or users of designated tourist routes. Schools and other institutional buildings, and their outdoor areas.
Low	Indoor workers. Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes. Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).

Source: IAN 135/10

Table 8.5: Criteria for Assessing Magnitude of Impact on Visual Amenity

Magnitude	Description
Major	The project, or a part of it, would become the dominant feature or focal point of the view.
Moderate	The project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	The project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible	Only a very small part of the project would be discernible, or it is at such a distance that it would form a barely noticeable feature or element of the view.
No Change	No part of the project, or work or activity associated with it, is discernible.

Source: IAN 135/10

8.12 Conclusion

8.12.1 The proposed scope of the ES is contained within Table 8.6, and further summarised in the below text.

Table 8.6: Proposed Scope of the Landscape and Visual Effects chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Visual Effects – DMRB Detailed Level Landscape Character – DMRB Detailed Level	N/A
Operation	Visual Effects – DMRB Detailed Level Landscape Character – DMRB Detailed Level	N/A

8.12.2 Given that significant effects upon both landscape character and visual amenity are likely during both construction and operation, the Scheme meets the criteria set out in IAN 135/10 Landscape and Visual Effects Assessment. It is therefore considered necessary to undertake further assessment to a DMRB Detailed

level to better understand the potential effects, and this will be presented within the ES.

9 Geology and Soils

9.1 Introduction

- 9.1.1 This chapter assesses the geology and soils issues (including contaminated land) which may affect, or may be affected by, the construction and operation of the proposed Scheme. This chapter has been prepared in accordance with DMRB Volume 11, Section 2, Part 4⁶⁴, DMRB Volume 11, Section 3, Part 11⁶⁵, to a Scoping Level.
- 9.1.2 The potential requirement for further assessment to either Simple or Detailed level will therefore be identified. Where required, this will be presented within an Environmental Statement (ES).
- 9.1.3 The effects of the Scheme upon agricultural land has been assessed in Chapter 13 People and Communities and this is therefore not considered in detail within this chapter.

9.2 Study Area

- 9.2.1 No study area for Geology and Soils are specified in DMRB Volume 11 Section 3 Part 11⁶⁶ and therefore the study area used for this chapter and proposed for the Environmental Statement has been defined through professional judgement, based on the type and scale of the Scheme and the context of the surrounding area.
- 9.2.2 In general, the study area for this assessment considers features within 500m of the Scheme, however for hydrogeological and hydrological features with the potential for further-reaching impacts, a wider area is considered to be more appropriate. For example, where there are features that may be affected by pollutants transported downstream of the works, these features would be included in the assessment as appropriate. Additionally, for groundwater the potential zone of impact during construction and operation phases will be assessed on the underlying Water Framework Directive (WFD) groundwater body.

9.3 Baseline Conditions

- 9.3.1 Information to inform this assessment chapter has been obtained from the Geology of Britain viewer⁶⁷, and agricultural land use information from the Ministry of Agriculture, Fisheries, and Food (MAFF). The Somerset Environmental Records Centre (SERC) data request (June 2017) also provided information on the Local Geological Sites (LGSs) within the vicinity of the Scheme.

⁶⁴ Highways England (2008) DMRB Volume 11 Section 1 Part 4 HA 204/08 'Scoping of Environmental Impact Assessments'.

⁶⁵ Highways England (2008) DMRB Volume 11 Section 3 Part 11 'Geology and Soils'.

⁶⁶ Highways England (2008) DMRB Volume 11 Section 3 Part 11 'Geology and Soils'.

⁶⁷ British Geological Survey (2017) Geology of Britain Interactive Map [online] available at: <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> (last accessed November 2017).

- 9.3.2 An additional source of information used to inform this chapter is the A303 Sparkford to Ilchester Preliminary Sources Study Report (PSSR): This report included the summary of information from a large number of historic reports available from the Highways Agency Geotechnical Data Management System (HAGDMS) website⁶⁸ along with a review of previous Ground Investigation (GI) broadly located adjacent to the Scheme (as it generally follows the existing road), a Landmark Envirocheck Report, and an unexploded ordnance (UXO) pre-desk study assessment of the route by Zetica. Observations from a site walkover carried out on 22 and 23 March 2016 are also incorporated into this study.

Area-Wide Baseline Conditions

Geographical Setting

- 9.3.3 The area is dominated by the east-west trending ridge of Camel Hill formed by the relatively resistant beds of the White Lias and the Blue Lias. Surrounding Camel Hill are the relatively flat, low lying Vales of Sparkford and Ilchester⁶⁹.

Geological Setting

Superficial Deposits

- 9.3.4 According to BGS mapping^{70,71}, superficial deposits located along the proposed Scheme are limited. A broad east-west trending ribbon of Alluvium (clay, silt, sand and gravel) is present to the north of the existing A303.
- 9.3.5 A small area of River Terrace deposits (sand and gravel) is shown 500m west of Sparkford on BGS mapping. This is indicated to underlie the easternmost section of the Scheme.
- 9.3.6 River Terrace deposits are also potentially present at Podimore, south of the existing A303.

⁶⁸ Highways England (2017) Highways Agency Geotechnical Data Management System (HAGDMS) [online] available at: <https://data.gov.uk/dataset/highways-agency-geotechnical-data-management-system-hagdms> (last accessed October 2017).

⁶⁹ OS Explorer (2015) 1:25,000 Scale Sheet 129: Yeovil and Sherborne – Somerton and Wincanton. ISBN 9780319243251.

⁷⁰ British Geological Survey (1973) Geological Survey of England and Wales 1:63, 360/1:500,000 geological map series, New Series p(Sheet number 296 – Glastonbury), 1:50,000 scale, Solid and Drift [online] available at: <http://www.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=10187> (last accessed October 2017).

⁷¹ British Geological Survey (2017) Online viewer – bedrock and superficial geology and borehole search functions [online] available at: <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> (last accessed October 2017).

Solid Geology

- 9.3.7 BGS mapping^{72,73} indicates the area is principally underlain by solid strata of the Langport Member, Blue Lias Formation and the Charmouth Mudstone Formation (undifferentiated), of the Lias Group consisting of mudstones (previously referred to as the Lower Lias):
- The Langport Member (previously referred to as the Langport Beds or the White Lias) comprise a series of tough cream and buff calcite mudstones with thin interbedded pale grey and buff marls anticipated to be ~6.4m in thickness at Sparkford;
 - The overlying Blue Lias comprises an interbedded sequence of grey and blue-grey limestones and mudstones/shales. At Camel Hill, the Blue Lias is anticipated to be ~7.6m in thickness; and,
 - The Charmouth Mudstone Formation comprises dark grey laminated shales, and dark, pale and bluish grey mudstones with locally concretionary and tabular limestone beds and abundant argillaceous limestone, phosphatic or ironstone nodules in some areas.
- 9.3.8 The BGS⁷⁴ note that much of the Lias has high pyrite and sulphate content. Lias clays also contain variable amounts of the clay mineral smectite, and are hence prone to swelling and shrinking. The Lias Group rocks are recorded as having the highest incidence of landsliding in the UK.
- 9.3.9 In the vicinity of Camel Hill, the current A303 and proposed Scheme area crossed by a small inlier of undifferentiated interbedded mudstone and limestone of the Westbury Formation and the Cotham Member of the Penarth Group (previously known as the Rhaetic Beds). The inlier is bounded to the southern side by an east-west trending normal fault (Camel Hill Fault).
- 9.3.10 The regional inclination of strata is variable across the routes, but broadly inclined to the north.

Coal Mining and Brine Extraction

- 9.3.11 According to the Coal Authority Interactive Map Viewer⁷⁵, historic or current coal mine workings are not present in the vicinity of the Scheme. Brine excavation is not anticipated based on the geology of the surrounding area.

⁷² British Geological Survey (1973) Geological Survey of England and Wales 1:63, 360/1:500,000 geological map series, New Series p(Sheet number 296 – Glastonbury), 1:50,000 scale, Solid and Drift [online] available at: <http://www.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=10187> (last accessed October 2017).

⁷³ British Geological Survey (2017) Online viewer – bedrock and superficial geology and borehole search functions [online] available at: <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> (last accessed October 2017).

⁷⁴ Hobbs, P.R.N., Entwisle, K.L., Northmore, K.J., Sumbler, M.G., Jones, L.D., Kemp, S., Self, S., Barron, M. and Meakin, J.L (2012) Engineering Geology of British Rocks and Soils - Lias Group. British Geological Survey, 323pp. (OR/12/032) (unpublished) [online] available at: <http://nora.nerc.ac.uk/17270/> (last accessed October 2017).

⁷⁵ Coal Authority (2017) Interactive Map Viewer [online] available at: <http://mapapps2.bgs.ac.uk/coalauthority/home.html> (last accessed October 2017).

Hydrogeology

Bedrock

- 9.3.12 According to Environment Agency online mapping⁷⁶, the bedrock geology present across the Scheme (solid strata of the Langport Member, Blue Lias Formation and the Charmouth Mudstone Formation) is classed as a Secondary A Aquifer. The Westbury Formation and the Cotham Member of the Penarth Group are classed as a Secondary B Aquifer.
- 9.3.13 The Scheme is not within a Groundwater Source Protection Zone (SPZ), with the nearest SPZ2 (outer zone) located approximately 3.5km from Sparkford.

Superficial Deposits

- 9.3.14 The overlying drift deposits, where present, are Secondary A Aquifer.

Abstractions

- 9.3.15 There is a lack of abstraction boreholes in the area with only two abstraction licences recorded to the west of Sparkford dating back to 1967 to 1970. It is not known if these abstractions are still active.

Hydrology

- 9.3.16 The proposed route lies within the catchment of the River Cam to the south and the River Cary via Dyke Brook to the north. The River Cam runs approximately 500m to the south in a roughly parallel direction to the west before it joins the River Yeo at a confluence near Yeovilton. Dyke Brook ranges from being around 1200m to 1650m to the north where it flows to the west in a roughly parallel direction and meets with the River Cary.

Foot and Mouth Burial Sites

- 9.3.17 As part of the PSSR consultation was undertaken with the Department for Environment Food and Rural Affairs (Defra) regarding the location of Foot and Mouth burial sites. The State Veterinary Service reported that there were no Foot and Mouth cases within the district and that the nearest burial site is to the west of Taunton.

Unexploded Ordnance

- 9.3.18 A UXO pre-desk study assessment of the route by Zetica (contained within Appendix C of the PSSR (363903-90-110-RE-001-P02) (*Highways England, 2016*) has identified a likely low UXO hazard level.

Scheme Specific Baseline Conditions

- 9.3.19 Baseline data specific to the Scheme alignment can be found in Table 9.1.

⁷⁶ Environment Agency (2017) What's In Your Backyard online viewer [online] available at: <http://apps.environment-agency.gov.uk/wiyby/search%20function> (last accessed October 2017).

Table 9.1: Baseline Data for Geology and Soils

Aspect	Details and Chainage (where applicable)
Geology	<ul style="list-style-type: none"> There are approximately 80 No. relevant exploratory boreholes along the route of the existing A303, which provide information on the ground conditions. Although the eastern half of the proposed Scheme deviates from the existing A303 alignment, along with the supplementary access roads and on/off slips.
	<div>0 - 200 m</div> <ul style="list-style-type: none"> Thin layer of topsoil up to 0.5m thick, underlain by firm to very stiff, grey clay. Some layers contain calcareous shells and concretions, occasional thin beds of slightly laminated mudstone (Lias Group).
	<div>2000 - 3500 m</div> <ul style="list-style-type: none"> Topsoil around 0.3m thick overlying sand and gravel superficial deposits (River Terrace Deposits). Rockhead is recorded at a maximum of 8mbgl with stiff to very hard, grey, silty sometimes shelly clay. The Camel Hill fault crosses the proposed route at a chainage of approximately 3200m with Westbury Formation and Cotham Member limestone beds 100m east of the fault line.
	<div>3500 - 5000 m</div> <ul style="list-style-type: none"> Thin layer of superficial deposits to a max depth of 1.45m bgl, generally described as brown sand and gravel with Blue Lias Formation (limestone) proven to 15mbgl. To the south of the road up to 1 m thick River Terrace Deposits of gravel are recorded.
	<div>500 - 600 m</div> <ul style="list-style-type: none"> Approximately 0.3m thickness of topsoil occasionally underlain by River Terrace Deposits of gravel to a maximum of 0.7m thick. Bedrock comprises Charmouth Mudstone Formation (of Lias Group).
Sites of Geological Interest	<p>There are a number of historic quarries located in close proximity to the current A303 and the Scheme in the vicinity of Camel Hill. The presence or composition of any backfilled materials is unknown.</p> <p>There are two local geological sites in close proximity to the proposed Scheme:</p> <ul style="list-style-type: none"> Camel Hill Quarry East – “Hummocky area in woods” adjacent to the south of the existing A303 at approx. Ch. 4950; and, Sparkford Hill Copse – “Useful sections of Rhaetic Langport Beds in disused quarries in wood owned by the Sparkford Copse Trust” located approximately 350m south-east of the existing A303 just west of the Hazlegrove Junction Roundabout. <p>There are a number of BGS Recorded Mineral Sites in close proximity to the current A303 and the proposed Scheme in the vicinity of Camel Hill. They predominantly relate to Camel Hill Farm and Ridge, Queen Camel. Several of them coincide with the location of historic quarry sites.</p>
Hydrology	<p>Dyke Brook and the River Cam are fed by a number of springs that can be seen on the OS map of the area. Numerous springs are indicated on site mapping and a number of the fields have linear drainage ditches which appear to flow southwards. The Scheme would not cross any major water courses however there are eight existing culverts passing beneath the existing A303.</p>
Soil Survey	<p>Two different soil types are shown along the Scheme. At Ch. 0-2000 m the soil is described as slightly acid, loamy and clayey soils with impeded drainage. From Ch. 2000m to the east, the soil is described as lime-rich loamy and clayey soils with impeded drainage. The Agricultural Land Classification in the vicinity of the proposed Scheme is predominantly Grade 3.</p>

Aspect	Details and Chainage (where applicable)
Landfill Records	<p>Two landfills are located within 500m of the proposed Scheme:</p> <ul style="list-style-type: none"> Land Adjacent to Hazlegrove Park, which accepted inert and household waste from June 1989 to June 1990. The route crosses the southern boundary of the landfill at approximately Ch. 5650m; and, Camel Hill Quarry, which accepted inert and industrial waste from 29 November 1989 to 5 June 1992, which is located to the immediate south of the existing A303 at the approximate Ch. 5050m.
Current Land Use and manmade Features	<ul style="list-style-type: none"> The principal land use throughout the area of interest is agriculture including arable farming and pasture for dairy farming. The principal man-made feature for the Scheme is the existing highway network. An active Shell petrol station is located at approximate Ch. 4700m to the immediate south of the existing A303 while Steart Road Garage with associated underground fuel tanks is located close to the north of the proposed Scheme alignment at Ch. 3300. A filling station is also present south of Hazlegrove Roundabout, to the south of the proposed Scheme. MOD land with a visible array is present immediately to the south of the Scheme alignment at approximate Ch. 4250m. Made Ground has been encountered within boreholes to a maximum depth of 1.4m⁷⁷. Made ground is anticipated with the existing road construction, comprising asphalt over DoT Type 1 sub-base.
Route History	<ul style="list-style-type: none"> The vicinity of the Scheme alignment has comprised generally agricultural land, wooded areas and orchards throughout its history prior to A303 construction. On the earliest mapping (1886), several quarries were indicated to the north and south of the eastern half of the A303. However, the majority of these were no longer marked by 1904 mapping suggesting abandonment/infilling. The filling station to the south of the existing A303 at Ch. 4700 was first marked on 1975 mapping. A garage was also shown to the south of the road at Camel Cross Ch. 2050m on 1975 mapping (now a restaurant). The MOD land at Ch. 4250m was first identified on 1962 mapping. Over time, the surrounding settlements have grown and the number of mapped ponds and springs in the vicinity has risen.
Potential Contamination Risks	<ul style="list-style-type: none"> Infilled historic quarries containing potentially unknown fill present potential soil and groundwater contamination risks. Historic and current fuel stations/garages with underground tanks adjacent to proposed Scheme. Existing landfill site known as 'Land Adjacent to Hazlegrove Park' and the landfill site known as 'Camel Hill Quarry' is located in close proximity to the south. Presence of Made Ground from the construction of the existing A303 and isolated commercial/residential/agricultural uses. MOD site present directly next to the existing A303 at Chainage. 4250, specific details unknown. A historic saw pit is identified along the Scheme at Ch. 5175m.

⁷⁷ British Geological Survey (2017) Mineral resource maps in England and parts of north Wales [online] available at: <https://www.bgs.ac.uk/mineralsuk/planning/resource.html> (last accessed October 2017).

9.4 Assumptions and Limitations

- 9.4.1 The baseline information on the Scheme has been based on a desk study of currently available information at the time of writing.

9.5 Guidance and Best Practice

- 9.5.1 The assessment will be undertaken in accordance with the published standards and guidance, with particular reference to:

- DMRB Volume 11 Section 3 Part 11 'Geology and Soils'⁷⁸;
- Environmental Protection Act 1990 (as amended by the Environment Act 1995); and,
- Environmental Protection (Duty of Care) Regulations 1991 (as amended 2003).

9.6 Consultation

- 9.6.1 Initial consultation with the Environment Agency has been progressed through the key stakeholder engagement exercises which have been undertaken (refer to Chapter 4 for further details). However, specific consultation with the Environment Agency will be necessary to discuss the effect of the Scheme on the landfill sites identified and vice versa.

9.7 Potential Impacts

Construction

- 9.7.1 The Camel Hill Quarry East LGS is located immediately south of the existing A303, and Sparkford Hill Copse LGS is located approximately 140m south-east of the Scheme; however, construction works would not encroach beyond the boundaries of these designations and so adverse effects are unlikely.
- 9.7.2 Excavation works associated with the Scheme (to a maximum depth of approximately 11m) have the potential to result in the permanent removal/sterilisation of any areas of Superficial Alluvium/River Terrace Deposits (and their future use as a potential resource), with the potential for adverse effects. Site construction may also lead to the permanent removal of high quality site soils. In addition, soil deterioration and consolidation may occur due to poor storage and handling or due to vehicle movements and loading, leading to adverse effects.
- 9.7.3 Construction works could result in the potential for surface water runoff to become entrained with sediment or concrete spillages and pollute nearby watercourses or for the discharge of potentially contaminated/sediment laden groundwater to watercourses following dewatering of excavations/foundation works. During foundation works, there is the potential for the creation of contamination pathways/driving down of contaminants presenting a risk to

⁷⁸ Highways England (2008) DMRB Volume 11 Section 3 Part 11 'Geology and Soils'.

groundwater along with the potential for increased turbidity and quality deterioration, which would result in adverse effects.

- 9.7.4 Given the nature of their work, construction and maintenance workers may come into contact with potentially contaminated soils/leachates/ground gases particularly in landfill areas
- 9.7.5 While the linear areas to be re-vegetated after construction are considered to be of low ecological potential, if the soil chemical composition is not suitable for vegetation establishment the strips of land may be left vulnerable to erosion.
- 9.7.6 The Scheme would directly encroach on the southern extent of the historic landfill called 'Land adjacent to Hazlegrove Park'. It is possible for potentially contaminated ground to be directly disturbed, specifically as a result of required earthworks, however, the severity of the contamination will depend on the exact nature of the fill materials. Localised residual contamination from agricultural practices or existing highway usage may also be encountered. Contaminant mobilisation during excavation or remediation activities could potentially cause contamination of soils, groundwater and surface water, particularly in vicinity of historic landfilling and former (potentially infilled) quarries. The contamination of soils, groundwater and surface water could also occur through accidental spills and leaks relating to construction plant and fuels/oils.
- 9.7.7 The removal or remediation of any areas of contaminated soils identified would have a potential beneficial effect.

Operation

- 9.7.8 The completed and operational Scheme is not expected to result in any adverse effects on geology or soils.

9.8 Design, Mitigation, and Enhancement Measures

Construction

- 9.8.1 All construction works should be carried out in accordance with a Construction Environmental Management Plan (CEMP) detailing the reasonable and practicable steps to be undertaken to prevent pollution of the surrounding environment including site soils, groundwaters, surface waters and air (dust suppression). The works should be monitored by a suitably qualified Site Environmental Engineer / Environmental Manager, to be responsible in identifying and approving all methods of pollution control.
- 9.8.2 Measures for the protection of site soils will be required to be set out in a Soil Management Plan (SMP) included within the CEMP. For example, topsoils and subsoils should be stripped first, segregated and stockpiled appropriately for re-use across the site where possible. Other possible mitigation measures may include the use of a geotextile membrane and the formation of temporary running surfaces for construction plant.
- 9.8.3 To minimise the generation of excess soils/geological materials, a robust Materials Management Plan (MMP), a Site Waste Management Plan (SWMP)

and compliance with the CL:AIRE document⁷⁹ will be necessary. Where possible, the re-use of excess soils/Superficial Materials/excavated bedrock across the site or on nearby sites should be promoted to minimise the volume of resource sterilised.

- 9.8.4 For the protection of controlled waters, the CEMP should cover all necessary requirements e.g. guidance on storage requirements of hazardous substances, the use of cut-off ditches and settling tanks where necessary. The discharge of potentially contaminated groundwater from dewatering should be appropriately managed and may require an Environmental Permit/Discharge Consent. To prevent the contamination of the Secondary Aquifers the Contractor must take precautions, in line with all associated pollution prevention guidelines. Where piling or penetrative ground improvement is required into aquifers, the works should be carried out in accordance with the latest guidance. A Foundation Works Risk Assessment may need to be undertaken.
- 9.8.5 For the management of contamination risks a detailed GI and CLRA should be undertaken to inform the characterisation of potential contamination risks (including landfill specific risks such as landfill gas) and enable identification of necessary mitigation measures to ensure protection of human and environmental receptors during construction. The data may feed into a Detailed Quantitative Risk Assessment (DQRA) and Remediation Strategy if necessary.

Operation

- 9.8.6 The completed and operational Scheme is not expected to result in any adverse effects on geology or soils.

9.9 Description of the Likely Significant Effects

Construction

- 9.9.1 There are not anticipated to be any likely significant effects as a result of the construction of the Scheme. However, as a precautionary approach, due to the absence of GI survey results, this assessment of effects during construction will be included as part of the ES.

Operation

- 9.9.2 The completed and operational Scheme is not expected to result in any significant adverse effects on geology or soils, and this will therefore be scoped out of the ES.
- 9.9.3 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

⁷⁹ CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice [online] available at: <http://www.360environmental.co.uk/documents/Definition%20of%20Waste.%20Development%20Industry%20Code%20of%20Practice.pdf> (last accessed October 2017).

9.10 Proposed Level and Scope of Assessment

- 9.10.1 As a precautionary approach, due to the absence of GI survey results, further construction stage assessment in accordance with DMRB Volume 11 Section 3 Part 11, to a Simple level will be undertaken and presented within the ES.
- 9.10.2 The completed and operational Scheme is not expected to result in any significant direct adverse effects upon Geology and Soils. As a result, it is considered that no further assessment of operational stage effects is required and should therefore be scoped out of further assessment work.
- 9.10.3 A CLRA will be required to inform the GI (to be completed prior to the GI scope being finalised), with the geo-environmental scope to be agreed by South Somerset District Council Contaminated Land Officer and the Environment Agency. At the earliest opportunity following the GI a Quantitative Risk Assessment (either Generic or Detailed as influenced by the GI findings) and Remediation Strategy should be completed which, along with geotechnical assessment will inform the final Scheme design. This assessment will be presented in the ES.

9.11 Conclusion

- 9.11.1 The proposed scope of the ES is contained within Table 9.2, and further summarised in the below text.

Table 9.2: Proposed Scope of the Geology and Soils chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Geology and soils – to DMRB Simple level	N/A
Operation	N/A	Geology and Soils – no further assessment required

- 9.11.2 In summary, with the inclusion of appropriate mitigation measures, construction stage effects on identified geology and soils receptors are not considered to be significant for the proposed Scheme. However, until results of additional surveys including GI are made available, the assessment of construction stage effects will be included as part of the ES. The scope of the construction works warrants further construction stage assessment in accordance with DMRB Volume 11 Section 3 Part 11, to a DMRB Simple level.
- 9.11.3 The completed and operational Scheme is not expected to result in any significant adverse effects on geology or soils, and this will therefore be scoped out of the ES.

10 Biodiversity

10.1 Introduction

- 10.1.1 This chapter presents the key ecological receptors within the footprint and surrounding areas of the Scheme. It has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 4, DMRB Volume 11, Section 3, Part 4⁸⁰, and Interim Advice Note (IAN) 130/10⁸¹, to a Scoping Level, and where necessary, the requirement for further assessment to either Simple or Detailed level will be identified.
- 10.1.2 The potential effects on these receptors as a result of the Scheme has also been assessed, and this will form the basis of any recommended further survey and assessment requirements, to determine the magnitude of impacts, the requirements for mitigation measures, and overall significance of effects. Where required, further assessment will be presented within an Environmental Statement (ES).

10.2 Study Area

- 10.2.1 The following study areas have been used to gather information on ecological receptors that could be affected by the Scheme:
- 2km from the Scheme boundary for internationally and nationally designated nature conservation sites, including Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar Sites, National Nature Reserves (NNRs) and Sites of Special Scientific Interest (SSSIs) in line with DMRB Volume 11, Section 4, Part 1 HD 44/09 'Assessment of Implications (of Highways and/or Roads Projects) on European sites' (including Appropriate Assessment). This takes into consideration areas likely to be impacted by hydrological disruption;
 - 200m from roads that are expected to be affected by the Scheme for sites affected by changes in air quality with national or international designations for nature conservation. The local Affected Road Network (ARN) is considered to extend from Wimbourne Stoke to Buckland St Mary. This covers an extent of approximately 90km;
 - Ancient woodland and BAP habitats such as calcareous grassland are also considered up to 200m due to potential changes in air quality;
 - 30km from the Scheme boundary for SACs designated for bat populations in line with DMRB Volume 11, Section 4, Part 1 HD 44/09 'Assessment of Implications (of Highways and/or Roads Projects) on European sites' (including Appropriate Assessment);

⁸⁰ Highways England (2008) DMRB Volume 11, Section 3, Part 4 'Ecology and Nature Conservation'.

⁸¹ Highways England (2010) IAN 130/10 'Ecology and Nature Conservation Criteria for Impact Assessment' [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian130.pdf> (last accessed October 2017).

- 1km from the Scheme boundary for locally designated nature conservation sites, including Local Nature Reserves (LNRs), priority habitats, Local Wildlife Sites (LWSs) and RSPB reserves. This study area has been defined by professional judgement to ensure that all potential effects were identified within the zone of influence. The use of professional judgement will be described within the ES;
- 500m from the Scheme boundary for preliminary ecological assessments including Phase 1 habitat survey, Habitat Suitability Index (HSI) assessments of waterbodies for Great Crested Newts (GCN), and badgers. This study area was defined through professional judgement to ensure that all habitats were identified within the vicinity of the Scheme and to inform the forthcoming Phase 2 protected species surveys;
- 250m buffer from the Scheme boundary for other species such as water vole, otter, dormouse, reptiles and breeding birds. As above, this study area was defined through professional judgement to ensure that all habitats were identified within the vicinity of the Scheme and to inform the forthcoming Phase 2 protected species surveys; and,
- 1.5km from the Scheme boundary for barn owl surveys.

10.3 Baseline Conditions

10.3.1 This assessment chapter has been informed by a number of sources. Information regarding statutory and non-statutory sites is available from Natural England's MAGIC Interactive Map⁸², with further information available from Natural England and the Joint Nature Conservation Committee (JNCC). Information on the Local Wildlife Sites (LWS) within the study area has been obtained from a data request from Somerset Environment Records Centre (SERC), in April 2015 and a further request for updated information was made in June 2017. Information relating to habitats and species have been obtained from ecological surveys that have been undertaken by MMSJV since February 2016 until present.

Designated Sites

International

10.3.2 No internationally designated sites are present within 2km of the Scheme, but the following internationally designated sites are located within 30km (for sites designated for bats) of the Scheme:

- The Mells Valley SAC is located approximately 22km north of the Scheme. Its primary reason for designation is due to the presence of the greater horseshoe bat *Rhinolophus ferrumequinum*. The qualifying features include habitats such as semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*);

⁸² Natural England (2017) MAGIC Interactive Mapping [online] available at: <http://magic.defra.gov.uk/MagicMap.aspx> (last accessed July 2017).

- North Somerset & Mendip Bats SAC is located approximately 29km north of the Scheme. Its primary reason for designation is due to the presence of greater horseshoe bats *Rhinolophus ferrumequinum* and lesser horseshoe bats *Rhinolophus hipposideros*. The qualifying feature includes habitats such as semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) and *Tilio-Acerion* forests of slopes, screes and ravines; and,
- Bracket's Coppice is located approximately 17km south of the Scheme. Its primary reason for designation is due to the presence of Bechstein's bat *Myotis bechsteinii*. The qualifying feature includes habitats such as *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

Nationally Designated Sites

10.3.3 Sparkford Wood SSSI is located 1.2km north east of the Scheme. It is designated due to the broadleaved semi-natural woodland which largely comprises penduculate oak *Quercus robur* together with locally common ash *Fraxinus excelsior* and an understory of hazel coppice *Corylus avellana*. The ground flora, which includes abundant bluebell *Hyacinthoides non-scripta*, varies in conjunction with different soil types which range from mildly calcareous to acid. The woodland supports a large population of homostyle primroses *Primula vulgaris* which are recognised to be of international significance.

10.3.4 There are four designated sites within 200m of the ARN for the Scheme:

- Whitesheet Hill SSSI;
- Stockton Wood and Down SSSI;
- Yarnbury Castle SSSI; and,
- Parsonage Down SSSI.

10.3.5 All the above designated sites, except Charnage Down Chalk Pit, have been designated for the presence of chalk grassland which supports many notable, and in some cases rare, species of flora, some of which may be sensitive to NO_x and nitrogen deposition. In addition, the Stockton Wood and Down SSSI consists of scrub and woodland.

Regional

10.3.6 Regionally designated LWS within 2km of the Scheme are as follows:

- River Cary LWS is located 1.05km northwest;
- Cogberry Plantation LWS is located 0.58km northwest;
- Bower Plantation LWS is located 0.76km northwest;
- Annis Hill LWS is located 0.36km northwest;
- Home Ground Pond LWS is located 0.26km north;
- Lindsay House Quarry LWS is located 0.55km north;
- Vale Farm Field LWS is located 0.5km north;
- Parsons Steeple LWS is located 0.38km north;
- Yarcombe Wood LWS is located 0.94km northeast;
- Gason Lane Field LWS is located 0.01km south;

- Ridge Copse LWS is located 0.05km south;
- Camel Hill Transmitter Site LWS is located adjacent to the Scheme;
- Hazlegrove Park LWS is within the Scheme footprint;
- Sparkford Hill Copse LWS is located 0.48km northeast; and,
- Downhead Manor Farm Candidate LWS is located 0.19km north.

Habitats

10.3.7 Priority habitats within the Scheme's zone of influence (Zoi) consist of hedgerows, broadleaved semi-natural woodland, ditches, parkland, calcareous grassland and ponds.

Protected and Notable Species

10.3.8 Surveys for bats, breeding birds, barn owls, great crested newts, common reptiles, water voles, otters and macroinvertebrates have been completed. The findings are presented within Appendix C.

10.3.9 Surveys currently being completed include badger bait marking surveys, dormouse nest tube surveys and further invertebrate surveys. Full ecological survey findings will be presented within the ES.

10.4 Assumptions and Limitations

10.4.1 Not all land was intensively searched, due to the dense nature of some of the vegetation present on site and health and safety concerns, regarding surveying immediately adjacent to the live A303 carriageway.

10.5 Guidance and Best Practice

10.5.1 Further assessment will be carried out in accordance with the following guidance, and targeted surveys for protected species will be necessary as part of this assessment:

- DMRB Volume 11 Section 3 Part 4 Ecology and Nature Conservation⁸³;
- DMRB Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects;
- IAN 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment⁸⁴;
- Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK⁸⁵; and,

⁸³ Highways England (2008) DMRB Volume 11, Section 3, Part 4 'Ecology and Nature Conservation'.

⁸⁴ Highways England (2010) Interim Advice Note 130/10 Ecology and Natural Conservation: Criteria for Impact Assessment.

⁸⁵ Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Guidelines for Ecological Impact Assessment in the UK [online] available at:

https://www.cieem.net/data/files/Publications/EcIA_Guidelines_Terrestrial_Freshwater_and_Coastal_Jan_2016.pdf (last accessed October 2017).

- CIEEM Sources of Survey Methods⁸⁶.

10.6 Consultation

- 10.6.1 A meeting was held with Natural England on 2 May 2017 to discuss the proposed survey methodology for bats and other protected species, to develop mitigation proposals and to confirm Natural England's current biodiversity principles.
- 10.6.2 Further consultation with Natural England will be undertaken as part of the ES, to fully develop an appropriate ecological mitigation strategy. In addition, consultation with the following groups may also be required to fully develop robust mitigation measures:
- Somerset County Council;
 - South Somerset District Council;
 - Environment Agency;
 - Somerset Wildlife Trust;
 - Local wildlife organisations and groups; and,
 - Land owners.

10.7 Potential Impacts

Construction

- 10.7.1 During the construction phase, vegetation clearance will be required to facilitate the Scheme. This would directly reduce and fragment the available terrestrial habitat for species, such as badgers, barn owls, reptiles, GCN and dormice. Construction impacts may include increased risk of a pollution incident, such as contaminated land run off or spills/leaks of oils and fuels, and increased airborne pollutants into adjacent habitats which support these species. Changes in the drainage condition have the potential to disturb great crested newts, otters and water voles. GCN use drainage systems as connective corridors to move between ponds, and have been known to hibernate in such features.
- 10.7.2 In addition, the Scheme has the potential to disturb and remove habitats within a LWS; the eastern extent of the proposed Scheme crosses the southern section of Hazlegrove Park LWS, and is adjacent to Camel Hill Transmitter Site LWS, Gason Lane Field LWS, and Ridge Copse LWS. Construction activities could increase the risk of a pollution incident, such as contaminated land run off or spills/ leaks of oils and fuels.
- 10.7.3 Any night-time works required may directly disturb nocturnal species such as bats and badgers as a result of increased lighting pollution, noise and vibration. This disturbance could potentially contribute to the displacement of this species from the area.

⁸⁶ Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Sources of Survey Methods (SoSM) [online] available at: <https://www.cieem.net/sources-of-survey-methods-sosm-> (last accessed October 2017).

Operation

- 10.7.4 Once operational, the Scheme would result in the permanent loss and potential severance of habitats of biodiversity value such as broad-leaved semi-natural woodland, parkland and hedgerows. In the absence of mitigation, the permanent loss of habitat suitable for protected species has the potential to adversely affect individual species and their conservation status.

10.8 Design, Mitigation and Enhancement Measures

Construction

- 10.8.1 An Ecological Mitigation Strategy will be prepared, detailing proposals to manage and mitigate for ecological effects associated with the proposed Scheme. Best practice measures would also be included within and implemented through a Construction Environmental Management Plan (CEMP) to manage and minimise adverse construction stage effects. Measures would include the presence of an ecological clerk of works, toolbox talks, the sensitive timing of works and phased, supervised vegetation clearance.
- 10.8.2 European protected species (EPS) licences granted from Natural England with respect to protected species may also be required. These would contain a method statement giving details of appropriate mitigation to ensure no long-term effects on the species.
- 10.8.3 If works are to take place during the night, any lighting required should be managed to avoid spill onto ecological features. The effects can be minimised through the use of hoods, cowls or shields to prevent back-spill.

Operation

- 10.8.4 Measures to minimise the potential effects and to ensure that there is no net loss of biodiversity would be incorporated within the Scheme design and developed during the Preliminary Design and beyond. This could include the following measures:
- Habitat recreation and enhancement;
 - An appropriate ecological design; and,
 - An appropriate option design to ensure that irreplaceable features are avoided or fully compensated.
- 10.8.5 A number of areas for ecological mitigation have been incorporated within the draft Red Line Boundary (see Appendix B). These will be used as potential receptor areas for species such as reptiles and GCN. Other areas will be used for habitat creation, providing areas of foraging and shelter for a number of species. The exact extent and design is still to be determined, once the mitigation strategies have been finalised.
- 10.8.6 Surveys have been completed for the following species:
- Bat activity surveys (completed October 2017);
 - Bat roost surveys (completed September 2017);

- Breeding bird and barn owl surveys (completed August 2017);
- Dormouse surveys (partly completed September 2017);
- Reptile surveys (completed September 2017);
- Water vole and otter surveys (completed September 2017);
- Macro-invertebrate surveys (completed September 2017);
- National vegetation classification surveys (completed June 2017), and;
- Hedgerow surveys (completed October 2017).

10.8.7 Completion of surveys is required for the following species in order to further inform the mitigation methods and design. The findings of all the surveys will be reported in the ES:

- Badger bait marking surveys (completion December 2017) However, access was revoked for several main setts, these will be completed in March 2018;
- Dormouse surveys (completion of sites where access was revoked (March 2018); and,
- Terrestrial invertebrates: brown hair streak butterfly (November 2017) and spring invertebrates (April 2018).

10.8.8 Enhancement measures will be developed as part of the Preliminary Design.

10.9 Description of the Likely Significant Effects

10.9.1 There is potential for significant direct and indirect effects to protected species, designated sites, and sensitive habitats as a result of the proposed Scheme during both construction and operation, to be included within ES.

10.9.2 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

10.10 Proposed Level and Scope of Assessment

10.10.1 The scope of the works and the potential significance of direct and indirect effects warrants further assessment to a Detailed level, in accordance with IAN 130/10⁸⁷, as there is potential to cause disruption to protected species, designated sites and sensitive habitats as a result of the Scheme.

10.11 Proposed Methodology including Significance

10.11.1 The survey and assessment will be undertaken in accordance with DMRB Volume 11, Section 3, Part 4 'Ecology and Nature Conservation'⁸⁸, IAN

⁸⁷ Highways England (2010) IAN 130/10 'Ecology and Nature Conservation: Criteria for Impact Assessment [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian130.pdf> (last accessed October 2017).

⁸⁸ Highways England (2008) DMRB Volume 11, Section 3, Part 4 'Ecology and Nature Conservation'.

130/10⁸⁹ and CIEEM guidelines⁹⁰. The ecological receptors are valued in accordance with IAN130/10 and the published CIEEM guidelines, which utilise an approach to valuing ecological features that involves the use of professional judgment, based on available guidance and information, together with advice from experts who know the area in which the study area sits and/or the distribution and status of the features that are being considered.

10.11.2 Significance of effects would be assessed in accordance with DMRB guidance, which also relies on professional judgment and the advice and views of appropriate statutory agencies and other consultees on local ecological status, in its approach to assigning value.

10.11.3 A Habitat Regulations Assessment Screening will also be undertaken due to the presence of internationally designated sites (designated for bat species) located within 30km of the Scheme, in accordance with DMRB HD 44/09 and IAN 141/11. Consistency of information and avoidance of duplication will be ensured between the HRA screening process and within the ES.

10.11.4 The value (sensitivity) of ecological features and resources of nature conservation value will be assessed using the criteria outlined in Table 10.1. Following this, the characterisation of each ecological impact and the magnitude of change as a result of the Scheme would be determined using the criteria set out in Table 10.2. The significance of effect upon each resource will then be ascertained using the criteria set out in Table 10.3.

Table 10.1: Criteria for Determining the Conservation Value of an Ecological Receptor Feature

Conservation Value (IAN 130/10)	Criteria	Geographical Scale (CIEEM)	Criteria
International or European value	High importance and rarity and limited potential for substitution.	International and European	Internationally designated sites (SPAs, SACs and Ramsar Sites). Significant populations of species and habitats of international importance, notably qualifying interest features of designated sites. Habitat and species listed in EC Habitats Directive. High importance and rarity and limited potential for substitution.
UK or national value	High importance and rarity, or with limited potential for substitution	National	Nationally designated sites (SSSIs, NNR). Nationally important habitats of good condition and/or significant species population of national importance. Regionally important habitats and/or species with limited potential for substitution. Significant species population.

⁸⁹ Highways England (2010) IAN 130/10 'Ecology and Nature Conservation: Criteria for Impact Assessment [online] available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian130.pdf> (last accessed October 2017).

⁹⁰ CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK [online] available at: https://www.cieem.net/data/files/Publications/EcIA_Guidelines_Terrestrial_Freshwater_and_Coastal_Jan_2016.pdf (last accessed October 2017).

Conservation Value (IAN 130/10)	Criteria	Geographical Scale (CIEEM)	Criteria
			High importance and rarity, or with limited potential for substitution.
Regional value	High or medium importance and rarity, and limited potential for substitution	Regional	Locally designated sites (LNR, SNCIs). Regionally important habitats and/or species with potential for substitution. BAP priority habitats and species other than those of national importance. High or medium importance and rarity, and limited potential for substitution.
County value	Low or medium importance and rarity.	County	Undesignated sites of some local biodiversity and earth heritage interest. Local species of importance (often listed in BAPs). Low or medium importance and rarity.
Local value	Very low importance and rarity.	Local	Other habitats or species populations with little biodiversity value and earth heritage interest. Very low importance and rarity.

Source: IAN 130/10 and the published CIEEM guidelines

Table 10.2: Criteria for Determining the Magnitude of Impact

Magnitude of Impact	Criteria	
	Adverse	Beneficial
Major	Loss of resources and/or quality and integrity of resources; severe damage to key characteristics, features or elements.	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Moderate	Loss of resources, but not adversely affecting the integrity; partially loss of/damage to key characteristics, features or elements.	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration, to one (maybe more) key characteristics, features or elements.	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements.	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.	

Source: DMRB Volume 11, Section 2, Part 5 HA 205/108

10.11.5 The significance of effect upon each resource will then be ascertained using the criteria set out in Table 10.3. For the purposes of this assessment, effects of moderate adverse or beneficial and above are considered to be significant.

Table 10.3: Overall Appraisal Category

		Environmental/Conservation Value (sensitivity)				
		Very High	High	Medium	Low	Negligible
Magnitude of Impact	Major	Very Large	Large to Very Large	Moderate to Large	Slight to Moderate	Slight
	Moderate	Large to Very Large	Moderate to Large	Moderate	Slight	Neutral to Slight
	Minor	Moderate to Slight	Slight to Moderate	Slight	Neutral to Slight	Neutral
	Negligible	Slight	Slight	Neutral to Slight	Neutral to Slight	Neutral
	No change	Neutral	Neutral	Neutral	Neutral	Neutral

10.12 Conclusion

10.12.1 The proposed scope of the ES is contained within Table 10.4, and further summarised in the below text.

Table 10.4: Proposed Scope of the Biodiversity chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Protected species, designated sites, and sensitive habitats – DMRB Detailed level.	N/A
Operation	Protected species, designated sites, and sensitive habitats – DMRB Detailed level.	N/A

10.12.2 There is potential for significant direct and indirect effects to protected species, designated sites, and sensitive habitats as a result of the proposed Scheme, during both construction and operation. Subsequently, this warrants further assessment to DMRB Detailed level, and will be presented within the ES.

11 Materials

11.1 Introduction

11.1.1 This chapter assesses the potential effects on material assets from the Scheme, and has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 4⁹¹ to a Scoping Level. For the purposes of this Scoping Report, the assessment scope comprises:

- The use of material resources; and,
- The generation and management of waste.

11.1.2 The potential requirement for further assessment to either DMRB Simple or Detailed level will be identified. Where required, this will be presented within an Environmental Statement (ES).

11.2 Study Area

11.2.1 Currently there is no guidance available for defining the study area to be used for materials assessment. As a result, the study area, which will be adopted in the ES, has been determined through professional judgement by the influence of the Scheme, rather than through a set geographical location. Therefore, the study area encompasses the use of material resources and the potential waste arisings that would occur within the Scheme footprint (the red line boundary (see Appendix B).

11.2.2 During construction, the majority of waste will be generated within the immediate vicinity of the construction site and any re-use, recycling or treatment will, wherever practicable, take place on-site. However, where reuse or recycling is not practicable on-site, wastes will need to be removed to external facilities elsewhere. There is potential that disposal to landfill of some waste materials may be required, either locally or further afield, depending on the nature of the waste. The assessment will, therefore, take into account waste facilities located within the County of Somerset, which represent the closest waste facilities to the proposed Scheme.

11.3 Baseline Conditions

Material Resources

11.3.1 Aggregates (sand, gravel and crushed rock) are the raw materials used to make construction products. There are three main sources of aggregate in the UK, these are as follows:

- Land-won (often referred to as 'natural' or 'primary' aggregates) – these are extracted directly from the ground in quarries or pits;

⁹¹ Highways England (2008) DMRB Volume 11 Section 2 Part 4 HA204/08 'Scoping of Environmental Impact Assessments'.

- Marine-dredged – these comprise sand and gravel dredged from the sea floor; and,
- Secondary/recycled – secondary aggregates are a by-product from mineral operations or industrial processes, and recycled aggregates are materials produced by treatment of construction and demolition waste.

Current Local Aggregate Reserves

- 11.3.2 Baseline conditions for material resources have been established through desktop research, and has been based on available aggregate resources data for Somerset County Council. Information has been obtained from the Somerset Local Aggregate Assessment⁹² and the Somerset Minerals Plan⁹³
- 11.3.3 Somerset is the largest producer of crushed rock in the south of England, the vast majority of which is extracted from the quarries in the east Mendip Hills, with an average of over 10 million tonnes per year produced in recent years.
- 11.3.4 The permitted reserves of crushed rock in Somerset at the end of 2015 were approximately 380 million tonnes.
- 11.3.5 Somerset currently has no land-won sand and gravel workings and superficial deposits of sand and gravel in Somerset are generally limited. Therefore, Somerset does not currently maintain its own landbank of permitted reserves for sand and gravel and has not extracted sand and gravel during the past 10 years. The sand and gravel apportionment for the county was previously shared with that of Devon and Cornwall.
- 11.3.6 Devon's 5th Local Aggregate Assessment (2016) reported sand and gravel permitted reserves at the end of 2015 of 7 million tonnes, with a landbank period of 12.5 years.
- 11.3.7 Marine dredged sand and gravel originating from the Bristol Channel is landed at Dunball Wharf. Approximately 55,000 tonnes of marine-dredged sand and gravel was landed at this wharf in 2015.
- 11.3.8 The baseline will be further expanded in the ES to outline the permitted aggregate quarries and aggregate recycling facilities in Somerset.

Generation and Management of Waste

- 11.3.9 The most recent information available relating to current waste generation and operational waste facilities in Somerset and the South West region has been gathered to provide the baseline for this assessment. Information on the current waste arisings, and the waste management facilities have been determined through a desk-top study, using a number of readily available resources, in

⁹² Somerset County Council (2015) Somerset Local Aggregate Assessment *Fourth Edition*: incorporating data from 2006-2015 [online] available at: <http://www.somerset.gov.uk/policies-and-plans/plans/somerset-minerals-plan/> (last accessed November 2017)

⁹³ Somerset County Council (2015) Somerset Minerals Plan: Development Plan Document up to 2030 [online] available at: <http://www.somerset.gov.uk/policies-and-plans/plans/somerset-minerals-plan/> (last accessed November 2017)

particular data from the Environment Agency, Defra, Somerset County Council, and South Somerset District Council.

Waste Generation in the South West and England

11.3.10 The latest data from the Environment Agency indicated that England produced over 191.1 million tonnes of waste in 2015, which was managed in 6,427 permitted waste facilities⁹⁴. The South West region produced over 22.6 million tonnes of waste in 2015, which was managed in 874 sites.

11.3.11 With respect to construction and demolition waste, the Environment Agency recorded that 715,000 tonnes of inert construction and demolition waste was deposited in landfill in the South West region, with 27,000 tonnes landfilled in Somerset. There are no figures available showing how much construction and demolition waste was recovered or recycled or how much was contaminated soil. However, the Environment Agency recorded that 413,000 tonnes of waste material was used in construction (under permits) within the South West and 150,000 tonnes of waste material was used in construction in the Somerset in 2015. A further 1.8 million tonnes were deposited in landfill for recovery/ land benefit with 259,000 tonnes deposited in the Somerset (Table 11.1).

Table 11.1: Waste Breakdown by Site Type (2015)

Site Type	Somerset (tonnes)	South West (tonnes)	England (tonnes)
Landfill	464,000	3,461,000	43,932,000
Transfer	263,000	3,653,000	44,946,000
Treatment (excluding metal recycling sector)	506,000	6,468,000	64,156,000
Metal Recovery	82,000	1,327,000	13,182,000
Incinerated	0	209,000	10,379,000
Use of Waste	153,000	730,000	2,009,000
Land Disposal	259,000	1,851,000	12,578,000
Total	1,727,000	22,699,000	191,182,000
Use of Waste			
In construction	150,000	413,000	1,063,000
In reclamation	3,000	284,000	848,000
To manufacture timber	0	32,000	98,000
Land Disposal			
Deposited in landfill for recovery/benefit	259,000	1,817,000	12,336,000
Borehole and lagoon inputs	0	34,000	242,000
Hazardous Waste*			
Managed	46,768	417,435	4,607,527
Deposited	38,715	433,719	4,966,543**

Source: Environment Agency (2017) Waste Management for England 2015

Notes: *The data is a summary of the registered hazardous waste movements. The same waste may have been moved between multiple facilities and each separate movement is recorded.

**Does not include 2,525 tonnes to unspecified destinations.

⁹⁴ Environment Agency (2017) Waste Management for England 2015 [online] available at: <https://www.gov.uk/government/statistics/waste-management-for-england-2015#history> (last accessed September 2017)

11.3.12 Regarding hazardous waste, the ENV23 – UK Statistics on waste⁹⁵ produced by DEFRA details that in 2014, over 4 million tonnes were produced in the UK with just under 750,000 tonnes produced by the construction sector, of which just over 600,000 tonnes was produced in England.

Potential Local Hazardous Waste Arisings

11.3.13 To identify potential sources of contamination an initial review of the landfill sites, both authorised and historic, in the area was undertaken, these are shown on the plan contained in Appendix A. Potential sources of contamination that are greater than 500m away from the study area have not been considered, as these are considered unlikely to affect the proposed Scheme.

11.3.14 There are no authorised landfills and two historic landfills within 500m of the proposed Scheme. For details of these historic landfills, see Table 11.2 below.

Table 11.2 Historic Landfill Sites within 500m of the Scheme

Site Name	Site Address	Type/wastes accepted	Status	Distance from Scheme options
Land Adjacent to Hazlegrove Park	Sparkford Bypass, Sparkford	Accepted inert and household waste.	Last received waste: 20 June 1990.	Adjacent/within the boundary of the proposed Scheme.
Camel Hill Quarry	Queen Camel, Sparkford	Accepted inert and industrial waste (which excludes waste from mines, quarries, and agricultural wastes).	Last received waste: 5 June 1992.	160m from the proposed Scheme (at the closest point).

Source: Environmental Agency (2017) What's in your backyard?

11.3.15 In addition, as indicated in Chapter 9 Geology and Soils, there may also potential contamination risks from infilled historic quarries, fuel stations/garages and underground tanks, presence of Made Ground, and MoD land. For more information on the potential contamination risks see Chapter 9 Geology and Soils.

Waste Facilities

11.3.16 The Environment Agency reported that in 2015, 874 sites accepted waste in the South West, and at the end of 2015, 1,182 sites in the South West had environmental permits to accept waste.

11.3.17 The Somerset Waste Core Strategy⁹⁶ outlines that there is sufficient capacity at Walpole, Dimmer, and Whiscombe Landfill Sites to meet Somerset's

⁹⁵ Department for Environment, Food and Rural Affairs (updated 2017) ENV23 – UK statistics on waste [online] available at: <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management> (last accessed September 2017).

⁹⁶ Somerset County Council (February 2015) Somerset Waste Core Strategy: Development Plan Document up to 2028 [online] available at: <http://www.somerset.gov.uk/policies-and-plans/policies/somerset-waste-core-strategy/> (last accessed September 2017)

requirements for non-hazardous landfilling until at least 2028, however due to the limited planning life remaining at Lime Kiln Hill Quarry and Whiteball Landfill there will be a theoretical need to plan for over 300,000m³ of inert landfill void space post 2015.

11.3.18 Somerset has a range of facilities which generate recycled aggregates, treat or transfer construction and demolition waste, and/or treat/handle soil. These sites are estimated to provide capacity to recycle more than 1 million tonnes of inert waste per annum⁹⁷.

11.3.19 The latest information available on recovery operations in Somerset is from 2013. Table 11.3 lists the inert waste recovery projects operating under Environment Agency permits in Somerset in 2013. Collectively these ten projects provide capacity in excess of 1.25 million tonnes, which is well in excess of the amount of inert waste generated in Somerset⁹⁸. However, recovery operations tend to be relative short, fixed-term projects where only the minimum amount of inert waste must be used to achieve the stated purpose. Therefore, the operational recovery facilities in Somerset are likely to change over time, however, Table 11.3 gives an indication of the potential capacity of recovery operations in Somerset. Suitable recovery operation facilities should be identified before commencement of construction.

Table 11.3: Inert Waste Recovery Projects in Somerset (Operational during 2013)

Company/ Operator	Site/ Location	EA Permit Type	Estimated Capacity for Project (tonnes)*
B+J Haulage	Middlemoor Water Park, Woolavington	A25	225,000
Beaton,	Ashley Ash View farm acoustic bund, Somerton	SR2010 No 8	59,400
Canvin Anthony	The Old Quarry, Somerton	SR2010 No 10	99,999
Commercial Recycling Ltd	Riding Gate Acoustic Bund, Wincanton	A25	49,999
Davies, Robert	Haygrass Nurseries, Taunton	SR 2010 No 7	49,999
Hazelden, Keith + Janet	Fulwood, Taunton	SR 2010 No 8	99,999
Hopkins Development	Sutton Farm, Yeovil	SR2010 No 8	99,999
Ling, Steve John	Bowler Eggs, West Buckland	SR2010 No 7	49,999
Notaro, S	Huntworth Golf Club, North Petherton	A25	475,200
RM Penny (Plant Hire + Demolition)	Clapton Lane Piggeries, Chilcompton	SR2010 No 7	49,999
Total			1,259,593

Source: Somerset County Council (2016) Inert Waste Review [online] available at:

<http://www.somerset.gov.uk/policies-and-plans/plans/somerset-waste-plan/> (last accessed June 2017)

⁹⁷ Somerset County Council (2016) Inert Waste Review [online] available at:

<http://www.somerset.gov.uk/policies-and-plans/plans/somerset-waste-plan/> (last accessed September 2017).

⁹⁸ Somerset County Council (2016) Inert Waste Review [online] available at:

<http://www.somerset.gov.uk/policies-and-plans/plans/somerset-waste-plan/> (last accessed September 2017).

*Projects can be multi-year, so this does not equate to an annual throughput. Actual throughput was less than 250,000 tonnes in total for these ten projects in 2013, indicating the potential capacity provided by these types of projects.

11.3.20 The baseline will be further expanded in the ES to outline permitted waste facilities in Somerset, including disposal facilities, recycling facilities, recovery facilities, and operational incinerators.

11.4 Assumptions and Limitations

11.4.1 Estimates of the cut and fill volumes are included within this Scoping Report, and have been used to define the scope of the ES. These figures are likely to change as the detailed design progresses and evolves. Therefore, these figures should be considered as indicative and are intended for the purpose of defining the scope of the assessment, and should be reviewed upon further assessment.

11.4.2 Quantities of materials required and the waste anticipated to be generated for the construction of the Scheme are not available at this stage, as the preliminary design has not been finalised. Therefore, only a qualitative assessment has been carried out at this stage, limited to identifying activities that are likely to require significant quantities of materials, or are likely to generate significant quantities of waste.

11.5 Guidance and Best Practice

11.5.1 There is currently no guidance for assessing the effects on materials. Further assessment will be carried out in accordance with guidance provided in the DMRB Volume 11, Section 2, Part 5⁹⁹, recognising the requirements of the National Policy Statement for National Networks (NPSNN).

11.6 Consultation

11.6.1 No consultation regarding the materials assessment is required with statutory environmental bodies to support the ES.

11.7 Potential Impacts

Use of Material Resources

Construction

11.7.1 The Scheme would be likely to require large quantities of material resources and will therefore have permanent direct adverse effects on the environment, specifically through the depletion of natural resources. It is outside of the scope of the assessment to assess the environmental effects associated with the raw materials extraction, and processing and manufacturing of products, as these are likely to be subject to separate environmental assessments. The use of material resources would also be likely to generate adverse environmental effects through the transportation of materials (for use on-site), however the effects of this are more logically dealt with within Chapter 6 Air Quality and

⁹⁹ Highways England (2008) DMRB Volume 11 Section 2 Part 5 HA 205/08 'Assessment and Management of Environmental Effects'.

Chapter 12 Noise and Vibration, and will therefore not be included within the scope of the materials assessment.

11.7.2 The Scheme is likely to require large quantities of material resources for the construction of the carriageway and associated structures. The types of material resources likely to be required are as follows:

- Steel;
- Concrete;
- Fly Ash;
- Plastic;
- Clay;
- Iron;
- Cement;
- Aggregate; and,
- Bitumen.

11.7.3 Specific quantities of materials have not been quantified at this stage. However, the cut and fill volumes have been estimated and are presented in Table 11.4 below.

Table 11.4: Estimated Cut and Fill Volumes for the Scheme

Cut	Fill	Overall Balance
773,959m ²	597,284m ²	176,675m ² surplus

* Cut fill balance figures are indicative at this stage and subject to change as the design of the Scheme progresses. The cut fill balance figures reflect estimated required landscaping volumes rather than surplus volumes currently within the engineering model

Operation

11.7.4 There would be minimal requirements for materials, besides in frequent maintenance activities.

Generation and Management of Waste

Construction

11.7.5 The generation and management of waste as a result of the construction of the Scheme may result in adverse environmental effects, including the temporary occupation of waste management facility space (from treatment of waste) and the permanent reduction to landfill capacity (from disposal of waste). The generation and management of waste would require transport off-site, however as per Paragraph 11.7 2, this is more logically dealt within Chapter 6 Air Quality and Chapter 12 Noise and Vibration.

11.7.6 Exact quantities of waste likely to be generated by the construction of the proposed Scheme have not been quantified at this stage. However, waste may result from the following:

- Surplus excavated materials (soils or substrata);

- Green waste (from vegetation removal or management);
- Waste from the demolition of existing structures (only one agricultural barn requires demolition);
- Contaminated soils from excavations (which may be classified as hazardous waste); and,
- Surplus construction materials (e.g. concrete, aggregates, asphalt).

11.7.7 As noted in Table 11.4, there would be a surplus of cut material of approximately 176,675m².

Operation

11.7.8 Infrequent maintenance activities associated with the operation of the Scheme would be unlikely to generate high quantities of waste.

11.8 Design, Mitigation and Enhancement Measures

Construction

- 11.8.1 Measures would be implemented to reduce the effects of material resource use and waste generation by the Scheme during construction.
- 11.8.2 Consideration would be given throughout the Scheme design to minimising the use of virgin materials, through reducing the material requirements within the design itself, through utilising new infrastructure that contains a high proportion of recycled content (where design constraints allow), and by designing to re-use and recycle site-won materials, wherever possible. Embodied carbon emissions of the material resources required for the Scheme will be calculated within the ES.
- 11.8.3 The Scheme would apply the waste hierarchy to minimise disposal and maximise re-use and recycling. For example, through the re-use of excavated soils and green waste on-site for landscaping, and through the recycling of inert material by crushing, blending and subsequent re-use e.g. as an aggregate. Where waste cannot be re-used or recycled on-site, opportunities should be sought for the re-use of material on other nearby schemes, or in other uses with clear benefits to the environment, e.g. in the remodelling of agricultural land, or in the restoration of nearby quarries or other excavation sites. The Somerset Waste Core Strategy¹⁰⁰ outlines that Somerset has a long history of aggregate and building stone production, and therefore there may be opportunities for the re-use of inert waste in quarry restoration, subject to the waste being suitable. Therefore, the re-use of inert waste material in the restoration of nearby quarries, would be investigated. By re-using and recycling as much waste as possible, this would reduce the amount of waste going to landfill.
- 11.8.4 The appointed Contractor would produce a Construction Environmental Management Plan (CEMP) which would detail mitigation measures to be adhered to on-site to reduce impacts on material resources and waste

¹⁰⁰ Somerset County Council (February 2015) Somerset Waste Core Strategy: Development Plan Document up to 2028 [online] available at: <http://www.somerset.gov.uk/policies-and-plans/policies/somerset-waste-core-strategy/> (last accessed May 2017)

generation during the remediation/preparation, demolition and construction phases. An Outline CEMP will also be prepared in support of the Development Consent Order (DCO) application as part of the ES.

- 11.8.5 Consideration will be given to the need for a Site Waste Management Plan (SWMP), which would consider the sourcing, transport and use and disposal of materials in a sustainable manner and take account of, and capture, design changes as the Scheme design evolves and would ensure that unavoidable construction waste is identified and able to be managed in accordance with the waste hierarchy and other relevant legislative requirements. The SWMP would be used to derive the management options that would achieve the highest practicable performance levels within the hierarchy.
- 11.8.6 A Materials Management Plan (MMP) should also be produced by the Contractor for the earthworks. This would ensure that site-won and imported materials comply with an earthworks specification ensuring that the geotechnical and chemical composition is acceptable before being used on-site during construction. The MMP would also detail information on the cut and fill balance.

Operation

- 11.8.7 No mitigation or enhancement measures have been identified with respect to materials.

11.9 Description of the Likely Significant Effects

Construction

Use of Material Resources

- 11.9.1 At this stage it is assumed that all fill material would be suitable for re-use on-site, and therefore as there would be sufficient quantity of cut material to be re-used for fill, it is unlikely that significant effects resulting from material resource use would result from this aspect as the works. However, considering the size and scale of the Scheme and the works required, which encompasses the construction of a new dual carriageway, junctions and associated structures, there is potential that a significant quantity of material resources would be required. It is likely that any significant effects due to the quantity of material resources required could be appropriately mitigated through the implementation of mitigation measures outlined in Section 11.8. However, without accurate material quantification at this stage for the preliminary design of the proposed Scheme, this assumption cannot be confirmed. Therefore, further assessment within the ES will be necessary, with accurate material quantification and preliminary design information, to confirm the likelihood of significant effects.

Generation and Management of Waste

- 11.9.2 The Scheme would aim to minimise the generation of waste as much as possible, through the implementation of the waste hierarchy (as outlined in Section 11.8 above). Additionally, it is assumed at this stage that the surplus cut materials would be suitable to be re-used in the landscaping for the Scheme.

- 11.9.3 As long as waste is managed appropriately, implementing the mitigation measures outlined in Section 11.8 it is unlikely that the generation and management of waste would result in significant effects. However, due to the existing uncertainties regarding the quantities of waste anticipated, further assessment within the ES will be necessary to confirm the likely significant effects.

Operation

- 11.9.4 Significant adverse effects are not likely for materials assets during the operation of the proposed Scheme. Refer to Section 11.7 for further information.
- 11.9.5 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

11.10 Proposed Level and Scope of Assessment

- 11.10.1 There is potential for significant adverse effects during construction due to the quantity of materials likely to be required for the proposed Scheme, although it is likely that significant effects can be appropriately mitigated. It is unlikely that significant quantities of waste requiring off-site treatment or disposal would be generated by the construction of the proposed Scheme. However, in the absence of accurate material quantification of the preliminary design these assumptions cannot be confirmed. Therefore, further assessment is required, which would benefit from accurate material quantification, further design information and a construction strategy.
- 11.10.2 The detailed assessment will consider the following:
- The use of material resources; and,
 - The generation and management of waste
- 11.10.3 The assessment will not consider the environmental effects of contaminated materials, as this will be considered within the assessment of geology and soils. Additionally, a detailed assessment of the effects associated with the transportation of materials and waste will not be undertaken, as this is more logically dealt within the assessments of air quality, noise and vibration and people and communities.
- 11.10.4 As stated in Paragraphs 11.7.5 and 11.7.9, there would be minimal requirements for materials and minimal waste generation, besides infrequent maintenance activities, during the operation of the proposed Scheme. As such, no significant direct or indirect effects are anticipated (see Paragraph 11.9.2) and therefore, the assessment on materials (which encompasses the use of material resources and the generation and management of waste) during operation are scoped out of further assessment.

11.11 Proposed Methodology including Significance

- 11.11.1 The ES will set out the methodology recognising the requirements of the NPSNN, including how significance of effects are to be determined.

11.12 Conclusion

11.12.1 The proposed scope of the ES is contained within Table 11.4, and further summarised in the below text.

Table 11.4: Proposed Scope of the Materials chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Use of material resources and Generation and management of waste.	N/A
Operation	N/A	Use of material resources and generation and management of waste – no further assessment is required.

11.12.2 Due to the value, size and scale of the Scheme, and the works required to construct the Scheme, it is considered that there is potential for significant adverse effects on material resources due to the potential quantity of materials required. It is likely that any significant effects can be appropriately mitigated. However, in the absence of accurate material quantification of the preliminary design, this assumption cannot be confirmed. Therefore, further assessment will be required as part of the ES.

11.12.3 The Scheme would be likely to generate waste during construction which would need to be appropriately managed. Consideration will be given to the need for a SWMP, which would consider the sourcing, transport and use and disposal of waste materials in a sustainable manner. Following the implementation of a SWMP and appropriate mitigation measures, the generation and management of waste is not anticipated to result in significant direct or indirect effects. However, in the absence of accurate quantification and a construction strategy, further assessment will be required to confirm this conclusion.

11.12.4 The DMRB Detailed level assessment on Materials during construction will be undertaken and presented within the ES.

11.12.5 No further assessment is required for the effects of the proposed Scheme on material assets during operation, as no significant direct or indirect effects are anticipated as there would be minimal requirements for materials and minimal waste generation, besides infrequent maintenance activities. As such, the need for an assessment during operation for Materials has been scoped out of the ES.

12 Noise and Vibration

12.1 Introduction

- 12.1.1 This chapter has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 4¹⁰¹, and DMRB Volume 11, Section 3, Part 7¹⁰², to a Scoping Level. The construction and operation of the Scheme would have the potential to give rise to both temporary and permanent noise and vibration effects at sensitive receptors in the area, which in turn could generate adverse or beneficial effects. This section identifies the key noise and vibration effects, describes the study area and key receptors. The potential requirement for further assessment to either Simple or Detailed level will also be identified. Where required, this will be presented within an Environmental Statement (ES).

12.2 Study Area

- 12.2.1 The DMRB Volume 11 Section 3 Part 7 provides the methodology for assessment of road projects within the UK.
- 12.2.2 For operational noise, the methodology requires that the study area is identified as an area within 1km of the physical works associated with the Scheme. Within this study area, road traffic noise predictions are performed at any sensitive receptor within 600m of a road where this is the possibility of a change of 1dB LA10, 18hr upon Scheme opening, or 3 dB LA10, 18hr in the long term.
- 12.2.3 For potential effects due to road traffic noise outside of the 1km study area, the methodology requires that sensitive receptors be identified adjacent to roads where the change in received road traffic noise level would, as a result of the Scheme, increase or decrease by at least 1dB LA10, 18hr on opening or 3dB in the long term. Consequently, the spatial extents of the assessment may extend beyond the physical works associated with the Scheme.
- 12.2.4 For construction noise, the study area is the same as that defined for assessment of operational noise effects, although this may be extended to assess the effects from construction traffic on the existing road network and from potential diversion routes. Within the study area, the extent of the assessment will be limited to areas where total noise (calculated construction noise plus baseline noise) exceeds baseline noise levels.

12.3 Baseline Conditions

- 12.3.1 As baseline noise surveys have not been undertaken at this stage of the Scheme development, existing baseline conditions have been determined through desktop study.
- 12.3.2 Sources included in the desk study are:

¹⁰¹ Highways England (2008) DMRB Volume 11 Section 2 Part 4 HA 204/08 'Scoping of Environmental Impact Assessments'.

¹⁰² Highways England (2011) DMRB Volume 11 Section 3 Part 7 HD 213/11 Noise and Vibration.

- Noise mapping undertaken as part of the requirements of The Environmental Noise (England) Regulations 2006;
- OS mapping;
- Consultation with the Local Authority;
- Traffic flows available from previous stages of the assessment; and,
- Review of any previous surveys and assessments.

12.3.3 The existing noise sensitive receptors for the Scheme include the following:

- Two Noise Important Areas (NIAs) are located within the footprint of the proposed Scheme on the existing A303 just to the east of Camel Cross and approximately 150m to the west of Howell Lane; and,
- There are approximately 230 residential properties, 20 farms, one school and 12 commercial properties within 500m of the proposed Scheme.

12.4 Assumptions and Limitations

Assumptions Regarding the Baseline

12.4.1 To adequately characterise the baseline environment an extensive and detailed noise survey will be necessary. DMRB advises "*This [Detailed] level of assessment may be a desk-based exercise, supplemented with site-collected information needed to inform a quantitative assessment... [which] should include a noise measurement survey*". Noise surveys occur at Detailed stage of assessment and will therefore be conducted for the Scheme, as part of the ES.

Assumptions Regarding the Identification of Likely Significant Effects

Construction Assessment

12.4.2 Information on construction activities to inform this Scoping Report is limited to a high-level description of construction sequences and provisional details of likely plant to be used.

Operational Assessment

12.4.3 The traffic data to be used for noise predictions is based upon the South West Regional Traffic Model (SWRTM) traffic data and standard prediction methodology. A description of the traffic modelling process relevant to noise assessment will be included in the ES. A full DMRB assessment requires extensive and detailed modelling of the proposed Scheme and the surrounding area, using detailed topographical data. At this stage of assessment, horizontal and vertical alignments of the Scheme are incorporated into the acoustic model, however as design progresses these may change.

12.4.4 Public domain LiDAR data is used to provide topographical and existing height data. Ordnance Survey Address-point data is used to locate residential receptors.

12.4.5 Mitigation measures in the form of acoustic bunds have been incorporated into the proposed Scheme design. Assessment within the ES will verify the sufficiency of the proposed mitigation.

12.5 Guidance and Best Practice

12.5.1 The following legislation, standards and best practice guidelines are considered to be relevant to the proposed Scheme.

- The National Planning Policy Framework (NPPF) 2012¹⁰³;
- The Noise Policy Statement for England (NPSE) 2010¹⁰⁴;
- The National Policy Statement for National Networks (NPSNN) 2014¹⁰⁵;
- The Land Compensation Act 1973 Part 1;
- The Noise Insulation Regulations 1975 (amended 1988);
- Sections 60 and 61 of The Control of Pollution Act 1974;
- The Environmental Protection Act 1990;
- British Standard (BS) 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise';
- BS5228-2:2009 'Code of construction practice for noise and vibration control on construction and open sites - Part 2: Vibration';
- Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7 'Noise and Vibration' (HD213/11 – Revision 1) 2011¹⁰⁶;
- Interim Advice Note (IAN) 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' and Volume 11, Section 3, Part 7 'Noise'¹⁰⁷;
- Calculation of Road Traffic Noise (CRTN) 1988; and,
- IEMA's Guidelines for Noise Impact Assessment¹⁰⁸.

12.5.2 The above list is not exhaustive and further guidance will be referred to if necessary.

12.6 Consultation

12.6.1 To date, no consultation has been undertaken specifically for respect to noise and vibration. For Scheme-wide consultation, reference should be made to

¹⁰³ Communities and Local Government (2012) National Planning Policy Framework [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf (last accessed September 2017).

¹⁰⁴ Defra (2010) Noise Policy Statement for England [online] available at: <https://www.gov.uk/government/publications/noise-policy-statement-for-england> (last accessed September 2017).

¹⁰⁵ Department for Transport (2015) National Policy Statement for Networks National [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed September 2017).

¹⁰⁶ Highways England (2011) DMRB Volume 11 Section 3 Part 7 HD 213/11 Noise and Vibration.

¹⁰⁷ Highways England (2015) IAN 185/15 'Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed bands' for users

¹⁰⁸ Institute of Environmental Management and Assessment (2014) Guidelines for Environmental Impact Assessment.

Chapter 4. Consultation with the Local Authority Environmental Health Officer (EHO) will be necessary to discuss the effects of noise and vibration as part of work associated with the ES.

12.7 Potential Impacts

Construction

- 12.7.1 During construction, the Scheme has the potential to directly alter the noise and vibration baseline for sensitive receptors for a temporary period. Effects are likely to be restricted to areas where the existing baseline noise levels are exceeded. Principally, this would be in the vicinity of the Scheme envelope, although could extend along elements of the existing road network, depending on haul routes and the quantity of construction-related traffic.
- 12.7.2 BS7385¹⁰⁹ provides guidance on the levels of vibration that would be necessary to cause structural damage to different types of buildings. The Standard indicates that continuous Peak Particle Velocities (PPVs) of more than about seven mm/s would be required to cause structural damage to residential buildings. There is the potential for adverse effects to vulnerable buildings, and appropriate mitigation would be identified as part of the ES.

Operation

- 12.8 During operation, as the Scheme would broadly follow the existing road corridor, there is the potential for changes to traffic flows and road alignment to result in noise changes at noise sensitive receptors, particularly from increased traffic. Changes in road alignment would have a relatively low effect on noise levels as the Scheme would follow the existing road corridor.

12.9 Design, Mitigation and Enhancement Measures

Construction

- 12.9.1 It is anticipated that the limits for normal working hours and levels of noise at nearby properties would be agreed by the Contractor in advance with local Authority Environmental Health Officers (EHOs) and incorporated into the Construction Environment Management Plan (CEMP) for the Scheme.
- 12.9.2 The Section 61 application would require the use of best practicable means (BPM) for noise control at all times during construction. These should include the selection of the most appropriate method and plant for the job, adequate maintenance of plant, optimum siting of stationary plant, local screening and the education of the workforce. Restrictions may also be placed on early/late delivery times. Potentially affected residents should be kept informed in advance of the works and contact details be provided to request further information or to report disturbance.

¹⁰⁹ British Standard (BS) 7385-1:1990 'Evaluation and measurement for vibration in buildings – Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings'

- 12.9.3 For residential buildings, limits will be placed based upon levels at which there is a likelihood of complaint, these being considerably lower than those at which building damage may occur.
- 12.9.4 Incorporated mitigation related to construction noise and vibration will be set out within the CEMP. This will identify the series of measures to reduce the environmental effects during the construction period and covers environmental and safety aspects affecting the interests of residents, businesses, all road users and the general public in the vicinity of the works. These measures will include considerations of the residents of early phases of the Scheme during the construction period for later phases.
- 12.9.5 The effects of potential noise and vibration on local communities can be mitigated by effective communication between the promoter, Contractor and the public. Prior notification of construction works to any potential affected residents will be required. Following that, investigation and remediation of noise issues during construction may also be required.
- 12.9.6 Where potentially significant effects of construction noise and vibration are predicted, the Contractor would consult the Local Authority to determine potential additional mitigation measures for the Scheme.

Operation

- 12.9.7 DMRB advises on reductions of sound from thin surface courses. For the purposes of this assessment it has been assumed that by the Design Year (2033) in the do-minimum case, all existing trunk roads and motorways would be surfaced with thin surface course.
- 12.9.8 Enhancement measures for noise and vibration will be considered as part of the Detailed assessment within the ES.

12.10 Description of the Likely Significant Effects

Construction

- 12.10.1 With strict adherence to mitigation as described in Section 12.8, construction noise would be managed to appropriate levels and is therefore not anticipated to have significant direct adverse effects. Effects associated with construction vibration are also not anticipated to be significant, with the implementation of appropriate mitigation to be identified as part of the ES. However, at this stage with insufficient information on construction activities further assessment will be required in the ES to confirm this and to inform the mitigation strategy. This will be undertaken based upon the requirements of BS5228 Parts 1 and 2.

Operation

- 12.10.2 With the implementation of appropriate mitigation as described in Section 12.8, such as the provision of noise barriers/bunds and low noise road surfacing, potential adverse effects would be reduced. Nonetheless, it is considered that there is the potential for significant residual adverse effects to noise and vibration sensitive receptors which warrants further assessment within the ES.

12.10.3 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

12.11 Proposed Level and Scope of Assessment

12.11.1 The Scheme has the potential to directly alter the noise and vibration baseline for numerous sensitive receptors both temporarily (during construction) and permanently (during operation). Therefore, a quantitative assessment of both construction and operational noise and vibration is required to establish significant effects and to inform the mitigation strategy. The assessment will be undertaken to a Detailed level in accordance with DMRB.

12.12 Proposed Methodology including Significance

12.12.1 The NPSNN¹¹⁰ requires that ‘*due regard*’ must be given to relevant sections of the NPPF¹¹¹, the NPSE¹¹² and the associated National Planning Policy Guidance on noise¹¹³. To comply with these documents, it will be necessary to determine Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) for noise effects. The mitigation strategy will depend upon the magnitude of any impacts at sensitive receptors between LOAEL and SOAEL, in addition to exceedances of SOAEL, which will indicate the occurrence of significant adverse effects.

12.12.2 Environmental assessment regulations and the NPPF require that the assessment considers the significance of any effects. These will be considered on the basis of magnitude and change. NPPF requirements regarding single objective noise-based measures will be based upon those adopted for other recent infrastructure schemes. The concepts of LOAEL and SOAEL, introduced by NPSE have been defined based upon noise insulation threshold levels, World Health Organisation (WHO) guidance¹¹⁴ and for construction noise and vibration, guidance from BS5228 Parts 1 and 2¹¹⁵.

12.12.3 Residual effects have been considered significant only where, with incorporated mitigation, they exceed SOAEL. It is noted however that in order to address the second aim of NPSE, where impacts lie between LOAEL and SOAEL, “reasonable steps to mitigate and minimise adverse effects on health and quality of life”, should be taken. Consideration is therefore given within this assessment to adverse impacts which are identified to occur between LOAEL

¹¹⁰ Department for Transport (2015) National Policy Statement for Networks National [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed September 2017).

¹¹¹ Communities and Local Government (2012) National Planning Policy Framework [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf (last accessed September 2017).

¹¹² Defra (2010) Noise Policy Statement for England [online] available at: <https://www.gov.uk/government/publications/noise-policy-statement-for-england> (last accessed September 2017).

¹¹³ Communities and Local Government (2014) Planning Practice Guidance: Noise [online] available at: <https://www.gov.uk/guidance/noise--2> (last accessed September 2017).

¹¹⁴ WHO (2009), Night Noise Guidelines for Europe, available online http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf

¹¹⁵ BSI (2009, amended 2014) British Standard BS 5228 Code of practice for noise and vibration control on construction and open sites – Parts 1 and 2.

and SOAEL. For the purposes of this assessment, adverse effects are regarded as those arising from “moderate” or “major” impacts.

Construction Noise

- 12.12.4 To provide a quantitative assessment, detailed information would be required on plant, duration, method, location of construction compound, and haul routes. At this stage in the assessment process insufficient information is available to quantify construction impacts, and these will therefore be discussed qualitatively within this chapter.
- 12.12.5 BS5228–1:2009+A1:2014¹¹⁶ does not define strict criteria to determine the significance of noise effects, although examples of how limits of acceptability have been applied historically and some examples of assessing significance are provided. ‘Example Method 2 – 5dB(A) change’ (Annex E ‘Significance of Noise Effects’ Section E.3.3) will be adopted for the assessment of effects at sensitive receptors. This sets out limits for both day and night-time working.
- 12.12.6 This approach considers the expected changes in ambient noise levels and more appropriately reflects conventional Environmental Impact Assessment (EIA) methodologies compared with the use of fixed/absolute noise limits.
- 12.12.7 Where night-time working is envisaged, a qualitative assessment will be made of the effect of additional traffic using diversion routes. This assessment will be carried out in accordance with DMRB HD213/11 and will consider any sensitive receptors within any route sensitive to disruption. The significance of effects will depend on the nature of the diversion.

Construction Vibration

- 12.12.8 BS5228 ‘Code of construction practice for noise and vibration control on construction and open sites – Part 2: Vibration’¹¹⁷ provides guidance on the effect of vibration and the likelihood they will cause complaint and cosmetic damage to buildings. BS 5228 does not indicate whether particular vibrations are significant. However, it does state that: *“It is likely that vibration of... [1.0mm/s] ...in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents”*.
- 12.12.9 Generally, vibration from construction activities would be temporary and intermittent in nature. On this basis, in the assessment a PPV of 1.0mm/s or more would be considered to have the potential to result in a significant adverse effect.

Operational Noise

- 12.12.10 DMRB HD213/11 describes the effects of road traffic noise in terms of the noise descriptors conventionally used for assessing the impact of road traffic in the UK, i.e. the statistical noise level $L_{A10,18h}$ over an 18-hour period between 06:00 and 24:00 (the traffic noise index). The Calculation of Road Traffic Noise

¹¹⁶ British Standard (BS) 5228-1:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites – Part 1: Noise’.

¹¹⁷ British Standard (BS) 5228-1:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites – Part 1: Noise’.

(CRTN) methodology¹¹⁸ will be followed in the calculation of road traffic noise, which will provide input to assessment of effects using the DMRB methodology.

12.12.11 The level of road traffic noise from the road network will be predicted using traffic data provided in terms of 18-hour Annual Average Weekday Traffic (AAWT) flow between the hours of 06:00 to 24:00, along with average vehicle speed and percentage heavy vehicles.

12.12.12 Calculations of the road traffic noise level will be carried out for four scenarios:

- Do Minimum option in the baseline year;
- Do Minimum option in the future assessment year;
- Do Something option in the baseline year; and,
- Do Something option in the future assessment year.

12.12.13 In the above scenarios, 'Do Minimum' means traffic growth with committed development only. 'Do Something' means committed growth with the Scheme.

12.12.14 In accordance with DMRB HD213/11, for a Detailed level assessment, the assessment of road traffic noise effects requires the following comparisons:

- The short-term change in road traffic noise upon Scheme opening (Do Minimum option in the baseline year vs. Do Something option in the baseline year);
- The long-term change in road traffic noise assuming the Scheme is built (Do Minimum option in the baseline year vs. Do Something option in the future assessment year); and,
- The long-term change in road traffic noise assuming the Scheme is not built (Do Minimum option in the baseline year vs. Do Minimum option in the future assessment year).

Operational Vibration

12.12.15 Low frequency noise from vehicle exhausts may induce vibration (rattle) in light building elements such as windows i.e. airborne vibration. DMRB HD 213/11, para. A5.28 advises that vibration disturbance most closely parallels exposure to traffic noise levels, and that subject to professional judgement relating to conditions under which the research was undertaken, disturbance from vibration may be quantified along similar lines to nuisance from noise (the original research was restricted to properties within 40m of the carriageways where there were no noise barriers or other screening).

12.12.16 DMRB notes that traffic induced vibration is expected to affect a very small percentage of people at noise exposure levels below 58dB_{LA10}.

¹¹⁸ Department of Transport Welsh Office HMSO (1988) Calculation of Road Traffic Noise [online] available at: <http://www.devon.gov.uk/core-doc-n3-calculation-of-road-traffic-noise.pdf> (last accessed October 2017).

Summary of Proposed Significance Criteria

12.12.17 Environmental assessment regulations and the NPPF require that the assessment considered the significance of any effects. These will be considered on the basis of magnitude and change. NPPF requirements regarding single objective noise-based measures will be based upon those adopted for other recent infrastructure schemes.

12.12.18 NPSE sets out significance in terms of Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL). The following Table 12.1 summarises currently proposed LOAEL and SOAEL thresholds for noise and vibration at residential receptors.

Table 12.1: Summary of Potential Noise and Vibration Effects

Time Period	Source	Adverse Effect Level	Noise Level
Day	Operational Noise	LOAEL	Freefield 50dB $L_{Aeq,16hr}$
Day		SOAEL	Façade 67.5dB $L_{A10,18hr}$
Night		LOAEL	Freefield 40dB $L_{Aeq,8hr}$
Night		SOAEL	Freefield 55dB $L_{night, outside}$
Day	Construction noise	LOAEL	Facade 50dB $L_{Aeq,16hour}$
Day		SOAEL	Façade 75dB $L_{Aeq,12 hour}$
Night		LOAEL	Façade 45dB, $L_{Aeq,8 hour}$
Night		SOAEL	Facade 55dB $L_{Aeq,8 hour}$
N/A	Construction Vibration	LOAEL	PPV 0.14mm/s
N/A		SOAEL	PPV 1.0 mm/s

Human Health and Wellbeing

12.12.19 The requirement for the ES to assess significant effects on human health will be addressed under the NPPF and NPSE (Section 12.11.1 above) and the identification of sensitive receptors at, or above LOAEL which is “the level above which adverse effects on health and quality of life can be detected” and SOAEL, which is the levels “above which significant adverse effects on health and quality of life.

Conclusion

12.12.20 The proposed scope of the ES is contained within Table 12.2, and further summarised in the below text.

Table 12.2: Proposed Scope of the Noise and Vibration chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Noise and vibration – to DMRB Detailed level.	N/A
Operation	Noise and vibration – to DMRB Detailed level.	N/A

12.12.21 During construction, the proposed Scheme has the potential to directly alter the noise and vibration baseline for numerous sensitive receptors for a

temporary period. Effects are likely to be restricted to the vicinity of the proposed Scheme envelope, including elements of the existing road network. Mitigation will be key to minimising adverse effects. Significant effects are unlikely with appropriate CEMP and mitigation in place. Nonetheless, further assessment to DMRB Detailed level in the form of a quantitative construction noise and vibration assessment is required to inform the mitigation strategy, following the receipt of updated traffic data.

12.12.22 For operational noise and vibration effects, whilst there is the potential for beneficial effects for existing NIAs, adverse effects from the introduction of a new noise source and changes to traffic flows would also be likely. As a result, further assessment in the form of road traffic noise predictions is required for sensitive receptors, once traffic data is available. This assessment will determine potential impact as well as significance of effects according to NPSE. Appropriate mitigation and enhancement would ensure that direct effects are minimised.

12.12.23 Further assessment to a Detailed level will therefore be undertaken, and will be presented within an ES.

13 People and Communities

13.1 Introduction

- 13.1.1 This chapter assesses the effects of the Scheme on People and Communities, including Non-Motorised Users (NMUs), Amenity, Severance, Agricultural Land, Demolition of Private Property and Associated Land Take, Private Property, Development Land, Local Economy, Community Land, Motorised Travellers Views from the Road and Driver Stress. To address the requirements of the Infrastructure Planning (EIA) Regulations 2017, this chapter covers the impacts on population and health.
- 13.1.2 People and Communities is identified as a Design Manual for Roads and Bridges (DMRB) factor within Interim Advice Note (IAN) 125/15¹¹⁹. However, the guidance contained within the DMRB Volume 11 Section 3 has not yet been updated. As a result, and pending new guidance, this chapter has been prepared in accordance with DMRB Volume 11, Section 2, Part 4 and DMRB Volume 11, Section 3, Parts 6, 8 and 9 to a Scoping Level. Refer to Section 5.7 for further information regarding this limitation.
- 13.1.3 The potential requirement for further assessment to either DMRB Simple or Detailed level will be identified, and where required, this will be presented within an Environmental Statement (ES).

13.2 Study Area

- 13.2.1 No study areas for People and Communities are specified in the DMRB Volume 11 Section 2 Part 4, and the DMRB Volume 11 Section 3 Parts 6, 8 and 9, and therefore the study areas used for this chapter have been defined through professional judgement, based on the type and scale of the Scheme and the context of the surrounding area.
- **Non-Motorised Users:** The study area comprises all NMU facilities including PRow, footways, long distance walks and cycle routes within 250m of the Scheme;
 - **Amenity:** The study area comprises all NMU facilities identified within 250m of the Scheme;
 - **Severance:** The study area includes community facilities and connecting NMU routes within 250m of the Scheme. For the basis of this assessment, community facilities include those outlined in the DMRB Volume 11 Section 3 Part 8 Chapter 2, such as doctor's surgeries, hospitals and medical facilities, schools, churches, leisure facilities (e.g. cinemas) and formal recreation facilities (e.g. parks, sports and recreation grounds, children's play areas and outdoor sports facilities). Shops include large shops such as supermarkets;
 - **Motorised Travellers View from the Road:** The study area considers views from the Scheme; and,
 - **Driver Stress:** The study area consists the A303 and all side roads connecting to it within 250m of the Scheme.

¹¹⁹ Highways England (2015) IAN 125/15 'Environmental Assessment Update'.

- **Demolition of Private Property and Associated Land Take:** The assessment applies to direct effects of the Scheme on residential, industrial and commercial properties, including businesses such as independent shops. The assessment considers an area within 250m of the Scheme boundary;
- **Community Land and Community Facilities, and Development Land:** The study area is defined as the area within 250m of the Scheme boundary;
- **Local Economy:** The study area for the local economy will be the District of South Somerset; and,
- **Agricultural Land:** The study area for agricultural land as a National resource encompasses the agricultural land classification (ALC) grade of land that would be directly within the Scheme footprint. The effects on individual farm businesses encompasses farms that would be directly affected by the Scheme.

13.3 Baseline Conditions

13.3.1 Baseline information relating to this chapter has been obtained from South Somerset District Council's interactive map¹²⁰. NMU survey counts have also been undertaken at 29 locations within the vicinity of the Scheme which has informed this assessment.

Non-Motorised Users

13.3.2 There are a number of Public Rights of Way (PRoW) to the north and south of the proposed Scheme comprising 24 footpaths, two bridleways and two restricted byways¹²¹. There is also one national cycle route¹²², a long-distance path¹²³ and four footways¹²⁴ within the study area. Baseline conditions for NMUs have been established using an audit, which was undertaken in accordance with the DMRB standard HD 42/05. The Environmental Constraints Plan in Appendix A provides a general overview of PRoW locations, however drawings to support the ES will detail each NMU route more precisely.

13.3.3 Table 13.1 below provides a description of each NMU facility within the study area for the Scheme.

¹²⁰ South Somerset District Council (2017) 'Your Area' Interactive Map [online] available at: <https://www.southsomerset.gov.uk/generic-map/> (last accessed November 2017).

¹²¹ Somerset County Council (2017) Explore Somerset Interactive Mapping, [online] available at <https://roam.somerset.gov.uk/roam/map> (last accessed November 2017)

¹²² Sustrans (2017) National Cycle Network, [online] available at: <https://www.sustrans.org.uk/ncn/map> (Last accessed November 2017).

¹²³ The Walking Englishman (2017) Long Distance Footpath Directory [online] Available at: <https://www.walkingenglishman.com/ldp/ldp.html> (Last accessed November 2017)

¹²⁴ Google Maps (2017) [online] available at: <https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z> (last accessed November 2017).

Table 13.1: NMU amenities within the study area for the Scheme

NMU Facility	Description	Location
Footpath WN 23/10	Footpath intersects the A303 to the south, between the west of Gason Lane and Blackwell Road.	Within Scheme footprint
Footpath WN 23/11	Footpath intersects the A303 to the south, east of Ridge Copse before reaching Gason Lane.	50m south
Footpath WN 23/12	Footpath intersects the A303 to the north, between Hazlegrove Park and the school access road 250m north of Sparkford junction.	Within Scheme footprint
Footpath WN 23/14	Footpath intersects the A303 to the south, running through Ridge Copse.	30m south
Footpath WN 23/15	Footpath west of Gason Lane past the southern fringes of Ridge Copse and connecting to path WN 27/4 to the east.	150m south
Footpath WN 23/32	Footpath intersects the A303 to the north, between Camel Hill and Steart Hill.	Within Scheme footprint
Footpath WN 23/33	Footpath intersects the A303 to the north, running between Camel Hill east of Camel Hill Farm to Newlands Lane in the north.	Within Scheme footprint
Footpath WN 23/37	Connects PRoWs WN 23/32 and WN 23/33 at Camel Hill.	200m north
Footpath WN 23/38	West of the existing A303 dual carriageway at Sparkford, between Sparkford Hall and PRoW WN 23/12 in the west.	Within footprint
Footpath WN 27/14	Runs between High Street and the railway in Sparkford.	150m east
Footpath WN 27/16	Path between High Street Sparkford and Sparkford Hall, severed by the existing A303.	50m northeast
Footpath WN 27/4	Path between Ridge Copse and the A359.	200m south
Footpath WN 27/6	Path between Wolfester Terrace, crossing the railway at Sparkford before reaching Church Road.	100m south
Footpath Y 27/10	Footpath intersecting the A303 to the north, along Downhead Lane before reaching Glebe Farm.	Within Scheme footprint
Footpath Y 27/11	Between the B3151 and Urgashay in the south.	20m east
Restricted Byway Y 27/20	Slate lane passes between Steart Hill and Downhead Lane, passing West Camel Hill.	Adjacent to the Scheme
Footpath Y 27/21	Footpath intersects the A303 to the south, connecting to the B3151.	50m south
Footpath Y 27/22	To the west of Slow Court Lane	230m south
Footpath Y 27/29	Between Plowage Lane and Keep Street along Cottis Lane.	60m south
Footpath Y 27/29	Between Plowage and Downhead Lane.	Within Scheme footprint
Footpath Y 27/6	Footpath intersects A303 to the south, between the church adjacent to the A303 and West Camel.	30m south
Footpath Y 27/7	Footpath intersects the A303 to the south, between the A303 to the east of Plowage and Cottis Lane.	Adjacent to the Scheme

NMU Facility	Description	Location
Footpath Y 27/9	Footpath intersects the A303 to the north, between Plowage and Slate Lane, before reaching Steart Hill.	Within Scheme footprint
Footpath Y 27/UN	Footpath severed by the existing A303 to the west of Wayne's before connecting to Downhead.	Within Scheme footprint
Footpath Y 30/24	Starting 100m east of Podimore Inn, moving south towards RNAS Yeovilton.	200m west
Bridleway Y 30/28	Bridleway intersects the A303 to the north, along Eastmead Lane until Downhead Lane.	Within Scheme footprint
Bridleway Y 30/29	Between Higher Farm Lane and Eastmead Lane.	40m north
Footpath Y 30/UN	Between Podimore and Higher Farm Lane, running over the A303.	20m west
Footway	Alongside Church Street in Podimore, starting at the main road which connects to the A303 to the southernmost fringes of Podimore.	110m south
Footway	Runs adjacent to the south of the A303 between Howell Hill until Camel Cross.	Within Scheme footprint
Footway	Footway along Wolfester Terrace between the A359 (north of services) and Queen Camel.	100m east
Footway	Footway between Wolfester Terrace and High Street Sparkford, either side of the road.	Adjacent
Cycle Route 26	Runs from Portishead on the Somerset coast to Portland Bill on the Dorset coast via Wells, Castle Cary, Yeovil and Dorchester.	150m south
Celtic Way	The route visits more than 100 pre-historic sites through South Wales and the South West and includes 111 miles of the Land's End Trail.	Within Scheme footprint

Amenity

13.3.4 NMU facilities within the study area are identified within Table 13.1 above. The Environmental Constraints Plan in Appendix A provides a general overview of PRoW locations, however drawings to support the ES will detail each NMU route more precisely. There is one crossing facility over the A303 for NMUs within the study area, at Higher Farm Lane to the north of Podimore, where amenity is considered to be good.

13.3.5 Amenity is considered very poor at 11 PRoWs comprising WN 23/10, WN 23/11, WN 23/12, WN 23/14, WN 23/32, WN 23/33, WN 27/16, Y 27/21, Y 27/9, Y 27/UN, Y 30/28 and the Celtic Way, as NMUs currently have to cross the A303 at uncontrolled crossings at-grade. Amenity is considered poor for five PRoW comprising Y 27/11, Y 27/21, Y 27/6, Y 27/7 and Y 30/24, two footways at A303 Howell Hill to Camel Cross and Sparkford, to Queen Camel and Route 26 with a lack of barriers between traffic and NMU facilities.

13.3.6 The current lack of barriers between people and traffic in the locations above may cause people to fear crossing the road, due to a feeling of it being unsafe.

13.3.7 Nine PRow WN 23/15, WN 27/14, WN 27/6, Y 27/10, Y 27/20, Y 27/22, Y 27/27, Y 27/29, Y 30/24 and one footway at Church St. Podimore connect to side roads and amenity is considered to be acceptable here, whilst six PRow WN 23/37, WN 23/38, WN 27/4, Y 30/29, Y 30/UN (bridge solely used by NMUs) are completely separated from traffic and therefore amenity is good.

Severance

13.3.8 The proposed Scheme is located within the vicinity of several communities; Downhead and Camel Hill to the north of the A303, Sparkford to the east of the A303 and Queen Camel, West Camel and Podimore to the south of the A303.

13.3.9 NMU routes within 250m of the Scheme are listed above in Table 13.1.

13.3.10 Community facilities and connective NMU facilities within 250m of the proposed Scheme are outlined in Table 13.2 and were identified using Google Maps¹²⁵. These will be shown in the ES supporting figures.

Table 13.2: Community Facilities and connecting NMU Routes

Community Facility	Location	NMU Routes Connecting to Community facility
The Podimore Inn public house	Podimore	Footpath Y 30/UN Footpath Y 30/24 Bridleway Y 30/29 Bridleway Y 30/28
West Camel Methodist church	150m east of Plowage Lane	Footpath Y 27/6 Footpath Y 27/9 Footpath Y 27/10 Footpath Y 27/29 Restricted Byway Y 27/20
Sparkford Inn public house	Sparkford	Footpath WN 27/16 Footpath WN 27/14 Footpath WN 23/38

Driver Stress

13.3.11 The A303/A30 forms part of the Strategic Road Network (SRN) and is a strategic link between the south-west peninsula and the rest of the south, south-east and London. The route is comprised of multiple road standards including dual 2-lane all purpose (D2AP), single carriageway 2 lane (S2) and single carriageway sections with overtaking lanes (S2+1) together with associated varying speed limits (from 40mph to 70mph).

13.3.12 The single carriageway section runs between the Podimore bypass (a dual carriageway) and Hazlegrove Roundabout. There are a number of side roads which tie in to the existing A303 and provide access to the local community.

13.3.13 At present, significant congestion occurs between Sparkford and Ilchester on the A303, particularly during peak periods such as holidays, the summer and

¹²⁵ Google Maps (2017) [online] available at: <https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z> (last accessed November 2017).

weekends, leading to delays for drivers and increased traffic flows. The inability for vehicles to travel at a speed with which they are comfortable with in relation to the general standard of the road leads to driver frustration, and as such driver frustration is perceived to be High on the existing A303 between Sparkford and Ilchester. Congestion on the A303 may also lead to delays in public transport movements, community service vehicles and emergency services, further exacerbating driver frustration. Driver stress is considered to be High along the A303 between Sparkford and Ilchester during peak periods as a result of flow increased and inconsistent speeds.

13.3.14 Route uncertainty is considered to be low along the A303, given the presence of existing signage.

13.3.15 The accident rate on this section of the A303 is also higher than the national rate for A class trunk roads, with 162 accidents per billion vehicle km travelled, compared to the national rate for all A road of 113 accidents per billion vehicle km travelled. There is one NMU crossing over the A303, one footway alongside the A303 between Camel Cross and Howell Hill and approximately 16 points at which PRowS intersect the A303 at-grade between Higher Farm Lane and Sparkford Hall, which NMUs do use, although in fairly low numbers (13 NMUs counted on a summer holiday weekday and 1 NMU counted on a term-time weekday). As such, the fear of potential accidents amongst MTs is considered to be Moderate.

13.3.16 Frustration amongst drivers on the A359, B3151 and side roads situated within the study area is likely to be low, with congestion largely marginalised to the A303 and therefore, vehicles can drive at speeds consistent with their own wishes.

Demolition of Private Property and Associated Land Take

13.3.17 The area encompassing the Scheme is predominantly rural, used for agriculture with some residential dwellings and businesses. Aerial imagery and MAGIC¹²⁶ have been used to identify the baseline for this sub-factor

13.3.18 There is an agricultural farm adjacent to the A303 approximately 850m to the east of Podimore. At Camel Cross, there is a farm just north of the A303 on an unnamed road off Plowage Lane. In addition, Hawk House country lodging and bistro is situated adjacent to the south of the A303. At the intersection of Plowage Lane and the A303 there are two residential dwellings immediately south of the A303 and a derelict shed and residential property 'The Spinney' north of the A303. Approximately 600m east of the Plowage Lane/A303 intersection, there are two residential properties and a bakery.

13.3.19 At the intersection of Steart Hill and the A303, there are three residential properties and the Steart Road garage. Approximately 300m east of the Steart Hill/A303 intersection, there is a residential property 'Blue Haze' adjacent to the A303.

¹²⁶ ¹²⁶ Defra (2017) MAGIC Online GIS Mapping System [online] available at: <http://magic.defra.gov.uk> (last accessed October 2017).

13.3.20 At Camel Hill, there are two farms north of the A303 which include residential dwellings, Camel Hill Farm and Vale Farm. There are also four other residential properties in the vicinity of these two farms. South of the A303, along Traits Lane there is an electricity mast, buildings belonging to the Fleet Air Arm and one residential property 'Eyewell House'. Adjacent to the south of the A303 just north of Gastons Lane is a shell garage and Mattia diner.

13.3.21 At Hazlegrove roundabout there is a service station with convenience shop and garage and a McDonalds. Just north of the roundabout along the eastern side of the A303 is Long Hazel dairy farm and Long Hazel park campsite.

Community Land and Community Facilities

13.3.22 Sparkford Cricket Club cricket pitch is located in the study area. No other community land is present in the study area, based on a review of Google Maps¹²⁷.

13.3.23 Community facilities located in the study area include West Camel Methodist Church and St Peter's Church, based on a review of Google Maps¹²⁸.

13.3.24 A number of other community facilities, including a primary school, tennis club, bowls club, medical centre and Church are located outside the study area in Queen Camel (approximately 850m south of the Scheme). Although Hazlegrove Preparatory School main building is approximately 465m north of the current A303, the sole private access to the school is currently via the Hazlegrove roundabout. However, the school grounds and playing fields border the existing A303 and are therefore located within the study area.

Development Land

13.3.25 The South Somerset Local Plan (2006-2028) does not identify any development sites within 250m of the Scheme. However, the Local Plan outlines a target for the construction of at least 141 homes and 1.02 ha of employment land in Ilchester between 2006 and 2028¹²⁹.

Local Economy

13.3.26 South Somerset has a population of 165,600, of whom 95,900 (58%) are of working age (16-64 years old). Children (aged under 16 years) make up 18% of the population, which is in line with the national average of 19%. Older people (over 65 years) comprise 25% of the general population, which is considerably higher than the national average of 18%¹³⁰.

¹²⁷ Google Maps (2017) [online] available at: <https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z> (last accessed November 2017).

¹²⁸ Google Maps (2017) [online] available at: <https://www.google.co.uk/maps/@52.8382004,-2.3278149,6z> (last accessed November 2017).

¹²⁹ South Somerset District Council (2015): 'South Somerset Local Plan 2006 – 2028'. See: https://www.southsomerset.gov.uk/media/707200/south_somerset_local_plan_2006-2028_adoption_version_march_2015.pdf

¹³⁰ ONS (2016): 'Population estimates – local authority based by five-year age band'. Accessed October 2017.

13.3.27 Table 13.3 below shows the economically active population and, amongst them, those who are in employment and those who are unemployed. It shows there are the same proportion of economically active people in South Somerset as nationally (78%). It also shows that unemployment in South Somerset is the same as the South West region (4%), meaning both are in line with the national figure (5%). The South Somerset economically active population is the same as the national figure (78%), whilst the South West figure for the South West is slightly higher (81%).

Table 13.3: Employment and Unemployment (Apr 2016 – Mar 2017)

All people	South Somerset	South Somerset (%)	South West (%)	Great Britain (%)
Economically active	80,000	78%	81%	78%
In employment	77,800	76%	77%	74%
Unemployed (Model-based)	2,800	4%	4%	5%

Source: ONS annual population survey (April 2016-March 2017)

13.3.28 The English Indices of Deprivation 2015 are commonly used for the measurement and comparison of deprivation between neighbourhoods in England. In terms of deprivation, the study area contains three Lower layer Super Output Areas (LSOA) neighbourhoods, ranked 22,979, 16,939, and 20,669 out of 32,844 LSOAs in England, with 1 being the most deprived LSOA. This indicates that the Scheme is located within the 50% least deprived neighbourhoods in the country.

Agricultural Land

13.3.29 The land within the study area of the proposed Scheme is predominantly agricultural. Post 1988 ALC survey data is not available on MAGIC¹³¹ therefore this ALC assessment will be based on 1975 Ministry of Agriculture Fisheries and Food (MAFF) ALC grades. The MAFF 1975 ALC data provides an indication of the ALC Grades for the entire land area; however, these Grades are indicative and not derived from assessment. MAFF ALC Grades indicates that the majority of the land within the study area is Grade 3 (good to moderate) with a small amount of Grade 2 (very good quality) agricultural land.

Individual Farm Businesses

13.3.30 The land within the study area contains approximately 60 field parcels owned by a number of landowners, predominantly separated by hedgerows based on a review of OS MasterMap data. It would appear that the land use ranges from pastoral and arable to commercial and potentially subsistence, however in the absence of specific agricultural land use information which will be established as part of the ES this is speculative. Refer to Section 13.4 for information on the assumptions and limitations for this sub-topic.

¹³¹ Defra (2017) MAGIC Online GIS Mapping System [online] available at: <http://magic.defra.gov.uk> (last accessed October 2017).

13.4 Assumptions and Limitations

13.4.1 There are a number of assumptions associated with the People and Communities assessments to date.

- Origin destination surveys were undertaken by Tracsis in 2016 in four locations and also in 2017. The 2016 results proved to be inconclusive with only four interviews attempted and one conducted. It was decided that interview surveys should be carried out for a second time to the east of Hazlegrove House (at PRoW 3). Tracsis carried out the additional surveys on a weekday and weekend day in April 2017. Six interviews were attempted and five conducted, although all attempts were not undertaken on the PRoWs, rather on a desire line in a nearby field;
- The assessment of agricultural land is limited by the availability of specific information regarding the ALC Grades. As Post 1988 ALC grades are not available on MAGIC, the indicative MAFF 1975 ALC data are used, however as these grades are provisional they cannot be taken as the true ALC grade of the land. An ALC survey would be undertaken as part of work to support the ES, which would determine the quality of agricultural land in full;
- Full information on the uses of the agricultural land such as land use information, the nature of activities associated with the land and farm buildings and infrastructure is not fully known at this stage;
- Landowner information was collated using land registry data and in some cases field boundaries may be out of date or incorrect;
- Full information on the uses of the agricultural land such as the type of husbandry, severance and major accommodation works is not known at this stage and would be obtained as part of work to support the ES, which would through an agricultural questionnaire to landowners; and,
- Information on community facilities is primarily based on desk based research using Google Maps. This may not contain the most up to date information therefore the list of community facilities outlined in Section 13.3 should be viewed as an indication of provisions.
- Data used to define the baseline social and community conditions has been compiled from existing published sources. Assessments are based on the most recent data available. The currency of data varies from dataset to dataset depending on how frequently information is collected. Dates for each dataset are noted in the baseline section where available.
- The study area is based on a 250m buffer around Scheme, and not on distances via particular modes (such as walk times), by particular routes, or taking into account man-made and natural barriers (such as major roads, railway lines, or water courses).

13.5 Guidance and Best Practice

13.5.1 People and Communities is identified as a DMRB environmental factor within IAN 125/15. However, the guidance contained within the DMRB Volume 11 Section 3 has not yet been updated. As a result, and pending new guidance, further assessment required for People and Communities will be assessed using the guidance contained within the DMRB Volume 11 Section 3 as follows:

- Part 6 – Land Use;
- Part 8 – Pedestrians, Cyclists, Equestrians and Community Effects; and,
- Part 9 – Vehicle Travellers.

13.6 Consultation

- 13.6.1 A meeting was held with Somerset County Council's Rights of Way Officer on 28 November 2016. Key points discussed at the meeting included requirements for the Celtic Way; which is not promoted as a long-distance walk by the Council, good spacing for NMU crossings, requirements for right of way diversions and provisions for grade separated crossings. A previous meeting was held with Somerset County Council in January 2016. Initial consultation was also held with stakeholder user groups, with the Blackmore Vale and Yeo Valley CTC, Somerset Ramblers and South Somerset Bridleways Association providing feedback in early 2016.

13.7 Potential Impacts

Construction

- 13.7.1 During construction works, it is possible that overnight work may be required. This could cause temporary disruption for MTs along the A303, A359 and adjoining side roads. Traffic management would result in temporary reduced speeds and narrow lanes, which would increase journey times. The People and Communities assessment will factor these traffic management requirements in. This could temporarily increase stress for MTs and cause disruption for local communities, although mitigation would reduce overall effects.
- 13.7.2 The Scheme would have a direct effect upon NMU facilities comprising footpaths, bridleways and restricted byways, a long-distance path and a footway. It may be necessary to temporarily close or divert these amenities to facilitate construction works. This would result in temporary increases in journey times and lengths for NMUs and could also result in increased severance to community facilities.
- 13.7.3 Amenity is likely to be temporarily affected for users of NMU facilities during construction, through the presence of construction plant, machinery, materials, construction compounds and construction lighting, whilst there is also potential for barriers between people and traffic to change, which would further reduce amenity.
- 13.7.4 The Scheme would result in the requirement for one agricultural building to be demolished and potential for land take associated with private property.
- 13.7.5 During construction, the Scheme would result in traffic management measures, which may result in temporary speed reductions, temporary traffic lights, and single direction traffic. This could increase journey times and therefore affect those travelling to community facilities, such as the two churches within the study area.
- 13.7.6 Although Hazlegrove Preparatory School is located outside of the 250m study area, the sole private access to the school is currently via the Hazlegrove

roundabout, which falls within the study area. The Scheme would permanently change this access to the school, which would potentially cause disruption to the community facility.

- 13.7.7 There are not anticipated to be any effects on development land in the study area.
- 13.7.8 The Scheme would require new construction workforce, which if local, could have a beneficial effect on employment rates. However, because of the size of the Scheme, this effect is unlikely to be significant.
- 13.7.9 For the duration of the construction phase, there would be construction workers on-site, with the potential for a slight and indirect temporary beneficial effect on the local economy as a result of these workers using local facilities, for example hospitality and catering establishments.
- 13.7.10 With respect to agricultural land, there is potential for significant amounts of best and most versatile (BMV) land to be temporarily affected, although an ALC survey will establish amounts of BMV land likely to be lost. There is also potential for adverse effects on numerous individual farm businesses, after considering temporary land take requirements and total proportions of land lost from individual farms. Potential effects on human health and wellbeing will be established within the ES.

Operation

- 13.7.11 The introduction of a new road, side road connections and associated infrastructure for the proposed Scheme would open up new views for MTs.
- 13.7.12 The proposed Scheme is anticipated to remove the majority of through-flow traffic from the existing A303 onto the new road, which would be a high speed, free flowing dual carriageway for its length. This would provide significant relief from congestion upon the local road network and reduce driver stress.
- 13.7.13 The proposed Scheme would result in some journey length and time increases for NMUs, and this also has the potential to result in increased severance to nearby community facilities. The Scheme has the potential to affect amenity for NMU routes with changes to barriers between people and traffic and changes to traffic flows.
- 13.7.14 There are not anticipated to be any effects on Development Land in the study area.
- 13.7.15 It is not anticipated that community land would be affected; however, with regards to community facilities, the Scheme would result in relief from congestion on the local road network, which is likely to improve access to community facilities in the study area, in terms of journey time.
- 13.7.16 Although Hazlegrove Preparatory School is located outside of the 250m study area boundary, the sole private access to the school is currently via the Hazlegrove roundabout, which falls within the study area. The Scheme would re-route access to the school, with a new slip road provided from a new grade separated junction. During operation, there is therefore potential for access to

the school to be improved. The creation of an additional junction separate to the A303 would separate traffic for the school from general vehicular traffic. This could also ease congestion around the entrance to the school, thereby improving access.

13.7.17 Direct operational employment is not expected to be created as a result of the Scheme. However, there are likely to be increased indirect employment opportunities related to reduced congestion and improved journey times.

13.7.18 Potential demolition and land take would be required to construct the Scheme and therefore potential effects are considered for the construction phase only, and would not result in any effects once the Scheme is operational.

13.7.19 With respect to agricultural land, there is potential for significant amounts of BMV land to be temporarily affected, although an ALC survey will establish amounts of BMV land likely to be lost. There is also potential for significant effects on numerous individual farm businesses, after considering permanent land take requirements and total proportions of land lost from individual farms. This could affect the commercial viability of individual farm businesses.

13.7.20 Potential effects on human health and wellbeing will be established within the ES.

13.8 Design, Mitigation and Enhancement Measures

Construction

13.8.1 Mitigation measures of relevance during construction include the following:

- A Construction Environmental Management Plan (CEMP) would be prepared by the appointed Contractor and implemented during the construction period, to ensure the construction of the Scheme is undertaken in as sensitive a manner as possible;
- A Traffic Management Plan (TMP) would be implemented during the construction phase of the Scheme, to ensure that access is maintained and disruption is minimised as far as possible;
- All temporary diversions for users of NMU amenities around the work site are clearly signed, with alternative access arrangements maintained through the full construction period, as required;
- Reinstatement measures would be implemented if agricultural land during the construction phase is altered, damaged or lost, ensuring that land is reinstated to its previous ALC grade prior to works commencing;
- Ongoing consultation to take into account the individual needs of landowners and inform mitigation design, if agreed;
- Compensation would be explored for landowners should agricultural land, individual farm businesses and private property currently in use be directly affected during construction of the Scheme, through the Compulsory Purchase Acquisition mechanism; and,
- Management of soils: In areas of land which would be temporarily acquired, soils would be managed in accordance with Defra (2009) 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites' whilst a Soil Handling and Management Plan will be

followed which will include details of how agricultural land will be restored at the end of construction.

Operation

13.8.2 Mitigation measures of relevance during operation include the following:

- An NMU strategy has been produced alongside the Scheme design which includes the locations for diversions of existing NMU routes, new crossings, potential cycle routes and PRowS to be extinguished;
- Ongoing consultation to take into account the individual needs of landowners and inform mitigation design, if agreed;
- Compensation would be explored for landowners should agricultural land, individual farm businesses and private property currently in use be directly affected during operation of the proposed Scheme, through the Compulsory Purchase Acquisition mechanism.

13.9 Description of the Likely Significant Effects

Construction

- 13.9.1 During construction, there is potential for temporary significant effects on agricultural land and individual farm businesses, taking into account mitigation described in Section 13.8. Given existing design and mitigation uncertainties and the potential significant effects, further assessment is required within the ES.
- 13.9.2 There is potential for temporary and permanent significant effects with regard for the demolition of private property and land take taking into account mitigation described in Section 13.8. Given existing design and mitigation uncertainties and the potential significant effects, further assessment is required within the ES.
- 13.9.3 Taking into account the mitigation described in Section 13.8, significant adverse effects on Driver Stress, NMUs, Severance, Amenity, Community Land and Community Facilities, and the Local Economy, are unlikely during construction. Further assessment is still required within the ES due to existing design uncertainties so as to ensure that significant effects are identified and mitigated accordingly.
- 13.9.4 There are not anticipated to be any effects on development land and MTs views from the road in the study area. Therefore, these sub-factors have been scoped out of further assessment.

Operation

- 13.9.5 In terms of MTs views from the road, landscape planting would be included as part of the Scheme design which would be likely to reduce visibility to the wider landscape, with vegetation gradually maturing over time. Taking into account the mitigation described above in Section 13.8, significant adverse effects on Views from the Road are unlikely during operation. Further assessment is still required within the ES due to existing design and mitigation uncertainties during

construction, so as to ensure that the significant effects are identified and mitigated accordingly.

- 13.9.6 Significant effects on Driver Stress are unlikely during operation, however further assessment is still required within the ES, to analyse traffic data so as to ensure that significant effects are identified and mitigated accordingly.
- 13.9.7 Significant effects on Community facilities are unlikely during operation, however further assessment is still required within the Environmental Statement, due to existing design uncertainties so as to ensure that likely significant effects are identified and mitigated accordingly.
- 13.9.8 Significant effects on Community facilities are unlikely during operation, however further assessment is still required within the Environmental Statement, due to existing design uncertainties so as to ensure that likely significant effects are identified and mitigated accordingly.
- 13.9.9 During operation, overall effects on Non-Motorised Users, Amenity and Severance are not likely to be significant taking into account mitigation described in Section 13.8, however there is potential for significant effects for individual receptors. Given design and mitigation uncertainties and potential significant effects at individual receptors, further assessment is required within the ES.
- 13.9.10 There is potential for permanent significant effects on agricultural land and individual farm businesses taking into account mitigation described in Section 13.8. Given existing design and mitigation uncertainties and the potential significant effects, further assessment is required within the ES.
- 13.9.11 Significant effects are not likely for Views from the Road, Driver Stress, Demolition and Private Property and Land Take, Community land and Community Facilities, Development Land or Local Economy. Refer to Section 13.7 for further information.
- 13.9.12 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

13.10 **Proposed Level and Scope of Assessment**

- 13.10.1 Further assessment is required for NMUs, Severance, Amenity, Agricultural Land, Demolition of Private Property and Associated Land Take during construction only, Community Land and Community Facilities, Local Economy, and MTs View from the Road and Driver Stress to a Detailed level during both construction and operation. Effects on human health and wellbeing will also be considered as part of the ES. Development Land has been scoped out of further assessment as there would be no direct effects, however due to the evolving nature of this sub-topic, the baseline should be reviewed when undertaking further assessment of People and Communities. Whilst the assessment of operation effects for demolition and land take has also been scoped out of further assessment, as potential effects are only likely during the construction phase of the Scheme.

13.11 Proposed Methodology including Significance

Human Health and Wellbeing Effects

13.11.1 The assessment of human health and wellbeing effects will be undertaken in line with DMRB Volume 11, Section 3, Part 8¹³² and by applying professional judgment. It will draw on the conclusions of the People and Communities sub-topics of NMUs, amenity, severance, agricultural land and demolition of private property and associated land take. The human health and wellbeing assessment considers changes in levels of physical activity for NMUs in accordance with TAG Unit A4.1 guidance¹³³, predominantly considering changes in journey length and wellbeing. The assessment therefore considers NMUs state of feeling comfortable or happy through changes to barriers between NMUs and vehicles, and also changes in traffic flows where NMUs and traffic meet. Consideration is also given to the severance of routes connecting to community facilities and effects on private property and business predominantly through any land take or demolition requirements.

Non-Motorised Users

13.11.2 The assessment of effects on NMUs will be undertaken using the guidance contained within the DMRB Volume 11, Section 3, Part 8 Pedestrians, Cyclists, Equestrians¹³⁴, and by applying professional judgement. The assessment examines the likely detriment or improvement to NMU journeys, including changes to journey length and quality along the length and within the wider vicinity of each NMU facility.

Amenity

13.11.3 Amenity is described as the “*relative attractiveness or pleasantness of a route or place*” in DMRB 11.3.8 and as such, the assessment will consider all relevant assets, routes, communities, community facilities and recreational facilities within the study area. Changes to the degree and duration of people’s exposure to traffic, fear or safety for people or existing barriers between pedestrians and vehicle traffic, footpath width, distance from traffic and any crossing facilities are also considered in this assessment. Exposure to noise and dirt, poor air quality and effects relating to visual intrusion are also relevant to amenity, however these are appropriately covered in Chapter 11 Noise and Vibration, Chapter 5 Air Quality, and Chapter 7 Landscape.

13.11.4 The following criteria will establish the amenity of existing NMU routes and therefore potential changes in amenity, by applying professional judgement and guidance within the DMRB Volume 11 Section 3 Part 8 Chapter 4¹³⁵, which requires a descriptive approach to be employed indicating the change in

¹³² Highways England (2008) DMRB Volume 11 Section 3 Part 8 ‘Pedestrians, Cyclists, Equestrians and Community Effects’.

¹³³ Department for Transport (2014) TAG Unit A4.1 Social Impact Appraisal [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427096/TAG_Unit_A4.1_-_Social_Impact_Appraisal_November2014.pdf (last accessed October 2017).

¹³⁴ Highways England (2008) DMRB Volume 11, Section 3, Part 8 Pedestrians, Cyclists, Equestrians and Community Effects.

¹³⁵ Highways England (2008) DMRB Volume 11, Section 3, Part 8 Pedestrians, Cyclists, Equestrians and Community Effects.

amenity and providing a reference to forecast flows. The criteria in Table 13.4 below, along with the criteria in the magnitude of change (impacts) on amenity (Table 13.5) will be used to assess the overall change in amenity and significance. The following categories will be used to describe amenity:

Table 13.4: Categories used to describe amenity

Category	Description
Very Poor	NMUs required to cross or travel along a major road (i.e. an A-road or motorway) with no facilities specifically for NMUs.
Poor	NMUs required to either cross or travel along a minor road (i.e. a B-road or side road) in an urban area without any designated NMU facilities; or, cyclists required to travel along minor roads without any designated facilities.
Acceptable	NMUs required to cross or travel along a minor road in a rural area without any designated NMU facilities; or, NMUs are segregated from traffic, but are situated adjacent to a major or minor road; or, NMUs required to cross a major or minor road using a signalised crossing.
Good	NMUs completely separated from traffic.

Severance

13.11.5 Changes in journey times and amenity for pedestrians and others may be such that they affect adversely or beneficially, the degree to which a locality is subject to 'community severance'. DMRB outlines Community Severance as the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows. In addition to changes in Community Severance caused by changes in pedestrians' and others' ability to travel in the locality of a scheme, Severance may sometimes be caused by the demolition of a community facility or the loss of land used by members of the public.

13.11.6 The severance assessment will consider the effect of the scheme on key community facilities (as defined in Section 13.2), primarily through assessing the effects on NMU routes connecting to these facilities, as described in DMRB Volume 11 Section 3 Part 8 Chapter 2, using guidance in DMRB Volume 11 Section 3 Part 8 Chapters 6 and 9. The value of receptors relevant to Severance can be found in Table 13.5, whilst the magnitude criteria used for establishing effects on NMU routes and subsequently on key community facilities can be found in Table 13.6 and Table 13.7.

Motorised Travellers View from the Road

13.11.7 DMRB 11.3.9 considers that the existence of a new road may enable more people to see the surrounding landscape than before or require people to pass through visually unattractive areas. Route selection has potential to allow travellers to appreciate the wider area and their location in relation to distinctive landscape features through new appropriate views, although characteristics of the new road that may also intrude on views. The view from the road assessment will provide a qualitative overview of the views afforded by the Scheme however, consideration will not be given to the existing conditions experienced by MTs or construction stage effects, as DMRB considers only impacts for the new road. A description will also be provided for traveller's

exposure to different types of scenery through which the routes pass, using the four categories below:

- No view - road in deep cutting or contained by earth bunds, environmental barriers or adjacent structures;
- Restricted view – frequent cuttings or structures blocking the view;
- Intermittent view – road generally at ground level but with shallow cuttings or barriers at intervals; and,
- Open view – view extending over many miles, or only restricted by existing landscape features.

Driver Stress

13.11.8 The assessment of effects of driver stress will be undertaken using the guidance contained within DMRB Volume 11.3.9. DMRB considers that driver stress has three components: frustration, fear of potential accidents and route uncertainty. A qualitative overview will be provided for construction and operation periods applying the three-point descriptive scale (Low, Moderate or High) in line with DMRB 11.3.9.4. The construction driver stress assessment will consider the likely scope of works and will consider potential changes to traffic flows, speeds and congestion for roads within the study area, when compared with the baseline. The operational driver stress assessment will use the traffic model and consider changes in traffic flows and speeds with and without the Scheme in the first 15 years after opening.

Demolition of Private Property and Associated Land Take

13.11.9 The assessment of effects of the Scheme on private property and associated land take will be undertaken using the guidance contained within DMRB Volume 11, Section 3, Part 6 Land Use¹³⁶ and by applying professional judgement. The assessment will identify the type and number of properties (residential, commercial, industrial and farm) which might be at risk of demolition or land take as a result of the Scheme. The assessment will also consider the effects of land-take from private properties such as the loss of gardens, garages and other parking space in part or in whole. In addition, the effects to businesses in relation to employment implications and loss of facilities or amenities arising from the loss of all or part of a business will be assessed.

Community Land and Community Facilities, Development Land, and Local Economy

13.11.10 Further assessment will be undertaken in accordance with DMRB Volume 11.3.6 and 11.3.9, and will consider both direct and indirect effects arising as a result of the construction and operation of the Scheme. This will identify social and community resources in the study area, as well as receptors relevant to the topic, and then identify the activities relating to the Scheme that could have an effect on those receptors and resources.

¹³⁶ Highways England (2008) DMRB Volume 11 Section 3 Part 6 'Land Use'.

Agricultural Land

- 13.11.11 As outlined in DMRB, the former MAFF classified agricultural land in England and Wales by grade, according to the extent to which its physical or chemical characteristics impose long term limitations on agricultural use for food production. The MAFF ALC system classifies land into five grades numbered one to five with grade three divided into two sub-grades (3a and 3b). The best and most versatile agricultural land falls into grades one, two and sub-grade 3a. This land ranges from excellent (grade one) to good quality (sub-grade 3a) and is the most flexible, productive, and efficient in response to inputs. Land in sub-grade 3b is of moderate quality with lower yields, or a more restrictive cropping range, or both. Grades four and five are poor and very poor-quality land with severe or very severe limitations.
- 13.11.12 The DMRB also outlines the assessment of effects on individual farm businesses which considers; the type of husbandry, severance and major accommodation works for access, water supply and drainage. These are aspects which would be carried out as part of work to support the Environmental Statement, through an agricultural land questionnaire to specific identified farms. The assessment of effects on individual farm businesses will therefore be limited to the size and ALC grade of severed or potentially affected farms.

Significance of Effects

- 13.11.13 Criteria defining significance of effects are not outlined within DMRB Volume 11 Section 3 Part 6 or Part 8. However, DMRB Volume 11 Section 2 Part 5 provides an approach to determining significance of effects as outlined in Table 5.1 in Chapter 5; relying on reasoned argument, professional judgement and the views of appropriate organisations. This also takes into account the value (sensitivity) of the receptor and the magnitude of impact, in accordance with Table 5.1 within this report.
- 13.11.14 Interpreting the guidance from DMRB, the effect categories have been allocated the following value (sensitivity) (Table 13.5). All NMUs are highly sensitive to change and are considered to be highly valued. Therefore, the descriptors included in the magnitude of change table also correspond to the overall significance of effects for both NMUs (refer to Table 13.7) and amenity (refer Table 13.7). Table 13.6 and Table 13.7 draw on the guidance set out in the DMRB Volume 11 Section 3 Part 8 Chapters 2, 6 and 9. The assessment of amenity also considers the criteria set out in Sections 13.10.3 and 13.10.4.
- 13.11.15 For agricultural land, the value assigned is based on the ALC Grade and the magnitude of change is dependent on the area of land take (refer to Table 12.9). The significance of individual farm businesses, derived from professional judgement and interpreting the DMRB 11.3.8 Chapters 6-10, is based on the area of land take and proportion of land lost (refer to Table 13.9). Effects on severance of the land, husbandry, access and drainage for individual farm businesses will be considered within the Environmental Statement, when more detailed design information will be available.

- 13.11.16 For Severance, the significance of effects will be derived from professional judgement, DMRB Volume 11 Section 3 Parts 6 and 8 and using Table 13.5 which considers the value of each receptor. Severance considers the effect of a scheme on key community facilities, primarily through assessing the effects on NMU routes connecting to these facilities, as described in DMRB Volume 11 Section 3 Part 8 Chapter 2, using guidance in DMRB Volume 11 Section 3 Part 8 Chapters 6 and 9. This assessment will use the magnitude criteria set out in Table 13.6 and Table 13.7 below to determine the effect on NMU routes connecting to key community facilities within the study area.
- 13.11.17 People are particularly sensitive to change and are vulnerable receptors with very little capacity and means to absorb changes. People are therefore considered to be highly valued for the assessment of demolition of private property and land take. This is based on professional judgement and aligns with the DMRB, however, this is in line with national policy which promotes good health and quality of life for people and requires applicants identify any 'likely significant environmental impacts that would have an effect on human beings' and 'identify measures to avoid, reduce or compensate adverse health impacts as appropriate' (paragraph 4.81 -4.82 of the NPSNN). Refer to Sections 13.11.19 to 13.11.24 for further information describing the assessment for Private Property and Associated Land Take, Community Land and Community Facilities, Development Land, and Local Economy.
- 13.11.18 Views from the Road assesses only views from the new road during operation, and considers where any change in views are beneficial, (where there would be a shift in category from no view to restricted, intermittent or open view), adverse (where there would be a shift in category from open view towards intermittent, restricted or no view) or neutral (no change in view category). A Low, Moderate and High descriptive scale is used to provide a qualitative description on driver stress changes from the baseline for MTs. The overall significance of effect is assessed using an on-balance approach.

Table 13.5: Value (Sensitivity)

Effect Category	Value
Non-Motorised Users	High
Amenity	High
Agricultural land	Dependent on ALC (refer to Table 13.8)
Individual Farm Businesses	Dependent on area of land-take
Severance	Low or medium (depending on the community facility severed)
Demolition of private property	High
Land take (High
View from the Road	Low
Driver Stress	Low
Community Land and development land	Dependent on magnitude criteria (refer to Table 13.10)
Community facilities	Dependent on magnitude criteria (refer to Table 13.10)
Local economy	Dependent on magnitude criteria (refer to Table 13.10)

Source: Derived by professional judgement and based on DMRB 11.3. 6, 11.3.8, and 11.3.9

Table 13.6: Impacts and Magnitude of Change on NMUs

Description of impacts on NMUs	Magnitude
<ul style="list-style-type: none"> Substantially improve NMU network through the provision of new amenities for NMUs where none existed previously. Length of journeys decreased by over 500m. 	Major Beneficial
<ul style="list-style-type: none"> Improve existing NMU network through the provision of new amenities for pedestrians and cyclists where few or none existed previously. Length of journeys decreased by 250-500m. 	Moderate Beneficial
<ul style="list-style-type: none"> Improve existing NMU network through the upgrading of existing amenities or provision of new amenities for NMUs where some already exist. Length of journeys decreased by up to 250m. 	Minor Beneficial
<ul style="list-style-type: none"> Length of journeys not materially changed. 	Negligible Beneficial
<ul style="list-style-type: none"> No change to journey length. 	No Change
<ul style="list-style-type: none"> Length of journeys not materially changed. 	Negligible Adverse
<ul style="list-style-type: none"> Improvements to existing NMU amenities are not provided. Length of journeys increased by up to 250m. 	Minor Adverse
<ul style="list-style-type: none"> Existing NMU facilities are degraded. Length of journeys increased by 250-500m. 	Moderate Adverse
<ul style="list-style-type: none"> Closure/ removal of NMU amenities where they previously existed. Length of journey journeys increased by over 500m. 	Major Adverse

Source: Derived by professional judgement and based on DMRB 11.3.8 Chapter 6

Table 13.7: Impacts and Magnitude of Change on Amenity

Description of impacts on Amenity	Magnitude
<ul style="list-style-type: none"> Substantial improvement to NMU network through the provision of new amenities for pedestrians and cyclists where none existed previously. 	Major Beneficial
<ul style="list-style-type: none"> Improvement to a greater degree than Minor (determined through professional judgement) for the existing NMU network through the provision of new amenities for pedestrians and cyclists where few or none existed previously. 	Moderate Beneficial
<ul style="list-style-type: none"> Improve existing NMU network through the provision of new amenities for pedestrians and cyclists where few or none existed previously. 	Minor Beneficial
<ul style="list-style-type: none"> No change in facilities 	No Change
<ul style="list-style-type: none"> Pedestrian at grade crossing of a new road carrying below 8000 vehicles per day (AADT) A new bridge would need to be climbed or a subway traversed 	Minor Adverse
<ul style="list-style-type: none"> Pedestrian at grade crossing of a new road carrying between 8000- 16000 vehicles per day (AADT) in the opening year 	Moderate Adverse
<ul style="list-style-type: none"> Pedestrian at grade crossing of a new road more than 16000 vehicles per day (AADT) in the opening year 	Major Adverse

Source: Derived by professional judgement and based on DMRB 11.3.8 Chapter 6

Table 13.8: Value and Magnitude Assigned to the Assessment of Agricultural Land as a National Resource

Grade	Value	Magnitude		
		Land take		
		>20ha	<20ha	indirect
1 and 2	High	Major Adverse	Moderate Adverse	Minor Adverse
3a	Medium	Moderate Adverse	Minor Adverse	Minor Adverse
3b and 4	Low	Minor Adverse	Minor Adverse	Minor Adverse

Source: Derived by professional judgement and based on DMRB 11.3.6 Chapters 6-10

Table 13.9: Value and Magnitude Assigned to the Assessment of Individual Farm Businesses

Receptor	Value	Magnitude		
		25% permanent land lost and/or access severely severed	10-24% permanent land lost and/or access partially severed	1-9% permanent land lost and/or minor access severed
Total area < 20ha and/or limited or highly specific range of high-value crops/livestock and low operational flexibility	High	Large or very Large Adverse	Moderate or Large Adverse	Slight or Moderate Adverse
Total area 20-50 ha and/or some diversification or range of crop/livestock types	Medium	Large or Moderate Adverse	Moderate Adverse	Slight Adverse
Total area >50ha and/or highly diversified income and flexible management	Low	Slight or Moderate Adverse	Slight Adverse	Neutral or Slight Adverse

Source: Derived by professional judgement and based on DMRB 11.3.6 Chapters 6-10

Private Property and Associated Land Take, Community Land and Community Facilities, Development Land, and Local Economy

13.11.19 For the sub-topics of Private Property and Associated Land Take, Community Land and Community Facilities, Development Land, and Local Economy receptors include:

- Residents in the immediate area of the Scheme;
- Landowners in the immediate area of the Scheme;
- Local employers and businesses in the area;
- Employees and job-seekers, particularly those who live locally; and,
- Users of community facilities in nearby villages, such as educational establishments, health facilities, recreational facilities, places of worship and public transport.

13.11.20 Resources include existing and potential:

- Residential properties and business premises;
- Residential, business, community and development land affected by the Scheme, construction works, and compounds; and,
- Community facilities and services including, for example, public transport, hospitals and community health facilities, primary and secondary schools, nurseries, places of worship and leisure and recreation services.

13.11.21 The sensitivity of these receptors and resources is governed by their capacity to absorb proposed changes arising from the Scheme. It ultimately reflects their vulnerability to the impacts of the proposed activities and their access to additional or alternative resources of a similar nature. If a resource is frequently used, if few alternatives exist, or if receptors have limited capacity to absorb the changes arising from the Scheme, that receptor is considered to be sensitive to the changes. Criteria describing the sensitivity of receptors are identified Table 13.10.

Table 13.10: Socio-Economic Sensitivity Criteria

Sensitivity	
High	<ul style="list-style-type: none"> • An already vulnerable receptor with very little capacity and means to absorb changes. • No alternative facilities, access arrangements or opportunities are available within an easily accessible distance. • A highly or frequently accessed resource.
Medium	<ul style="list-style-type: none"> • A non-vulnerable receptor with limited capacity and means to absorb changes. • A limited range of alternative facilities, access arrangements or opportunities are available within an easily accessible distance. • A moderately, or-semi-frequently accessed resource.
Low	<ul style="list-style-type: none"> • A non-vulnerable receptor with sufficient capacity and means to absorb changes. • A wide range of alternative facilities, access arrangements or opportunities are available within an easily accessible distance. • An infrequently accessed resource.

13.11.22 To assess the magnitude of an impact on these receptors and resources, each impact arising is assessed in terms of the following indicators:

- Spatial scope – whether impacts are likely to be felt within the proposed Scheme boundary, within the Local Impact Area (LIA) which extends to 250m from the Scheme boundary (refer to Section 13.2) or Wider Impact Area (WIA) which extends to the District of Somerset, or more widely;
- Extent – how many social and community resources and receptors are likely to be impacted;
- Duration – whether the impacts would be short or long-term; and
- Reversibility – whether the impact is permanent or temporary.

13.11.23 Taking these indicators into consideration, and also any mitigation measures that can be applied; the criteria are used as guidelines to assess the magnitude of each impact. This is described in more detail in Table 13.11.

Table 13.11: Socio-Economic and Community Impact Magnitude Criteria

Magnitude	Criteria guidelines
Major	<ul style="list-style-type: none"> • Affects receptors within the WIA and beyond. • Affects the well-being of many receptors (or the well-being of a few receptors in an acute way for an extended period). • Affects receptors for an extended period (e.g. the majority of the construction period or is permanent). • Requires considerable intervention to return to the baseline.
Moderate	<ul style="list-style-type: none"> • Affects either the well-being of receptors beyond the site boundary into the LIA. • Affects the well-being of a moderate number of receptors. • Continues over a number of years, but the baseline is re-established quickly. • May require some intervention to return to the baseline conditions.
Minor	<ul style="list-style-type: none"> • Affects the well-being of a small number of receptors. • Occurs exceptionally, mostly within the site boundary. • Does not extend beyond the life of the Proposed Scheme (the end of the construction period or first year of operation). • Baseline returns naturally or with limited intervention within a short timescale.
Negligible	<ul style="list-style-type: none"> • Localised to a specific location within the site. • Temporary or unlikely to result in detectable impact on the well-being of people or a socio-economic resource. • Considered to be a risk that is manageable with intervention. • Baseline remains consistent.

13.11.24 The significance of any potential effects is evaluated by combining the assessment of magnitude of each impact and the sensitivity of the receptor or resource; effects can be beneficial or adverse. The significance of effect is then determined using Table 5.2. For the purposes of the assessment, effects that are Moderate, Large, or Very Large are considered significant.

13.12 Conclusion

13.12.1 The proposed scope of the ES is contained within Table 13.12, and further summarised in the below text.

Table 13.12: Proposed Scope of the People and Communities chapter of the ES

Stage	Scoped In	Scoped Out
Construction	NMUs, Severance, Amenity, Agricultural Land, Driver Stress, Demolition of Private Property and Associated Land Take, Community Land & Community Facilities, and the Local Economy – to DMRB Detailed level. Human Health and Wellbeing.	Development Land, MT's View from the Road– no further assessment required during construction.
Operation	NMUs, Severance, Amenity, Agricultural Land, Driver Stress, MT's View from the Road, Community Land & Community Facilities, and the Local Economy – to DMRB Detailed level. Human Health and Wellbeing.	Development Land, Demolition of Private Property and Associated Land Take – no further assessment required once operational.

-
- 13.12.2 Further assessment is required to a DMRB Detailed level for NMUs, Severance, and Amenity. During construction, not significant adverse effects are likely, however given existing design and mitigation uncertainties, a Detailed assessment is required to ensure that effects have been correctly identified. During operation, although on balance not significant effects are likely for each sub-factor, there is potential for significant effects at individual receptors. Furthermore, there are also existing design and mitigation uncertainties, and therefore a Detailed assessment is required. These assessments will be carried out in accordance with the DMRB Volume 11, Section 3, Part 8 'Pedestrians, Cyclists, Equestrians and Community Effects' and Part 6 'Land Use' respectively.
- 13.12.3 Further assessment is required to a DMRB Detailed level for Agricultural land, including individual farm businesses with the potential for significant adverse effects during construction and operation.
- 13.12.4 Further assessment is also deemed necessary for MTs View from the Road and Driver Stress (during operation) for the proposed Scheme to a DMRB Detailed level, as although effects are unlikely to be significant, there are still existing design and mitigation uncertainties, and therefore a DMRB Detailed level assessment is required to ensure that effects have been correctly identified. This will be carried out in accordance with DMRB Volume 11, Section 3, Part 9 'Vehicle Travellers'. Further assessment for Driver Stress is also necessary for construction as well, as although effects are not likely to be significant, a DMRB Detailed level assessment is needed to ensure that effects have been correctly identified.
- 13.12.5 Further assessment is deemed necessary for Human Health and Wellbeing. The assessment of human health and wellbeing effects will be undertaken in line with DMRB Volume 11, Section 3, Part 8. The ES will set out the methodology recognising the requirements of the NPSNN, including how significance of effects are to be determined.
- 13.12.6 Effects on Demolition of Private Property and Associated Land Take during operation have been scoped out of further assessment, as effects on private property and land take would occur during the construction phase of the Scheme, and would dissipate during the operation phase.
- 13.12.7 Further assessment for the Scheme, in accordance with DMRB Volume 11.3.6 and 11.3.9, is also necessary for Community Land and Community Facilities, and the Local Economy, as although significant effects are not likely, a DMRB Detailed level assessment is required to verify that this is correct. This will involve a further assessment of impacts of the Scheme that could have an effect on Community Facilities and receptors, as well as the local economy.
- 13.12.8 Development Land has been scoped out of further assessment, with no direct effects predicted, however the baseline for this topic should be reviewed due to the evolving nature of development land.
- 13.12.9 The DMRB Detailed level of assessment will be presented within an ES.
-

14 Road Drainage and the Water Environment

14.1 Introduction

- 14.1.1 This chapter addresses the potential effects as a result of the construction and operation of the proposed Scheme on the Road Drainage and the Water Environment factor. It has been prepared in accordance with DMRB Volume 11, Section 2, Part 4¹³⁷, and DMRB Volume 11, Section 3, Part 10¹³⁸, to a Scoping Level. The factor incorporates surface water and groundwater, water resources and flood risk.
- 14.1.2 The potential requirement for further assessment to either DMRB Simple or Detailed level will be identified. Where required, this will be presented within an Environmental Statement (ES).

14.2 Study Area

- 14.2.1 The study area encompasses surface water features, human health receptors (taken to be drinking water abstractions in the context of this chapter), water resources and flood zones within a 1km area around the Scheme. This is extended where there are features that may be affected by pollutants transported downstream of the works, and therefore these features would be included in the assessment as appropriate. Additionally, for groundwater the potential zone of impact during construction and operation phases will be assessed on the underlying Water Framework Directive (WFD) groundwater body.

14.3 Baseline Conditions

- 14.3.1 Information relating to flood zones has been obtained from the Environment Agency's indicative flood mapping¹³⁹, and information on Surface Water Nitrate Vulnerable Zones, Water Framework Directive (WFD) waterbodies, and priority outfalls, has been obtained using the Environment Agency's Catchment Data Explorer¹⁴⁰.

Surface Water

- 14.3.2 The land alongside the Scheme is mainly used for arable cropping, interspersed with residential properties and farms. There is a network of drainage ditches and field drains, some of which are spring fed and some are partially culverted where they flow under the existing A303. This network forms tributaries of the

¹³⁷ Highways England (2008) DMRB Volume 11 Section 2 Part 4 HA 204/08 Scoping of Environmental Impact Assessments.

¹³⁸ Highways England (2008) DMRB Volume 11 Section 3 Part 10 HD 45/09 Road Drainage and the Water Environment.

¹³⁹ Environment Agency (2017) Flood mapping for Planning [online] available at: <https://flood-map-for-planning.service.gov.uk/> (last accessed November 2017)

¹⁴⁰ Environment Agency (2017) Catchment Data Explorer [online] available at: <http://environment.data.gov.uk/catchment-planning/> (last accessed November 2017).

Cam - Lower waterbody to the south of the Scheme, Park Brook to the west of the Scheme and Dyke Brook to the north of the Scheme.

- 14.3.3 The Cam - Lower WFD waterbody (GB108052015650) is located approximately 680m to the south of the Scheme. It is not classified as an artificial or heavily modified water body (HMWB) and is currently rated as Moderate status in the 2015 South West River Basin Management Plan (RBMP) with the objective of achieving Good status by 2027.
- 14.3.4 The Yeo Ds Over Compton WFD waterbody (GB108052015682) is the downstream waterbody of Cam - Lower and is located approximately 4.4km downstream to the south-west. It is classified as a HMWB and is currently rated as Moderate potential in the 2015 South West RBMP with objective of achieving Good potential by 2027. It supports the Wet Moor Site of Special Scientific Interest (SSSI) and the Somerset Levels and Moors Special Protection Area (SPA) and Ramsar site.
- 14.3.5 To the south-west and to the north of the Scheme, the drainage ditches outfall into Park Brook (1.2km downstream) and Dyke Brook (1.6km downstream). These are not classified as WFD waterbodies but are tributaries of the Cary - source to conf with KSD WFD waterbody (GB108052015140), which is located to the west of the Scheme, approximately 4.5km downstream from the eastern section of the Scheme via Dyke Brook and approximately 2.9km downstream from the west end of the Scheme via Park Brook. The Cary - source to conf with KSD WFD waterbody is not designated as an artificial or HMWB and is currently rated as Moderate status in the 2015 South West RBMP with objective of achieving Good status by 2027.
- 14.3.6 The Cary - source to conf with KSD WFD waterbody supports the King's Sedgemoor SSSI, the Somerset Levels & Moors SPA and Ramsar and the Somerset Levels National Nature Reserve (NNR). See Table 14.1 for Local Wildlife Sites (LWS) within the study area.

Groundwater

- 14.3.7 There is no underlying WFD groundwater body within the study area. However, the groundwater is mainly classified as Secondary A both for superficial and bedrock deposits.
- 14.3.8 The Scheme lies over an area of bedrock classed as a Secondary A aquifer, with a small area classed as Secondary B around Queen Camel¹⁴¹. To the north and to the south of the A303 there are superficial groundwater layers classed as a Secondary A aquifer, although these do not directly underlie the Scheme. The groundwater vulnerability is predominantly Minor Aquifer Intermediate with areas of Minor Aquifer High around the surface waterbodies.

¹⁴¹ Environment Agency (2017) What's In Your Backyard? [online] available at: <http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=360500.0&y=126500.0&topic=groundwater&ep=map&scale=9&location=Sparkford,Somerset&lang=en&layerGroups=default&distance=&textonly=off#x=357685&y=125967&lg=4,10,&scale=7> (Last accessed October 2017).

14.3.9 Due to the geology of the area, which is mainly loamy and clay soils, the natural drainage system drains to surface watercourses with impeded drainage to the groundwater¹⁴². However, this is not valid for the areas along Dyke Brook and Park Brook where, despite the loamy and clay soil, the area is naturally wet with a high-water table and the natural drainage system drains to the local groundwater feeding into surface watercourses.

14.3.10 There are no Source Protection Zones (SPZs) within the study area, the closest is an SPZ2 4.4km to the south-east of the eastern end of the Scheme. This is defined as a 400-day travel time between a point below the surface to the groundwater abstraction.

Flood Zones

14.3.11 There are areas of Flood Zones 3 and 2 to the north and south of the Scheme classified as, mainly associated with the Dyke Brook and River Cam. These zones are defined as follows:

- Flood Zone 3 is land assessed as having a 1-in-100 or greater annual probability of river flooding (>1%); and,
- Flood Zone 2 is land having a 1-in-1000 or greater annual probability of river flooding (0.1%).

14.3.12 Flood defences are located to the south of the Scheme in Queen Camel, West Camel and Bridgehampton. However, there are no areas benefitting from flood defences.

Protected Zones and Sites

14.3.13 The surface water to the north of the existing A303 is within a Nitrate Vulnerable Zone (NVZ). This is likely to be due to the nitrates contained in runoff from agricultural land that is causing, or could cause, pollution of the water environment.

14.3.14 The Scheme is located within the SSSI Impact Risk Zone (IRZ) of Sparkford Wood, Babcary Meadows, East Polden Grassland and Wet Moor SSSIs. IRZs have been developed by Natural England to define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified, and indicate the types of development proposal which could potentially have adverse effects.

14.3.15 Sparkford Wood SSSI is located 1.4km north-east of the Scheme and is designated for broadleaved, mixed and yew woodland. Babcary Meadows SSSI is located 3.9km to the north of the Scheme and is designated for neutral grassland. East Polden Grassland SSSI is located 4.2km north-west of the Scheme and is designated for calcareous grassland. However, these sites are not hydraulically linked to the Scheme, and therefore will not be considered further within this assessment. Sparkford Wood SSSI, Babcary Meadows SSSI and East Polden Grassland SSSI are therefore scoped out of this assessment.

¹⁴² Cranfield University (2017) Soilscales Map [online] available at: <http://www.landis.org.uk/soilscales/> (Last accessed October 2017).

14.3.16 The Wet Moor SSSI is located 15.5km to the west of the Scheme, via the Cam – Lower waterbody and is designated for birds, invertebrates, neutral grassland, rivers and streams, standing open water and canals. The Wet Moor SSSI forms part of the Somerset Levels & Moors SPA and Ramsar site.

14.3.17 The King's Sedgemoor SSSI is located to the west of the Scheme, 17.9km via Park Brook and 20km via Dyke Brook. It is designated for birds, invertebrates, otters, neutral grassland, standing open water and canals. The King's Sedgemoor SSSI include the Somerset Levels NNR and forms part of the Somerset Levels and Moors SPA and Ramsar site.

14.3.18 Several LWS are located in the study area and are reported in Table 14.1.

Table 14.1: Existing LWS within the study area (from east to west)

LWS	Distance and direction from the proposed Scheme	Features
Hazlegrove Park	Crossed by the Scheme	Important assemblage of veteran trees and specialist invertebrate fauna
Sparkford Hill Copse	400m, south-east	Ancient woodland
Ridge Copse	50m, south	Semi-natural broadleaved woodland and quarry workings
Gason Lane Field	25m, south	Semi-improved calcareous grassland, with a narrow strip of broadleaved woodland
Camel Hill Transmitter Site	Adjacent, south	Unimproved calcareous grassland and semi-natural broadleaved woodland
Yarcombe Wood	840m, north	Ancient semi-natural broadleaved woodland and pond
Vale Farm Field	470m, north	Remnants of calcareous grassland
Parson's Steeple	230m, north	Ancient woodland site with semi-natural broadleaved woodland and mixed plantation stands
Lindsay House Quarry*	290m, north	Small quarry with herb rich calcareous grassland, scrub and broadleaved woodland
Annis Hill*	330m, north	Ancient semi-natural broadleaved woodland
Bower Plantation*	750m, north	Semi-natural broadleaved woodland
Cogberry Plantation	590m, north	Ancient semi-natural broadleaved woodland
River Cary	1.5km, north-west	Aquatic habitat with rare flora, bird and invertebrate interest including legally protected species
Downhead Manor Farm (candidate LWS ¹⁴³)	Adjacent, north	Ancient semi-natural & semi-natural broadleaved woodland. Small quarry with herb rich calcareous grassland and broadleaved woodland and Secondary broadleaved woodland (previously designated as Lindsay House Quarry, Annis Hill and Bower Plantation).

¹⁴³ Somerset Environmental Record Centre (2017). Evaluated Site Details – Around site at ST 5798 2543.

* Included in Downhead Manor Farm Candidate LWS.

Licenced Abstractions

14.3.19 There are no surface water or groundwater abstractions in the study area. The closest surface water abstraction is approximately 2.9km south-west of the Scheme, in Ilchester; while the closest groundwater abstraction is approximately 3.5km north-west of the Scheme, in Charlton Adam¹⁴⁴. As these lie outside of the study area, they will not be considered within the Road Drainage and Water Environment assessment.

Consented Discharges

14.3.20 The active consented discharges within 1km of the Scheme¹⁴⁵ are reported in Table 14.2.

Table 14.2: Existing water consented discharges within 1km of the Scheme

Owner	Location	Grid reference	Approximate distance and direction from the Scheme	Nature of discharge
Chartman Limited	Wakes Garage, A359/A303, Sparkford, Somerset, BA22 7JE	ST6000025820	225m, southeast	Shop including garden centre/retail trade (not motor vehicle)
Mr M Penn	Haynes Motor Museum, Sparkford, Yeovil, Somerset	ST6090026900	860m, northeast	Single domestic property including farm house
Kelda Water Services (Estates) Limited	Dwelling, Eyewell House, Camel Hill, Queen Camel, Yeovil, Somerset	ST5875025300	35m, south	Multiple domestic property including farm houses
Wessex Water Services Ltd	Green Lane Pumping Station, Green Lane, Queen Camel, Somerset, BA22 7NP	ST5929424948	645m, south	Storm tank/combined sewer overflows on sewerage network (water company)
G P Spiller	Wales Farm, Queen Camel,	ST5849024640	780m, south	Farms (not house)/crop and

¹⁴⁴ Environment Agency (2017) What's In Your Backyard? [online] available at: http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=360500.0&y=126500.0&topic=water_abstractions&ep=map&scale=9&location=Sparkford,Somerset&lang=en&layerGroups=default&distance=&textonly=off#x=357226&y=125882&lg=2,1,&scale=7 (last accessed November 2017).

¹⁴⁵ Environment Agency. Environmental Permitting Regulations [online] available at: <https://environment.data.gov.uk/public-register/view/search-water-discharge-consents> (last accessed November 2017).

Owner	Location	Grid reference	Approximate distance and direction from the Scheme	Nature of discharge
	Yeovil, Somerset, BA22 7PA			animal rearing/plant nursery
Mr W J Down & Partners	Slocourt Farm, Urgashay, Yeovil, Somerset	ST5709024470	575m, south	Farms (not house)/crop and animal rearing/plant nursery
Wessex Water Services Limited	Frog Lane Pumping Station, West Camel, Somerset	ST5753024630	540m, south	Pumping station on sewerage network (water company)
D L & H L Board	Church Farm, Podimore, Yeovil, Somerset	ST5456024780	465m, south-west	Farms (not house)/crop and animal rearing/plant nursery
Wessex Water Services Ltd	Podimore Sewage Treatment Works	ST5443024700	630m, south west	Waste water/sewage treatment works (water company)

Contaminated Land

14.3.21 No authorised landfills are present within the study area.

14.3.22 Three historic landfills are located to the east area of the Scheme, as follows:

- Land Adjacent to Hazlegrove Park is adjacent to the existing A303 to the north-west of Sparkford;
- Camel Hill Quarry is approximately 160m to the south of the new Hazlegrove roundabout; and,
- Sparkford Refuse Tip that is approximately 770m to the south-east of the new Hazlegrove roundabout.

14.3.23 These areas might be subject to contamination; reference should be made to Chapter 8 Geology and Soils for further information. The works would not affect Camel Hill Quarry and Sparkford Refuse Tip would not be within the footprint of or hydraulically connected to the proposed Scheme and these two historic landfills will therefore not be considered within the Road Drainage and the Water Environment assessment.

14.4 Assumptions and Limitations

14.4.1 It is assumed that the design would ensure treatment/containment facilities are fully incorporated to control any risk to the water environment, and all mitigation measures in accordance with standard guidance will be adhered to.

14.5 Guidance and Best Practice

14.5.1 The guidance and best practice listed below represent the approach required to meet the following statutory and non-statutory requirements:

- National Policy Statement for National Networks¹⁴⁶ (NPSNN);
- National Planning Policy Framework (NPPF) ¹⁴⁷ and its associated Technical Guidance¹⁴⁸;
- Groundwater protection guides covering: requirements, permissions, risk assessments and controls¹⁴⁹ , previously covered in GP3); and
- The Planning Inspectorate Advice Note Eighteen: The Water Framework Directive.

14.5.2 The Road Drainage and Water Environment assessment will be carried out in accordance with Highways England's technical guidance provided in DMRB Volume 11, Section 3, Part 10 (HD 45/09).

14.6 Consultation

14.6.1 Initial consultation was undertaken with the Environment Agency (see Chapter 4 for further details). A meeting was held with the Environment Agency on the 4 July 2017 to discuss the proposed Scheme options in relation to aquatic ecology, flood risk and the WFD. Discussion was held relating to the assessment methodology, mitigation proposals and to confirm the Environment Agency's requirements. Further consultation will be undertaken throughout the preparation of the ES.

14.7 Potential Impacts

Construction

14.7.1 There is the potential for mobilisation of sediment and contaminants from road runoff to the watercourses as a consequence of road construction. Construction activities for the proposed Scheme could increase the risk of a pollution incident at the site of works, associated with contaminated land or spills/leaks of chemicals. This could adversely affect the hydraulically linked LWSs near to the Scheme.

¹⁴⁶ Department for Transport (2015) National Policy Statement for National Networks [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/NNNPS-web.pdf (last accessed September 2017).

¹⁴⁷ Department for Communities and Local Government (2012) [online] available at <https://www.gov.uk/government/publications/national-planning-policy-framework--2>, (last accessed October 2017).

¹⁴⁸ Department for Communities and Local Government (2012) [online] available at: <https://www.gov.uk/government/collections/planning-practice-guidance> (last accessed October 2017).

¹⁴⁹ Environment Agency (2017) [online] available at: <https://www.gov.uk/government/collections/groundwater-protection> (last accessed October 2017).

Operation

- 14.7.2 Contaminants within surface water runoff due to traffic typically include vehicle emissions (including atmospheric deposition), vehicle part wear and vehicle leakages, catalytic converters, road surface erosion, and seasonal and regular maintenance practices. Possible contaminants include particulate solids, hydrocarbons (diesel, petroleum, lubricating oil leakages, and grease), heavy metals (especially copper and zinc but also cadmium, iron, lead and chromium in lesser amounts), oxides of nitrogen, sulphates, rubber, asbestos, tyre wear deposits including lead, zinc, and hydrocarbons, and de-icer during cold weather. All these can have adverse effects on receiving watercourses.
- 14.7.3 The additional impermeable area resulting from the new road would generate additional surface water runoff, which if not attenuated, could increase flood risk to the surrounding area.

14.8 Design, Mitigation and Enhancement Measures

Construction

- 14.8.1 To attenuate surface water run-off, prevent pollution within surface water discharge, physical effects from new structures (i.e. piling, outfalls, embankments) and to ensure no increase in flood risk, standard mitigation measures would be included in the CEMP, and Sustainable Drainage Systems (SuDS) would be implemented.
- 14.8.2 Mitigation measures would be contained within the CEMP for Land Adjacent to Hazlegrove Park, the historic landfill site adjacent to the Scheme, to avoid mobilisation of contaminated soil or contaminated runoff in the nearby drainage ditches. The CEMP would also prevent adverse effects on the bedrock aquifer during construction. These mitigation measures would ensure that residual effects would be not significant during construction.

Operation

- 14.8.3 The Scheme would result in a change to the road drainage. The introduction of a new road and the potential increase in the volume of traffic could result in an increase in pollutant input from highways runoff if unmitigated, resulting in long term increase in direct effects of diffuse pollution. However, pollution control measures and attenuation features within the Scheme's drainage design would ensure that residual effects would be not significant during operation.
- 14.8.4 As the Scheme has a footprint greater than 1ha, a Flood Risk Assessment (FRA) will be produced to ensure no increased surface water run-off and/or reduction in flood plain storage results from the Scheme.

14.9 Description of the Likely Significant Effects

- 14.10 Due to the Scheme's location along the ridge of Camel Hill, and with the implementation of best practice mitigation measures as described in Section 14.8 above, it is not anticipated that the Scheme would directly affect any surface watercourses or groundwater. As such, there are unlikely to be any

significant adverse effects, and it is proposed that this factor is scoped out of the ES.

14.11 Proposed Level and Scope of Assessment

14.11.1 In the absence of mitigation, construction activities have the potential to increase the runoff of sediment and contaminants to watercourses and pose an increased risk of a pollution incident associated with contaminated land or spills/leaks of chemicals. However, as described above in Section 14.8, best practice construction measures to be included within the CEMP in accordance with CIRIA Guidelines would prevent effects due to contaminated run-off during construction. SuDS incorporated within the Scheme's drainage design would prevent pollution during operation, which will be confirmed using the Highways Agency Water Risk Assessment Tool (HAWRAT). The results of this assessment will be presented as a separate report to the ES.

14.11.2 As the Scheme would not directly affect any surface watercourses or groundwater due to its location along the ridge of Camel Hill and the measures described above to control indirect effects, any effects on Road Drainage and the Water Environment would be not significant and therefore do not warrant further assessment. Effects on the water environment, including interrelationships with population and human health, land, soils, air, water and climate, as listed in Schedule 5(2) of the Infrastructure Planning (EIA) Regulations during construction and operation are therefore scoped out and it is proposed that the Road Drainage and the Water Environment environmental factor be scoped out of the ES.

14.11.3 A preliminary WFD assessment will be carried out, as described in Section 14.8.1, and as the Scheme has a footprint greater than 1ha, an FRA will also be carried out. The FRA will form part of the Drainage Strategy document and the WFD assessment will be presented as an appendix to the ES.

14.12 Proposed Methodology including Significance

14.12.1 A preliminary WFD assessment will be carried out in accordance with Environment Agency documents 'Water Framework Directive compliance of physical works in rivers Screening step 1.3: WFD deterioration & risk to water body status objectives', 'Assessing new modifications for compliance with WFD' and its accompanying Detailed Supplementary Guidance note and PINS Advice Note 18 The Water Framework Directive¹⁵⁰.

14.12.2 The FRA will be carried out in accordance with the requirements of the NPSNN and the NPPF and its accompanying Technical Guidance, and the Environment Agency's 'Climate change allowances for planners' NPPF supporting guidance.

14.13 Conclusion

14.13.1 The proposed scope of the ES is contained within Table 14.3 below.

¹⁵⁰ The Planning Inspectorate (2017) Advice Note 18 'The Water Framework Directive' [online] available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf (last accessed October 2017).

Table 14.3: Proposed Scope of the Road Drainage and Water Environment chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Flood Risk WFD compliance	Road Drainage and the Water Environment ES chapter
Operation	Flood Risk WFD compliance	Road Drainage and the Water Environment ES chapter

14.13.2 Likely significant effects on the water environmental have not been identified within this Environment Impact Assessment Scoping Report, due to best practice construction measures within the CEMP and SuDS incorporated within the drainage design. Residual effects on Road Drainage and the Water Environment therefore do not warrant further assessment and it is proposed that the Road Drainage and the Water Environment environmental factor be scoped out of the ES.

14.13.3 A WFD screening assessment and FRA will be carried out in accordance with the guidance described in Section 14.8, and will be reported as appendices to the ES.

15 Climate

15.1 Introduction

- 15.1.1 It has now been established that as a result of rising concentrations of Carbon, Dioxide (CO₂), and other greenhouse gases in the atmosphere, a degree of climate change is inevitable and is expected to have significant implications for infrastructure assets in future, particularly those with long operational lifetimes. This makes them sensitive, not only to the existing climate at the time of their construction, but also to climate variations over the decades of their use. In addition, the Climate Change Act was passed in November 2008 and it sets ambitious, legally binding targets of reducing CO₂, emissions by 34% by 2020 and 80% by 2050, relative to the 1990 baseline.
- 15.1.2 This section presents the outcomes of the scoping assessment for the climate change related environmental factor. To align with the requirements of the Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017 and the National Policy Statement for National Networks (NPSNN) it has been divided into two separate aspects:
- Greenhouse gas (GHG) impact assessment – effects on climate change of GHG emissions arising from the proposed Scheme, including how the project will affect the ability of Government to meet its carbon reduction plan targets (in accordance with Paragraph 5.17 of the NPSNN); and,
 - Climate change resilience assessment – the resilience of the proposed Scheme to climate change impacts., including how the proposal will take account of the projected impacts of climate change (in accordance with Paragraph 4.40 of the NPSNN and the Infrastructure Planning (EIA) Regulations 2017).
- 15.1.3 The potential requirement for further assessment will be identified within this chapter. Where necessary, further assessment will be presented within the Environmental Statement.

15.2 Study Area

Effects on Climate

- 15.2.1 The effects on climate assessment will consider the greenhouse gas emission potential throughout the lifecycle of the Scheme for both construction and operation (the latter for the design-life of the Scheme).

Vulnerability of the Scheme to Climate

Spatial scope

- 15.2.2 Climate change effects on the proposed design elements of the proposed Scheme such as structures, technology, mitigation and compensation areas and the environmental receptors will be considered.

Technical scope

- 15.2.3 The assessment will identify the key climate effects on the proposed Scheme design elements such as structures or technological assets, as well as environmental receptors identified within this Scoping Report that may be affected by the Scheme, in the context of climate change.

Temporal scope

- 15.2.4 The assessment of climate change effects will consider construction and operational effects on the proposed Scheme as a result of climate change. Climate change effects on construction have the potential to be scoped out depending on the construction duration. The operation assessment will be informed by the design-life of key elements of the Scheme and availability of UK Climate Projections.

15.3 Baseline Conditions

Effects on Climate

- 15.3.1 In this context, existing carbon emissions from a variety of sources in the area are considered, including those from transport infrastructure. From a UK perspective, national greenhouse gas emissions in 2015 decreased by 38% from 1990. In 2015, UK net CO₂ emissions were estimated at 403.8 million tonnes, a decrease of 3.8% in comparison to 2014 levels¹⁵¹. In 2015, 24% of UK greenhouse gas emissions were from the transport sector with emissions of 120 MtCO₂e in 2015.
- 15.3.2 Within the South Somerset region, the carbon emissions specifically from A roads in 2015 was 221.1ktCO₂, which represents a 13% decrease since 2005 and an 8.2% decrease in overall transport emissions¹⁵². There were 36.5 million vehicles licensed for use on roads in the UK in 2015, which is approximately 3.5 million extra vehicles. However, in 2015 the percentage of ultra-low emission vehicles (ULEVs) has reach 0.9% which is an 800% increase since 2013¹⁵³.
- 15.3.3 The UK construction industry is the largest consumer of natural resources with an average of over 400 million tonnes of material consumed every year. This accounts for approximately 10% of the total UK carbon emissions ¹⁵⁴. Therefore, approximately 40.38 million tonnes of CO₂ are attributed to the embodied carbon of construction materials.

¹⁵¹ Department for Business, Energy and Industrial Strategy (2015) 2015 UK Greenhouse Gas Emissions [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/589602/2015_Final_Emissions_Statistics_one_page_summary.pdf (last accessed August 2017).

¹⁵² Local Authority Carbon Dioxide Emissions estimates 2015 (June 2017)- https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/623015/2005_to_2015_UK_local_and_regional_CO2_emissions_statistical_release.pdf (last accessed July 2017).

¹⁵³ Vehicle Licensing Statistics: Quarter 4 (Oct-Dec) 2015, Department for Transport (April 2016)- https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516429/vehicle-licensing-statistics-2015.pdf (last accessed July 2017).

¹⁵⁴ Alinden, B. (2014) Embodied Energy and Carbon, ICE [online] available at: <https://www.ice.org.uk/knowledge-and-resources/briefing-sheet/embodied-energy-and-carbon> (last accessed July 2017)..

Vulnerability of the Scheme to Climate Change

15.3.4 The Met Office contains regional climate information for which Somerset is included in the south west England¹⁵⁵ region. High-level climate observations for south west England¹⁵⁶ over a 30-year averaging period between 1981-2010 are presented in Table 15.1 below.

15.3.5 It should be noted that climate projection data corresponding to the 2080s (2070-2099) under a high emissions scenario has been selected in line with NPS paragraph 4.41 which states that “*Where transport infrastructure has safety-critical elements and the design life of the asset is 60 years or greater, the applicant should apply the UK Climate Projections 2009 (UKCP09) high emissions scenario (high impact, low likelihood against the 2080 projections at the 50% probability level*”.

Table 15.1: Historic Climate Baseline for South West England (1981 – 2010)

Climatic Conditions	Climate Observations
Temperature	Mean daily minimum temperatures in Somerset can range from 1°C to 2°C in winter, whilst summer daily maximum temperatures are in the region of 21.5°C.
Rainfall	Vigorous Atlantic depressions are the source of the majority of rain in the south west in autumn and winter. Annual rainfall in the low-lying parts of central Somerset averages at 700mm. Monthly rainfall is variable, but is highest in the autumn and winter months. The number of days with rainfall totals greater than 1mm in Somerset are 12-13 days in winter, dropping to an average of 7-9 days in summer.
Wind	South west England is one of the more exposed areas of the UK. The strongest winds are associated with the passage of deep depressions close to or across the British Isles. The frequency and strength of these depressions is greatest in the winter half of the year when mean speeds and gusts are strongest at approximately 15 knots.
Sunshine	The south west of England has a favoured location with respect to the Azores high pressure when it extends its influence north eastwards towards the UK, particularly in summer. Average annual sunshine totals are between 1450 and 1600 hours.
Air Frost	The first air frost in Somerset can be expected around mid-October with over 50 days per year experiencing air frost.

15.3.6 The flood zones within the Scheme extents are outlined in Section 14.3 and displayed on the Environmental Constraints Plan in Appendix A.

¹⁵⁵ The Met Office (2016) South West England: Climate [online] available at: <http://www.metoffice.gov.uk/climate/uk/regional-climates/sw> (last accessed July 2017).

¹⁵⁶ The Met Office (2016) South West England: Climate [online] available at: <http://www.metoffice.gov.uk/climate/uk/regional-climates/sw> (last accessed July 2017).

15.4 Future Projections

Effects on Climate

15.4.1 The transport sector is a key driver in projected UK emissions increases with road transport emissions projected to rise by 28 MtCO₂e over 2023-2027 (the fourth carbon budget)¹⁵⁷.

Vulnerability of the Scheme to Climate Change

15.4.2 Southwest England is predicted to experience changes in temperature, rainfall, and frequency of extreme weather events, particularly flooding as a consequence of climate change. These changes are predicted to occur under all three emissions scenarios (i.e. low, medium, and high greenhouse gas emissions), which are incorporated into the climate change models produced by the Met Office Hadley Centre. The general trend for the region is warmer and drier summers, and warmer and wetter winters.

15.4.3 Under the high emissions scenario for the 2080s, estimated changes in climatic conditions are as outlined in Table 15.2 below.

Table 15.2: Future Climate Projections for the 2080s

Climatic Conditions	Climate Observations
Temperature	The average summer temperature is estimated to increase by 5°C under the central estimate, which represents 'as likely as not' probability of change (50th percentile), and average winter temperature is estimated to increase by 3.4°C (50th percentile).
Rainfall	The average summer rainfall rate is estimated to decrease by 30%, whereas the average winter rainfall rate is estimated to increase by 31% (in the 50 th percentile or central estimate for both).
Wind	Climate projections for wind are more uncertain than those for temperature and precipitation, due to inherent difficulty in modelling future wind conditions. However, overall an increase in extreme weather including wind is projected (Committee on Climate Change, 2017).

Source: UKCP09 Climate Projections

15.5 Assumptions and Limitations

15.5.1 Information on the climate baseline and future projections are based on freely available information from third parties, including the historical meteorological variables recorded by the Met Office and the UK Climate Projections (UKCP09) developed by the Met Office. In addition, the assessment has been informed by a selected range of existing climate change research and literature, available at the time of writing this assessment.

15.5.2 Climate projections are not predictions or forecasts but simulations of potential scenarios of future climate, under a range of hypothetical emissions scenarios

¹⁵⁷ Department for Business, Energy and Industrial Strategy (2017) Updated Energy and Emissions Projections 2016 [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/599539/Updated_energy_and_emissions_projections_2016.pdf (last accessed October 2017).

and assumptions. Therefore, the results from running the climate models cannot be treated as exact or factual, but projection options. They represent internally consistent representations of how the climate may evolve in response to a range of potential forcing scenarios, and their reliability varies between climate variables. Scenarios exclude outlying "surprise" or "disaster" scenarios in the literature, and any scenario necessarily includes subjective elements and is open to various interpretations. Generally global projections are more certain than regional, and temperature projections are more certain than those for precipitation. Further, the degree of uncertainty associated with all climate change projections increases for projections further into the future.

- 15.5.3 MMSJV has not independently verified the climate projections and does not accept responsibility or liability for any inaccuracies or shortcomings in this information. Should the information sources be modified by the third parties we assume no responsibility for any of the resulting inaccuracies in any of our reports. Issued reports are relevant to the project information provided and are not intended to address changes in project configuration or modifications which occur over time.
- 15.5.4 Accordingly, any further research, analysis or decision-making should take account of the nature of the data sources and climate projections and should consider the range of literature, additional observational data, evidence and research available, and any recent developments in these.
- 15.5.5 It should also be noted that at present, there is no single accepted methodology for the assessment of climate change within Environmental Impact Assessments (EIAs). A qualitative methodology for assessing the vulnerability of the Scheme to climate change will be produced in line with DMRB Volume 11 Section 2 Part 5. This will be updated as and when consolidated methodology or practice for this environmental factor is published.

15.6 Guidance and Best Practice

15.6.1 The following guidance documents have been used to inform the assessment:

- Climate Adaptation Risk Assessment Progress Update¹⁵⁸;
- IEMA Environmental Impact Assessment guide to Climate Change Resilience and Adaptation¹⁵⁹ ;
- IEMA's Guidance on Assessing the GHG Emissions and Evaluating their Significance¹⁶⁰;

¹⁵⁸ Highways England (2016) Climate Adaptation Risk Assessment [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/596812/climate-adrep-highways-england.pdf (last accessed October 2017).

¹⁵⁹ IEMA (2015) IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation [online] available at: [https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20\(1\).pdf](https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20(1).pdf) (last accessed October 2017).

¹⁶⁰ IEMA (2017) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance [online] available at: <https://www.iema.net/policy/ghg-in-eia-2017.pdf> (last accessed October 2017).

- TAG Unit A3 Environmental Impact Appraisal - Chapter 4 Greenhouse Gases¹⁶¹; and,
- PAS 2080:2016 Carbon management in infrastructure¹⁶².

15.7 Consultation

15.7.1 Initial consultation has been undertaken with the Environment Agency (refer to Chapter 4 for further details). Further consultation with the Environment Agency will be undertaken to inform the ES.

15.8 Potential Impacts

Construction

Effects on Climate

15.8.1 The proposed construction duration for the proposed Scheme would be approximately two and a half years. Embodied carbon emissions from the use of construction materials are the main contributor to climate change, with additional greenhouse gas emissions arising from the use of plant and transport of materials.

Vulnerability of the Scheme to Climate Change

15.8.2 During the temporary two and a half year construction period, climate change is not expected to bring about a change in the risk of severe weather between now and the start of the period of construction. Despite this, the construction site may be vulnerable to extremes of weather, leading to the risk of delay in activities.

Operation

Effects on Climate

15.8.3 The life of the Scheme is anticipated to be 60 years, with the Scheme opening in 2022. Over this time, the operation of the Scheme has the potential to result in an increase in local CO₂ emissions due to changes in vehicle distributions and speed limits. An appraisal of greenhouse gases for the Scheme opening year and design year to derive the change in carbon dioxide equivalent (CO₂e) emissions will be assessed in accordance with TAG Unit A3 Chapter 4.

Vulnerability of the Scheme to Climate

15.8.4 During the Scheme's 60-year appraisal period, changes in climate as outlined in Table 15.2 would be experienced in the Scheme area. This has the potential to result in adverse effects to the Scheme assets, such as deformation and deterioration of asphalt surfacing associated with temperature increase, and

¹⁶¹ Department for Transport (2015) TAG Unit A3 Environmental Impact Appraisal [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/638648/TAG_unit_a3_envir_imp_app_dec_15.pdf (last accessed October 2017).

¹⁶² BSI (2016) PAS 2080:2016 Carbon Management and Infrastructure.

changes in precipitation affecting the foundation strength and deterioration of the road surface, with the potential to lead to an increased flood risk.

- 15.8.5 Changes in climate also have the potential to pose adverse effects to the environmental receptors detailed throughout this scoping report. For example, increased precipitation may affect the foraging habits and opportunities of bats, and more frequent rainfall events resulting in higher runoff could increase pollutant concentrations within the receiving water.

15.9 Design, Mitigation and Enhancement Measures

Effects on Climate

Construction

- 15.9.1 The Scheme design aims to reduce the overall footprint of the Scheme by reusing the existing A303 where practicable. Where the Scheme is online, less materials would be required and land use change would be minimal, resulting in lower levels of CO₂ being emitted. This would also be the case for slip roads, as the road lengths and widths will be reduced where possible.
- 15.9.2 The footprint of structures and junctions will be made as compact as possible, ensuring minimal land use change and materials use.
- 15.9.3 The Scheme design aims to balance the cut and fill, reducing the need to import additional fill material. Furthermore, the design aims to zone earthworks to avoid double handling, which will be achieved through early engagement with the contractor. This will reduce the fuel consumption of plant, resulting in lower CO₂ emissions. Best practice construction techniques would be used to reduce effects from emissions from construction traffic and plant.
- 15.9.4 Throughout the Scheme design, materials will be evaluated and their carbon emissions calculated. This will ensure that materials with lower carbon outputs are considered. For example, for the vehicle restraints system, steel containment barriers have been chosen over concrete, which saves 44.9kgCO₂e per meter of barrier.
- 15.9.5 Additional design, mitigation and enhancement measures in relation to materials can be found in Section 11.8.
- 15.9.6 An assessment using the Highways England Carbon Tool¹⁶³, in conjunction with the Carbon Reduction Hierarchy, will be carried out as part of the Scheme design.

¹⁶³ Highways England (2015) Carbon Emissions Calculation Tool [online] available at: <https://www.gov.uk/government/publications/carbon-tool>

Operation

- 1.1.1 Further assessment is required to fully understand the difference between the Scheme and the existing A303. This will be included in the ES, including any required mitigation measures.

Vulnerability to Climate**Construction**

- 1.1.2 A Construction Environmental Management Plan (CEMP) would be prepared by the appointed Contractor and implemented during the construction period. The CEMP would ensure that the construction of the Scheme allows for adaptation to impacts of changes in climate, such as ensuring construction materials are covered when stored and pro-active planning to minimise adverse effects.

Operation

- 15.9.7 A Flood Risk Assessment (FRA), to be undertaken to support the Development Consent Order (DCO) application, will take into account the Environment Agency's 'Climate change allowances for planners' NPPF supporting guidance¹⁶⁴. In addition, the Scheme drainage design will be designed to accept flows generated by a rainfall event with a 1-in-100-year return period, plus an allowance for climate change.

15.10 Description of the Likely Significant Effects**Effects on Climate****Construction**

- 15.10.1 Due to the size of this Scheme the embodied carbon emissions from the use of construction materials are the main contributor to climate change, with additional greenhouse gas emissions arising from the use of plant and transport of materials. It is likely that any significant effects due to embodied carbon emissions can be reduced by implementing mitigation measures which are outlined in Section 11.8 and 15.9.

- 15.10.2 However, without a detailed design at this stage further assessment is required within the ES.

Operation

- 15.10.3 It is anticipated that the traffic levels will increase therefore it is recommended that further assessment in the ES using updated traffic data is undertaken to understand the operational effects on climate.

¹⁶⁴ Environment Agency (2017) Flood Risk Assessments: Climate Change Allowances [online] available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> (last accessed November 2017).

Vulnerability to Climate

Construction

15.10.4 Due to the short construction period being two and a half years, it is not anticipated that the climate will influence the construction phase.

Operation

15.10.5 During the Scheme's 60-year appraisal period, changes in climate as outlined in Table 15.2 would be experienced in the Scheme area. This has the potential to result in adverse effects to the Scheme assets, such as deformation and deterioration of asphalt surfacing associated with temperature increase, and changes in precipitation affecting the foundation strength and deterioration of the road surface, with the potential to lead to an increased flood risk.

15.10.6 This will be further assessed in greater detail as part of the ES.

15.10.7 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

15.11 Proposed Level and Scope of Assessment

15.11.1 The Scheme has the potential to contribute to climate change and be directly affected by climatic changes over its the lifetime. Therefore, further assessment is required in order to inform relevant mitigation and adaptation measures. The assessment will be presented within the ES.

Effects on Climate

15.11.2 The assessment will consider the greenhouse gas emission potential throughout the lifecycle of the Scheme for both construction and operation.

Vulnerability of the Scheme to Climate Change

Spatial Scope

15.11.3 The assessment will consider climate effects on the proposed Scheme assets such as pavements, drainage and geotechnical receptors in addition to the in-combination effects of climate change on the environmental receptors.

Temporal Scope

15.11.4 The construction and operational effects on the proposed Scheme as a result of climate change will be considered. The operational assessment will be informed by the lifespan of key elements within the Scheme design and availability of UK Climate Projections.

15.12 Proposed Methodology

15.12.1 There is at present no single accepted methodology for the assessment of climate change within EIAs. A qualitative methodology for assessing the

vulnerability of the proposed Scheme to climate change has been produced in line with DMRB Volume 11 Section 2 Part 5.

Effects on Climate

15.12.2 The assessment of the effects of the Scheme on climate will include:

- The greenhouse gases emitted through the materials used to construct the Scheme, and the significance of the effects of this (the assessment and significance methodology is outlined in Chapter 10 Materials of this Scoping Report);
- The greenhouse gases and significant carbon dioxide emitted during the lifecycle of the Scheme using the Mott MacDonald Carbon Portal, which is PAS2080 compliant for the Scheme design;
- In line with the NPSNN¹⁶⁵ significance of effects will be assessed by comparing estimated GHG emissions arising from the proposed Scheme with UK carbon budgets, and the associated reduction targets.
- Opportunities for mitigation in the Scheme design; and,
- A conclusion about whether this level of assessment is sufficient to understand the effects of the project or whether further assessment is necessary. This will be completed in accordance with the findings in the Air Quality and Materials chapters (Chapters 5 and 10 of this Scoping document).

Vulnerability of the Scheme to Climate

15.12.3 A qualitative methodology for assessing the vulnerability of the Scheme assets to climate change will be produced in line with DMRB Volume 11 Section 2 Part 5.

15.12.4 In line with the Infrastructure Planning (EIA) Regulations 2017 Schedule 4 Part 5, a description of the likely significant effects of the development on the environment, resulting from the vulnerability of the project to climate change, will be provided. In line with Schedule 4 Part 5 of the Infrastructure Planning (EIA) Regulations 2017, a description of the likely significant effects of the development on the environment, resulting from the vulnerability of the project to climate change, will be provided.

15.13 Conclusion

15.13.1 The proposed scope of the ES is contained within Table 15.3, and further summarised in the below text.

¹⁶⁵ Department for Transport (2014) National Policy Statement for National Networks [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf (last accessed October 2017).

Table 15.3: Proposed Scope of the Climate chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Effects on climate and Vulnerability of the Scheme to Climate	N/A
Operation	Effects on climate and Vulnerability of the Scheme to Climate	N/A

15.13.2 During construction and operation, it is anticipated that the Scheme would increase CO2 emissions and therefore have an adverse effect on climate; however further assessment appraising the Scheme greenhouse gas emissions is required as part of the ES.

15.13.3 The construction site may be vulnerable to extremes of weather, however it is anticipated that the adaptation measures included in the CEMP would minimise adverse effects. Further assessment will be included within the ES. In addition, during Scheme operation, changes in climate have the potential to pose a risk to the Scheme assets and environmental receptors. These will be assessed within the ES.

16 Combined and Cumulative Effects

16.1 Introduction

16.1.1 Combined and cumulative effects results from multiple actions on receptors over time and are generally additive or interactive (synergistic) in nature. They can also be considered as effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the project, identified as:

- Combined effects from a single project (the interrelationship between different environmental factors); and,
- Cumulative effects from different projects (with the project being assessed).

16.1.2 DMRB Volume 11, Section 2, Part 6 states that, in general, cumulative assessment will be most successful when the assessment of all other environmental effects of the project is complete.

16.1.3 The previous chapters presented within this report have identified that further assessment is required for a number of environmental factors, which would be prepared within the Environmental Statement (ES). As a result, no assessment of cumulative effects has currently been made within this report. Instead, this chapter provides an overview of the baseline, potential effects, and methodology of assessment for combined and cumulative effects, with further assessment recommended to be included within the ES.

16.2 Study Area

Combined Effects

16.2.1 The study area for the assessment of combined effects of the Scheme, for both construction and operation, is defined by the study areas identified within the relevant environment factor chapters of this report, ranging from 200m (for Air Quality) to 2km (for Biodiversity).

16.2.2 In terms of the combined effects of climate, a qualitative assessment of these effects will be included as part of the Climate chapter.

Cumulative Effects

16.2.3 The search area for the identification of 'other developments' for inclusion in the assessment of cumulative effects reflects a 2km Zone of Influence (ZOI) around the boundary of the proposed Scheme, for both construction and operation. This 2km ZOI is large enough to cover the proposed developments likely to contribute to cumulative effects, whilst being proportionate to the scope and scale of the proposed Scheme. DMRB Volume 11, Section 2, Part 5, states that the study area for the assessment of cumulative effects should be defined on a case-by-case basis reflecting the Scheme in question and the area over which significant effects can be reasonably be considered to have the potential to

occur from both the proposed Scheme and in combination with other developments. As such, a 2km search area for developments is deemed appropriate for this Scheme.

- 16.2.4 The study area used to identify the ZOI for environmental receptors included within the cumulative assessment, during both construction and operation, will reflect the individual ZOIs of the environmental factor chapters, outlined in Table 16.1 below. Table 16.1 does not include study areas for air quality and noise and vibration, as these factors are not being taken forward as part of this cumulative effects assessment (see Section 16.4 Assumptions and Limitations for further details).

Table 16.1: Environmental Factor Zones of Influence

Environmental Factor	DMRB Topic	Zone of Influence (Zoi)
Population and human health	Road Drainage and the Water Environment	<ul style="list-style-type: none"> • Construction and Operation: 1km ZOI for waterbodies (downstream adjacent Water Framework directive (WFD) waterbodies were also included). For groundwater bodies, the ZOI is the potential zone of impact. • See Chapter 14 Road Drainage and the Water Environment for further information.
	People and Communities	<ul style="list-style-type: none"> • Construction and Operation: A 250m ZOI for Non-Motorised Users, Amenity, Severance, and Driver Stress. Other topics are as follows: <ul style="list-style-type: none"> ○ For Agricultural Land, the study area encompasses land directly within the Scheme footprint; this has therefore not been included as part of the cumulative effects assessment. ○ For Motorised Travellers Views from the Road, the study area considers views from the proposed route alignments; this has therefore not been included as part of the cumulative effects assessment. ○ For Demolition of Private Property and Associated Land Take, the study area encompasses a specific area on and immediately adjacent to the Scheme alignment; this has therefore not been included as part of the cumulative effects assessment. • See Chapter 13 People and Communities for further information.
Biodiversity	Biodiversity	<ul style="list-style-type: none"> • Construction and Operation: A 2km ZOI which is the maximum ZOI extent used within the Biodiversity Assessment. habitats, • See Chapter 10 Biodiversity, for further information.

Environmental Factor	DMRB Topic	Zone of Influence (Zoi)
Land, soil, water, air and climate	Geology and Soils	<ul style="list-style-type: none"> • Construction and Operation: All locations where physical works and ground disturbance would take place, plus a 250m buffer. • See Chapter 9 Geology and Soils for further information.
	Road Drainage and the Water Environment	<ul style="list-style-type: none"> • Construction and Operation: 1km ZOI for waterbodies (downstream adjacent Water Framework directive (WFD) waterbodies were also included). For groundwater bodies, the ZOI is the potential zone of impact. • See Chapter 14 Road Drainage and the Water Environment for further information.
	Climate	<ul style="list-style-type: none"> • Construction and Operation: South West England; • See Chapter 15 Climate for further information.
Material assets, cultural heritage, and the landscape	Cultural Heritage	<ul style="list-style-type: none"> • Construction and Operation: A 1km ZOI which is the maximum ZOI extent used within the Cultural Heritage assessment, allowing a full understanding of the context and setting of the heritage assets. In addition to this, the following study area was also used: <ul style="list-style-type: none"> ○ 200m ZOI for Listed Buildings and Conservation Areas. • See Chapter 7 Cultural Heritage for further information.
	Landscape	<ul style="list-style-type: none"> • Construction and Operation: 1km ZOI for landscape and visual impacts. • See Chapter 8 Landscape for further information.
	Materials	<ul style="list-style-type: none"> • Construction: ZOI defined by the influence of the Scheme, rather than through a set geographical location – quantity of materials required and generation of waste. • Operational phase not assessed. • See Chapter 11 Materials for further information.

16.3 Baseline Conditions

16.3.1 The baseline for each environmental factor is described in detail for air quality, cultural heritage, landscape, nature conservation, geology and soils, materials, noise and vibration, people and communities, road drainage and water environment, and climate change, all contained in the preceding chapters of this report (Chapters 6 - 15).

16.3.2 The baseline for the cumulative effects will include the proposed major developments identified within the study area, once confirmed. The proposed major developments will be aligned with the proposed developments included within the traffic model, South Somerset District Council's Housing and Economic Land Availability Assessment (HELAA)¹⁶⁶, as well as any additional planning applications listed on South Somerset District Council's website.

16.4 Assumptions and Limitations

16.4.1 At this stage of assessment, the proposed major other developments within the area have not been identified. Therefore, the environmental effects that would result from other developments have not been identified. The assessment of potential effects is therefore limited at this stage, and has focused on some of the main receptors that could be affected as a result of both combined and cumulative effects. The likely residual effects and proposed mitigation for each of the other developments would be identified and incorporated into the cumulative effects assessment of the ES.

16.4.2 Due to the nature of the air quality and noise and vibration assessments, which will use traffic data to inform the assessments within the ES, it has been considered that an adequate cumulative effects assessment for each of the other developments included within the Short List will be undertaken and captured within the air quality and noise and vibration chapters of the ES.

16.5 Guidance and Best Practice

16.5.1 This chapter draws upon the following guidance:

- The Planning Inspectorate's 'Advice Note Seventeen: Cumulative Effects Assessment'; and,
- DMRB Volume 11 Section 2 Part 5 'Assessment and Management of Environmental Effects'.

16.6 Consultation

16.6.1 Consultation with South Somerset District Council as the Local Planning Authority will be undertaken as part of the ES to agree a list of proposed developments to be included within the cumulative effects assessment.

16.7 Potential Impacts

Combined Effects

Construction

16.7.1 During construction, there is the potential for combined effects to receptors including geology and soils, landscape/townscape, cultural features, communities, vehicle travellers, ecology, and material resources, as a result of

¹⁶⁶ South Somerset District Council (2017) Housing and Economic Land Availability Assessment [online] available at: https://www.southsomerset.gov.uk/media/873236/helaa_final_report_feb_2017.pdf (last accessed November 2017).

the Scheme due to the potential effects reported within the preceding chapters (Chapters 6 to 15).

Operation

16.7.2 During operation, there is the potential for combined effects to receptors including geology and soils, landscape/townscape, cultural features, communities, vehicle travellers, ecology, and material resources, as a result of the Scheme due to the potential effects reported within the preceding chapters (Chapters 6 to 15).

Cumulative Effects

Construction

16.7.3 During construction, there would be the potential for cumulative effects on all receptors, as a result of the Scheme with any of the other developments, for which the construction stages overlap.

Operation

16.7.4 Once operational there would be the potential for cumulative effects to receptors, including (but not limited to) habitats, protected species, agricultural land, noise and air quality.

16.8 Design, Mitigation and Enhancement Measures

Construction

16.8.1 For both combined and cumulative effects during construction, best practice mitigation measures included in the Construction Environmental Management Plan (CEMP) would ensure that effects are reduced as far as possible.

Operation

16.8.2 Combined effects would be reduced as far as possible through the implementation of best practice mitigation which would be identified following the assessment to be included within the ES.

16.8.3 In relation to cumulative effects, it is assumed that mitigation would be provided by the other developments to offset any significant environmental effects, and monitoring of significant effects would also be in place for those other developments that have gone through the statutory EIA process, which would reduce the likelihood of significant cumulative effects during operation.

16.9 Description of the Likely Significant Effects

Construction

16.9.1 With best practice mitigation measures in place, effects are not anticipated to be significant. However, an assessment of combined and cumulative effects during construction will be scoped into the ES, following completion of environmental assessments contained within the ES (for combined effects), and following

agreement of the proposed developments with South Somerset District Council, and further understanding of the other developments within the vicinity (for cumulative effects).

Operation

16.9.2 With best practice mitigation measures in place, and any further mitigation developed by other developments to offset any significant environmental effects, effects are not anticipated to be significant. However, an assessment of combined and cumulative effects during operation will be scoped into the ES, following completion of environmental assessments contained within the ES (for combined effects), and following agreement of the proposed developments with South Somerset District Council, and further understanding of the other developments within the vicinity (for cumulative effects).

16.9.3 The details of any monitoring required for anticipated significant adverse effects will be included as part of the ES.

16.10 Proposed Level and Scope of Assessment

16.10.1 The assessment for combined and cumulative effects within the ES will be undertaken for the Scheme for both the construction and operation phases.

16.11 Proposed Methodology including Significance

Combined Effects Methodology

16.11.1 The assessment methodology for combined effects will involve the identification of impact interactions associated with the proposed Scheme upon separate environmental receptors, to better understand the overall environmental effect of the Scheme.

16.11.2 The significance of construction and operational phase environmental effects will be brought forward from the preceding chapters of the ES into matrices, providing an overview of the potential effects on individual receptors. The assessment will consider adverse effects, after design mitigation has been taken into account. The significance of combined effects upon each environmental receptor group will then be made based upon the balance of scores and using professional judgement.

16.11.3 The methodology for the assessment of combined effects will follow DMRB Volume 11 Section 2 Part 5: Assessment and Management of Environmental Effects. For the purposes of the assessment, combined effects of Moderate Adverse or Beneficial and above will be considered significant.

Cumulative Effects Methodology

16.11.4 The assessment methodology for cumulative effects will involve the identification of incremental changes likely to be caused by potential 'other developments' together with the Scheme.

16.11.5 The assessment of cumulative effects will follow Advice Note Seventeen: Cumulative Effects Assessment¹⁶⁷ with the four stages of assessment:

- Stage 1: Establish the Nationally Significant Infrastructure Project's (NSIP's) Zone of Influence (ZOI) and identify a long list of 'other developments';
- Stage 2: Identify shortlist of 'other developments' for the cumulative effects assessment;
- Stage 3: Information gathering; and,
- Stage 4: Assessment.

16.11.6 The ES will set out the methodology recognising the requirements of the National Policy Statement for National Networks (NPSNN)¹⁶⁸ and advice on development of threshold criteria in Advice Note Seventeen: Cumulative Effects Assessment¹⁶⁹, giving particular regard to the size and spatial influence of developments on the proposed project.

16.11.7 Rather than reporting every interaction, the methodology for the assessment of cumulative effects will concentrate on the significant effects, and will aim to differentiate between permanent, temporary, direct, indirect and secondary effects, positive or negative.

16.11.8 Where significant cumulative effects, beyond those identified as residual effects from the Scheme in isolation, have been identified, additional mitigation measures will be developed to avoid significant effects.

16.11.9 The significance of cumulative effects upon each environmental resource will then be made based on the balance of scores and using professional judgement. An on-balance approach will be taken when identifying the overall cumulative effect for the proposed Scheme in conjunction with the other proposed major developments.

Significance Criteria

16.11.10 The assessment of significance of the combined and cumulative effects will be determined in accordance with the significance criteria contained in Table 15.4 of DMRB Volume 11, Section 2, Part 5 (HA 205/08), which is described in more detail in Chapter 5. Typically, the greater the environmental sensitivity or value of the receptor or resource, and the greater the magnitude of impact, the greater the effect. In this way, the consequences of a highly valued resource suffering a major detrimental impact would be a very large adverse

¹⁶⁷ The Planning Inspectorate (2015) Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects [online] available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf> (last accessed October 2017).

¹⁶⁸ Department for Transport (2014) National Policy Statement for National Networks [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf (last accessed October 2017).

¹⁶⁹ The Planning Inspectorate (2015) Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects [online] available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf> (last accessed October 2017).

effect, as shown in Table 5.2 contained in Chapter 5 of this report, and outlined in DMRB Volume 11, Section 2, Part 5 (HA 205/08).

- 16.11.11 For the purposes of the cumulative effects assessment, the value of a resource and magnitude of impact will be determined according to the criteria set within the preceding chapters of the ES. The significance of effect will then be carried forward from preceding chapters to enable an on-balance assessment of combined significance upon environmental receptors, as well as to identify the significance of cumulative effects with other developments. Typical descriptors of cumulative significance are included within Table 16.2, which reflects this on balance approach. Overall significance will be determined with mitigation included, as shown in Table 5.2 contained in Chapter 5 of this report.
- 16.11.12 Significance descriptors have also been aligned with the considerations included within Advice Note Seventeen: Cumulative Effects¹⁷⁰. Accordingly, where impacts are likely to be temporary, the overall significance of effect is considered to be reduced from a permanent impact on a receptor of the same value. Equally, localised and infrequent impacts are likely to be of lower magnitude than those that cover a greater geographical scale and / or regularly occur, resulting in a reduced significance of effect. Effects can be additive (such as the loss of two pieces of woodland of 1ha, resulting in 2ha cumulative woodland loss) or synergistic (two discharges combining to have an effect on a species not affected by discharges in isolation).
- 16.11.13 Where an effect is Moderate or above (Adverse or Beneficial), it is deemed to be significant.

Table 16.2 Combined and Cumulative Significance Criteria

Significance	Definition
Very Large (Adverse or Beneficial)	Where the combined effects of the Scheme or cumulative effects of the Scheme in association with other existing or more than likely/ near certain future major development upon an individual or collection of environmental receptors would be highly significant. Effects would be: <ul style="list-style-type: none"> Permanent and far reaching for receptors of very high value.
Large (Adverse or Beneficial)	Where the combined effects of the Scheme or cumulative effects of the Scheme in association with other existing or more than likely/ near certain major future developments upon an individual or collection of environmental receptors would be highly significant. Effects would be: <ul style="list-style-type: none"> Permanent and far reaching for receptors of high value; Localised for a receptor of very high value; or, Temporary for a receptor of very high value.
Moderate (Adverse or Beneficial)	Where the combined effects of the Scheme or cumulative effects of the Scheme in association with other existing or more than likely/ near certain major development upon an individual or collection of environmental receptors would be significant. Effects would be:

¹⁷⁰ The Planning Inspectorate (2015) Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects [online] available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf> (last accessed October 2017).

Significance	Definition
	<ul style="list-style-type: none"> • Permanent and far reaching for receptors of medium value; • Localised for receptors of high value; or, • Temporary for a receptor of high value.
Slight (Adverse or Beneficial)	<p>Where the combined effects of the Scheme or cumulative effects of the Scheme in association with other existing or more than likely/ near certain future major developments upon an individual or collection of environmental receptors would be noteworthy but not significant. Effects would be:</p> <ul style="list-style-type: none"> • Permanent and far reaching for receptors of low value; • Localised for receptors of medium value; or, • Temporary for a receptor of medium value.
Neutral	Where the combined effects of the Scheme or the cumulative effects of the Scheme in association with other existing or more than likely/ near certain future major developments would balance.

Source: Based on DMRB Volume 11 Section 2 Part 5 and professional judgement

16.12 Conclusion

16.12.1 The proposed scope of the ES is contained within Table 16.3, and further summarised in the below text.

Table 16.3: Proposed Scope of the Combined and Cumulative assessment chapter of the ES

Stage	Scoped In	Scoped Out
Construction	Combined Effects and Cumulative Effects – using PINS Advice Note Seventeen.	N/A
Operation	Combined Effects and Cumulative Effects – using PINS Advice Note Seventeen.	N/A

The methodology for the assessment of combined and cumulative effects has been considered within this chapter. It is not anticipated that there will be the potential for significant adverse effects associated with both combined and cumulative effects during construction and operation. However, it is recommended that the assessment for combined and cumulative effects is undertaken as part of the ES following completion of environmental assessments contained within the ES (for combined effects), and following agreement of the proposed developments with South Somerset District Council, and further understanding of the other developments within the vicinity (for cumulative effects).

16.12.2 The assessment within the ES will draw upon the guidance outlined in the DMRB Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects, and the more recently published PINS Advice Note Seventeen: Cumulative Effects Assessment.

17 Conclusions

- 17.1.1 This Environmental Impact Assessment Scoping Report has identified the potential for significant effects that may result during construction and operation of the Scheme. This information has been used to make recommendations for whether further environmental assessment is necessary for individual environmental factor. Where required, further assessment will be presented in the form of an Environmental Statement.

18 Glossary

Glossary Term	Descriptive Definition
Agricultural Land Classification	Agricultural Land Classification provides a means of assessing the quality of farmland. Its assessment is based on physical limitations of the land, such as climate, site characteristics (e.g. gradient) and soil. The assessment gives an indication of the versatility and expected yield of the land. The system classifies agricultural land in five grades. The best and most versatile land is classified as 1, 2 and 3a. The Agricultural Land Classification was developed by the former Ministry of Agriculture, Fisheries and Food (MAFF) in 1988 and revised in 1996.
Air Quality Management Area (AQMA)	Any parts of a Local Authority's area where the air quality objectives are not being achieved, or are not likely to be achieved within the relevant period must be identified and declared an AQMA.
Air Quality strategy (AQS)	Establishes the UK framework for air quality improvements. The Environment Agency is required to have regard to the Strategy in exercising its pollution control functions. Local authorities are also required to work towards the Strategy's objectives prescribed in regulations for that purpose.
Air quality objectives	Objectives are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale.
Ambient Noise	Ambient noise is the total sound in a given situation at a given time usually composed of sound from many sources, near and far.
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the project together with any known or foreseeable future changes that will take place before completion of the project.
Birds Directive	EC Directive on the Conservation of Wild Birds (Birds Directive 1979) as amended (79/409/EEC).
Biodiversity	The biological diversity of the earth's living resources. The total range of variability among systems and organisms at the following levels of organisation: bioregional, landscape, ecosystem, habitat, communities, species, populations, individuals, genes and the structural and functional relationships within and between these different levels.
Biodiversity Action Plan (BAP)	It describes the biological resources of the UK and provides detail plans for conservation of these resources.
Combined Effects	An assessment of how the effects reported within the individual environmental discipline chapters of the Environmental Statement would interact and combine on nearby receptors.
Congestion	Traffic experiences periods of excessive braking and acceleration and is associated with higher vehicle emissions. On motorways this occurs at speeds less than 50mph and / or near complex junctions.
Contamination Land Risk Assessment (CLRA)	It covers the main hazards that might happen during the construction project and the risk management that is required.

Glossary Term	Descriptive Definition
Conservation Area	An area designated by the Local Planning Authority under the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990 as possessing special architectural or historical interest. The Local Planning Authority will seek to preserve and enhance the character and appearance of these areas.
Conservation Management Plan	A conservation management plan is document that sets out the significance of a heritage asset, and how the significance will be retained in any future use, management, alteration, or repair.
Construction Environmental Management Plan (CEMP)	A CEMP includes the specific measures that will be taken to control and manage the environmental impacts whilst the project is under construction that may otherwise occur for each of the environmental topics, such as noise, air quality, water resources and ecology. In addition a description of the planned works and the general site arrangements should be included in the CEMP. The Principal Contractor will be responsible for ensuring the measures specified within the CEMP are implemented.
Cultural heritage landscape	The combination of nature and humankind, they express long relationship between people and their natural environment. Certain sites reflect techniques of land use that guarantee and sustain biological diversity.
Cumulative Assessment	An assessment on how the effects of the proposed Scheme would combine and interact with the effects of other developments. It considers the accumulation of, and interrelationship between effects which might affect the environment, economy or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place.
Decibel (dB)	The decibel is a logarithmic unit that expresses the ratio of two values of a physical quantity, often power or intensity. One of these quantities is often a reference value and in this case the decibel expresses the absolute level of the physical quantity.
Design Manual for Roads and Bridges (DMRB)	Design Manual for Roads and Bridges is a set of documents published by the Highways Agency. The document provides a comprehensive manual system which accommodates all current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads (including motorways).
Design Year	15 years after the Opening Year.
Development Consent Order (DCO)	Development Consent Order is a combination of grant planning permission with range of other separate consents such as listed buildings. It can also include rights to compulsorily purchase land
Do-Minimum network scheme	The 'Do-Minimum' forecast scenario in the Opening / Design Year is the base road and traffic network against which alternative improvements can be assessed. In many cases, the definition of the 'Do-Minimum' is straightforward; it is simply the 'Do-Nothing' scenario. However, one or more of the following four cases may arise, in which the 'Do-Minimum' differs from the 'Do-Nothing': i) The case where works will be carried out regardless of whether or not the 'Do- Something' scheme is built. ii) The case where the existing network may be improved to form a 'Do-Minimum scheme which can be tested as an alternative to carrying out major Do-Something improvements.

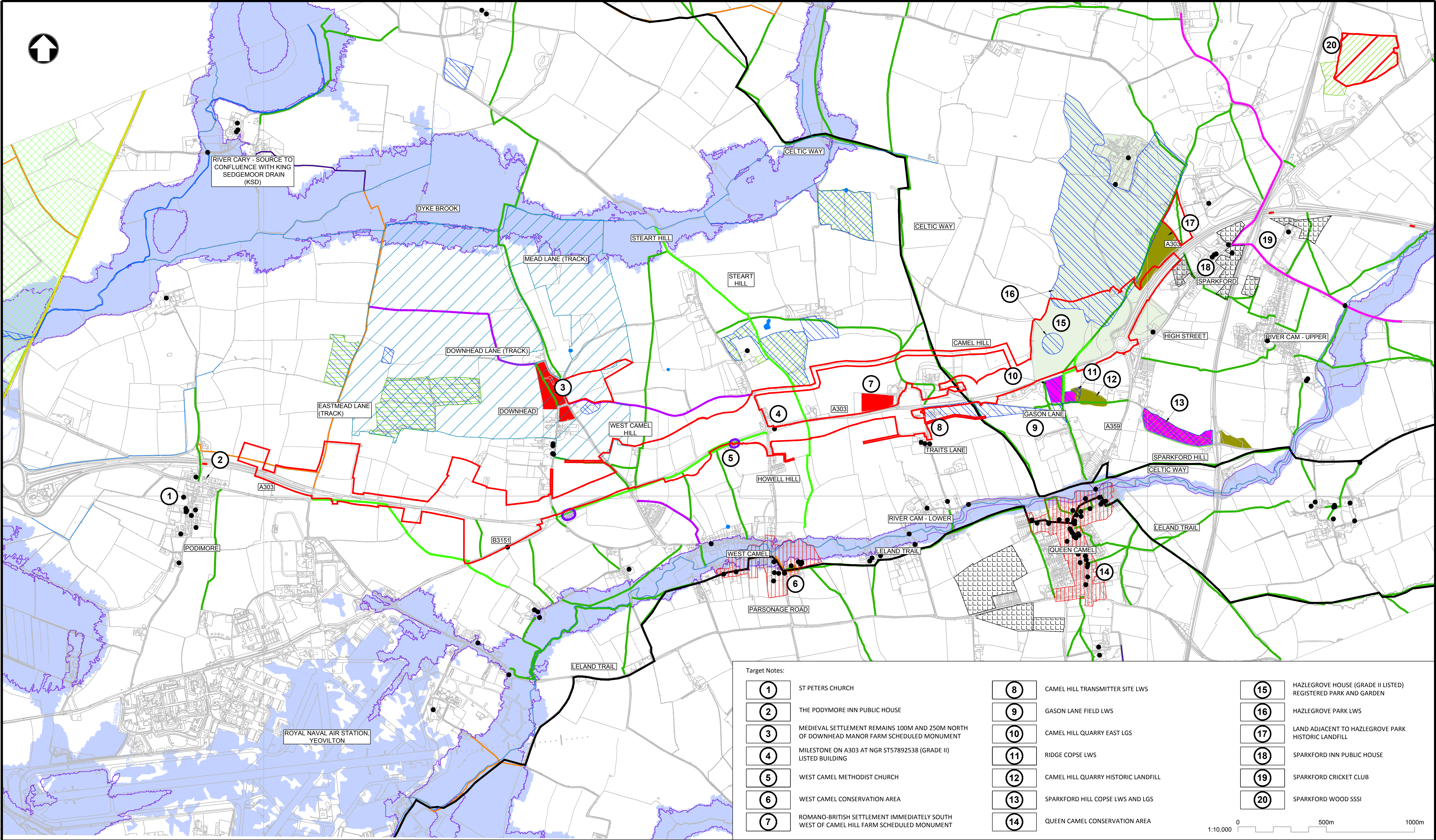
Glossary Term	Descriptive Definition
	<p>iii) The case where traffic conditions can be improved without significant capital expenditure.</p> <p>iv) The case where the area covered by the modelled network includes road proposals other than the one under immediate consideration.</p>
Driver Stress	The adverse mental and physiological effects experienced by a driver traversing a road network
Effect	Term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by correlating the magnitude of the impact to the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.
Emissions	Mass of a pollutant per time per vehicle at the point of exhaust and are used as inputs into an air quality model.
Enhancement	A measure that is over and above what is required to mitigate the adverse effects of a project.
Environment Agency	The Environment Agency is responsible for environmental protection and regulation in England and plays a central role in implementing the government's environmental strategy. The Environment Agency is the main body responsible for managing the regulation of major industry and waste, treatment of contaminated land, water quality and resources, fisheries, inland river, estuary and harbour navigations, and conservation and ecology. They are also responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.
Environmental Management Plan (EMP)	An EMP provides the framework for recording environmental risks, commitments and other environmental constraints and clearly identifies the structures and processes that will be used to manage and control these aspects. The EMP also seeks to ensure compliance with relevant environmental legislation, government policy objectives and scheme specific environmental objectives. It also provides the mechanism for monitoring, reviewing and auditing environmental performance and compliance.
Farm / Individual farm holdings / Farm business	An area of land that consists of one or more land parcels or group of fields that are managed by a named person or named business entity as an owner, tenant or in any other commercial agricultural capacity, for the production of food, forage or fibre.
Flood Risk Assessment	An assessment of the likelihood of flooding in a particular area so that development needs and mitigation measures can be carefully considered.
Forecast (Traffic)	A model describing a future set of traffic conditions e.g. Do-Minimum, Do-Something, etc.
Habitat Directive	EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (Habitats Directive 1992) as amended (92/43/EEC).
Heart of the South West (HotSW)	This is a LEP (refer to LEP in the glossary). The purpose of economic growth, job creation and prosperity in the areas of Devon, Plymouth, Somerset and Torbay.

Glossary Term	Descriptive Definition
Habitat Suitability Index (HSI)	A numerical index where a score of 0 and 1.0 are recorded for each habitat value which can include: geographic location, water quality and permanence.
Handover Environmental Management Plan (HEMP)	This is the main vehicle for passing essential environmental information to the client and responsible for future maintenance and operation of the asset.
Historic England	The public body that looks after England's historic environment. Championing historic places and helping people understand their value and care for them.
Historic Environment	All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.
Impact	Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact).
Highways England Interim Advice Note (IAN)	These contain specific guidance which are only used in connection with works on motorways and trunk roads.
Heavy Goods Vehicle (HGV)	HGVs are vehicles over 3.5 tonnes and includes rigid and articulate lorries.
$L_{Aeq, T}$ Index	The equivalent continuous level $L_{Aeq, T}$ is the level of a notional steady A-weighted sound, which at a given position and over a defined period of time (T) would have the same A-weighted acoustic energy as the fluctuating noise.
L_{Amax} Index	The maximum A-weighted sound pressure level measured during a given time period.
Listed Buildings	A building which is considered by the Secretary of State (for Culture, Media and Sport) to be of special architectural or historic interest in accordance with the regime set out in the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990.
Local Enterprise Partnership (LEP)	The LEP is a partnership between private sector, local authorities, universities and colleges.
Light Goods Vehicle (LGV)	LGVs are vehicles under 3.5 tonnes and refers to a commercial carrier
Lidar	It is a remote sensing technique that uses laser light to densely sample the surface of the earth, producing x,y,z measurements.
Materials Management Plan (MMP)	An MMP manages the recovery of material from the waste stream as opposed to producing new materials/ it also reduces the amount of waste and recyclables delivered to disposal or resource recovery facilities.
Mitigation	This measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects.
National Character Areas (NCAs)	A natural subdivision of England based on a combination of landscape, biodiversity, geodiversity and economic activity. The NCAs are defined by Natural England, the UK government's advisors on the natural environment.
Natural Environment and Rural Communities (NERC)	The aim of the NERC is to ensure the natural environment is conserved, enhanced and managed for the present and future generations.

Glossary Term	Descriptive Definition
National Policy Statement for National Networks (NSPNN)	The National Policy Statement for National Networks (NPSNN) sets out the need for, and Government's policies to deliver development of, NSIPs on the national road network in England and sets out the primary basis for making decisions of development consent for NSIPs in England.
National Planning Policy Framework (NPPF)	The NPPF sets out the Government's planning policies for England.
National Policy Statements	National policy statements are instruments issued under section 52(2) of the Resource Management Act 1991 and state objectives and policies for matters of national significance.
National vegetation classification (NVC)	The NVC assesses the full suite of vascular plant, bryophyte and macro-lichen species with a certain vegetation type.
Natural England	Natural England are responsible for: <ul style="list-style-type: none"> • Helping land managers and farmers protect wildlife and landscapes; • Advising on the protection of the marine environment in inshore waters (0 to 12 nautical miles); • Improving public access to the coastline; • Managing 140 National Nature Reserves and supporting National Trails; • Providing planning advice and wildlife licences through the planning system; • Managing programmes that help restore or recreate wildlife habitats; • Conserving and enhancing the landscape; and, • Providing evidence to help make decisions affecting the natural environment.
Lowest Observed Adverse Effect Level (LOAEL)	This the level of noise above which adverse effects on health and quality of life can be detected.
NO _x	Oxides of Nitrogen – which encompasses all nitrogen species although mainly NO and NO ₂ .
NO ₂	Nitrogen Dioxide.
Opening Year	The estimated year that the scheme would become operational.
Operation	The functioning of a project on completion of construction.
Outline Construction Environmental Management Plan	A CEMP at outline stage which will later be refined and expanded into a full CEMP as more information becomes available and there is more certainty in terms of the proposed layout, construction methods, programme, and the likely environmental effects.
Peak Particle Velocity (PPV)	Peak particle velocity refers to the maximum speed of a particular particle as it oscillates about a point of equilibrium that is moved by a passing wave. It is a term used to describe vibration, or elastic movement, resulting from excitation by seismic energy as it passes a particular point.
Planning Inspectorate (PINS)	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales.

Glossary Term	Descriptive Definition
PM ₁₀	Particulate matter with a diameter of 10 microns or less.
Receptor	A defined individual environmental feature that has the potential to be affected by a project.
Registered Park and Garden	A park or garden that has been registered under Historic England's 'Register of Historic Parks and Gardens of special historic interest in England' due to its high level of historic interest.
Scheduled Monument	A historic building or site that is included in the schedule of monuments kept by the secretary of state for culture, media, and sport. The National Planning Policy Framework sets out the Government's planning policies for England.
Significant Observed Adverse Effect Level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.
Site of Special Scientific Interest (SSSI)	A SSSI is a conservation designation denoting a protected area in the United Kingdom, designated due to special interest in its flora, fauna, geological or physiographical features. They are protected by law to conserve their wildlife or geology.
Strategic Road Networks (SRN)	A strategic road network is made up of motorways and major trunk roads in England and that are managed by Highways England.
Site Waste Management Plan (SWMP)	SWMPs encourage the effective management of materials and ensure waste is considered at all stages of a project - from design through to completion. Although no longer a regulatory requirement in England, SWMPs are still considered to be good practice.
Transport analysis guidance	Transport analysis guidance is a document produced by the government for projects that require government approval. It provides guidance on a range of topics which include: creating a transport model for the appraisal of the alternative solutions.
Transport appraisal process/ WebTAG	WebTAG involves 3 stage process: Stage 1 – option development, identifying the need for intervention and developing options; Stage 2 – further appraisal – the focus of the analysis is on estimating the likely performance and impact of intervention(s) in detail; and, Stage 3 – implementation, monitoring and evaluation.
TRICS	An interactive database and data analysis system comprising large number of transport survey records of individual developments across land use categories.
Unexploded ordnance (UXO)	Unexploded ordnance are explosive weapons (bombs, bullets etc) that did not explode when employed and still pose a risk of detonation. When planning a civil engineering project, a UXO assessment is done to determine whether any potential risks may be present.

Appendix A – Environmental Constraints Plan



Client



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Key to symbols

DRAFT RED LINE BOUNDARY	REGISTERED PARK AND GARDEN	SITES OF SPECIAL SCIENTIFIC INTEREST (SSSI)	LOCAL WILDLIFE SITE (LWS) (SOMERSET ENVIRONMENTAL RECORDS CENTRE, JUNE 2017)
NAMED WALKING ROUTES	HISTORIC LANDFILL	CONSERVATION AREA	NATIONAL TRUST LAND
FOOTPATH ALONGSIDE CARRIAGEWAY	PONDS, LAKES AND RUNNING WATER	SCHEDULED MONUMENT	CANDIDATE LOCAL WILDLIFE SITE (SOMERSET ENVIRONMENTAL RECORDS CENTRE, JUNE 2017)
FOOTPATH	LISTED BUILDING	LOCAL GEOLOGICAL SITE (LGS)	REGISTERED COMMON LAND
BRIDLEWAY	ANCIENT WOODLAND	FLOOD ZONE 2	ANCIENT WOODLAND IDENTIFIED BY SOMERSET ENVIRONMENTAL RECORDS CENTRE
RESTRICTED BYWAY	NOISE IMPORTANT AREA	FLOOD ZONE 3	PROPOSED DEVELOPMENTS IDENTIFIED IN THE SOMERSET DISTRICT COUNCIL HOUSING AND ECONOMIC LAND AVAILABILITY ASSESSMENT
CYCLE ROUTE			
FOSSE WAY			

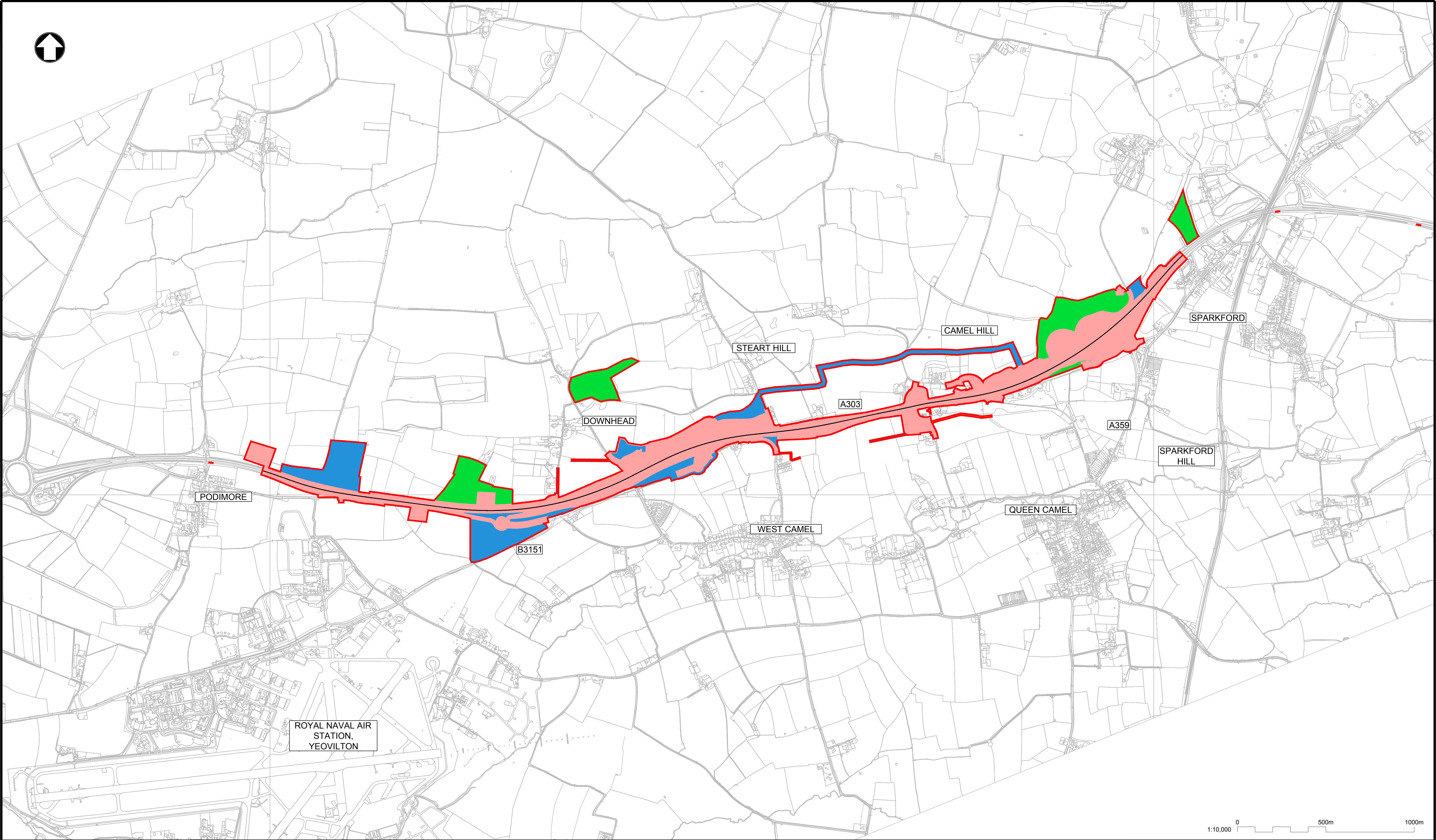
Project Title

A303 Sparkford to Ilchester

Drawing Title

Environmental Constraints Plan With Draft Red Line Boundary

Appendix B – Draft Red Line Boundary and Scheme Elements



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Key to symbols

	PROPOSED SIGNAGE
	ROUTE CENTRELINE
	PROVISIONAL RED LINE BOUNDARY
	PROPOSED PERMANENT LAND TAKE
	PROPOSED ECOLOGICAL MITIGATION AREAS
	PROPOSED TEMPORARY LAND TAKE

Project Title

A303 Sparkford to Ilchester

Drawing Title

Proposed Draft Red Line Boundary and Scheme Elements

Appendix C – Protected and Notable Species

The following species surveys have been completed, however some such as badger bait marking surveys, dormouse surveys and invertebrate surveys are yet to be completed. All ecological survey findings will be presented within the Environmental Statement (ES).

Badgers

The woodland, scrub and hedgerows provide suitable areas for badgers *Meles meles* to construct setts and forage within. A review of existing data has identified a total 36 setts within 500m of the Scheme (surveys undertaken by Mott MacDonald, 2004). During 2016 and 2017, five main, two annex, three subsidiary and 13 outlier setts were still active. Main setts with recent activity were observed within Annis Hill Wood, Hazlegrove Park Local Wildlife Site (LWS), Steart Wood, Camel Hill Transmitter Site LWS, and along the base of a hedgerow to the east of Downhead.

Bait marking surveys are currently being undertaken at the main setts found at Hazlegrove Park LWS, Camel Hill Transmitter Site LWS, and along the base of a hedgerow to the east of Downhead. Access has currently been denied at Annis Hill Wood and Steart Wood. These will commence in March 2018 once access has been reinstated,

Bats

There are existing records of brown long eared *Plecotus auritus* bats at Ridge Copse and Downhead Manor Farm. Serotine *Eptesicus serotinus* bats have also been recorded at Downhead Manor Farm and common pipistrelle *Pipistrellus pipistrellus* bats were identified southeast of Sparkford roundabout.

The ground assessments assessed all trees within 250m of the Scheme footprint, identifying more than 100 trees with moderate or high potential to support roosting bats. Features of trees used by bats as roosts include;

- Natural cavities and woodpecker holes;
- Cracks/splits in major limbs;
- Loose and lifted bark;
- Thick, close formed ivy stems; and,
- Dense epitomic growth.

The tree lines, woodland, hedgerows and watercourses provide suitable areas for bats to commute and forage.

The building assessments have identified more than 60 buildings within 250m of the Scheme footprint with bat roost potential. Features of buildings used by bats as roosts include:

- Soffits, fascias, barge-boards, weather boarding,
- Between roof felt/membrane and tiles/slates;

- Around window frames, in cavity walls, under hanging tiles and lead flashing; and,
- Roof voids.

Bat roosts were confirmed during the initial assessments and through DNA analysis of droppings at the following locations:

- Barbastelle *Barbastella barbastellus* and lesser horseshoe *Rhinolophus hipposideros* bat within a building adjacent to Parsons Steeple/Stearth Wood; and,
- Lesser horseshoe bat and brown long eared within a building located at Downhead.

Great crested newts

Great Crested Newts (GCN) *Triturus cristatus* require water bodies for breeding purposes, although they spend much of their life in terrestrial habitat. Water bodies are therefore important features to consider the likely presence of GCN within the Zol. Forty-four ponds have been identified within 500m of the proposed route options. Access was gained to all ponds and a Habitat Suitability Index (HSI) assessment was undertaken. This identified that 23 ponds were considered to have potential to support GCN.

Surveys were then undertaken on these 23 ponds and the following results were obtained. GCN have been recorded in numerous ponds to the west of Downhead. These ponds form a meta-population and have a medium GCN population.

One GCN was also recorded in a pond to the south of the A303 at Urgashay, constituting a small population.

GCN have been recorded in four ponds at the eastern extent of the Scheme, at Hazlegrove Park and north of Sparkford Hall. These ponds form a meta-population and have a medium GCN population.

Common Reptiles

The poor semi-improved grassland fields, scrub and coppice piles provide sheltering and foraging opportunities for widespread reptiles such as grass snake *Natrix natrix*, slow worm *Anguis fragilis* and common lizards *Zootoca vivipara*. Surveys have identified small populations of slow worms, grass snakes and common lizards within and adjacent to the Scheme footprint.

Dormouse

The woodland and hedgerows present have the potential to support dormice. The hedgerows are largely sub-optimal with limited species diversity. However, woodlands such as Parsons Steeple LWS and Ridge Copse LWS have a good structure, with a high canopy and continuous shrub layer which consisted of a sufficient variety of woody plants to supply a succession of foods throughout the season. Surveys are currently being undertaken in all suitable woodland and hedgerows within 250m of the Scheme footprint. No dormice have been found during the April to October 2017 surveys.

In woodlands such as Annis Hill Wood, Steart Wood, Rewber Brake and Yarcombe Wood, access was revoked from September onwards. The tubes will be removed in March 2018 and the tubes checked for any remaining evidence such as disused dormouse nests.

Otters and water voles

There are numerous ditches within 250m of the Scheme. These are generally newly created adjacent to hedgerow boundaries in the arable fields and are not established with vegetation. There is an unnamed ditch to the west of Podimore, near to Higher Farm Lane. This has steep banks ($>45^\circ$) and an abundance of riparian vegetation, which would provide foraging and sheltering opportunities for water voles. This ditch was surveyed in April and September 2017; however, no evidence of water vole or otter was observed.

To the south and east of Yarcombe Wood is a ditch network, which has shallow banks, vegetated with common grassland species, bordering on agricultural land with a hedge running one side and frequent ledges. Water vole burrows and latrines were observed but no evidence of otter was identified.

Dyke Brook is located to the north of the A303 and outside of the 250m buffer. Both evidence of otter and water vole was observed.

To the south of the A303 and outside of the 250m buffer, is the River Cam. There are existing records for both otter and water vole on this section of the River.

Invertebrates

There are no existing records of red listed or county notable species within 250m of the Scheme. However, the woodlands and grasslands designated as local wildlife sites do provide suitable habitat for a variety of invertebrate species. Surveys were undertaken in July and September 2017 and the data is currently being analysed. Due to the presence of blackthorn, brown hair streak surveys will be undertaken during winter 2017. A spring survey for invertebrates will commence in April 2018, to ensure a full suite of surveys has been undertaken.

There are two ditches within close proximity to the footprint of the Scheme, at the eastern extent of the Scheme. Macro invertebrate surveys have been undertaken and the data is currently being analysed.

White Clawed Crayfish

The watercourses, such as the ditches in close proximity to the Scheme, do not provide suitable habitat for white clawed crayfish. Therefore, no further surveys for this species has been undertaken.

Overwintering birds

The habitats within the Scheme footprint and adjacent to it, provide low potential habitat for overwintering bird species. There are also no internationally designated sites within 2km that include overwintering bird species as qualifying features. Therefore, overwintering birds are not considered further in this assessment.

Other species

The woodland and grassland habitats provide ideal habitat for deer to shelter and forage within. Roe deer have been observed during other protected species surveys and are present across the Scheme footprint, north of the A303.