

A358 Taunton to Southfields Dualling Scheme

Environmental Impact Assessment Scoping Report - Volume
1: Main Report

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1 Introduction

1.1 Purpose of the report

- 1.1.1 Highway England proposes to construct the A358 Taunton to Southfields Dualling scheme (hereafter referred to as ‘the proposed scheme’). The proposed scheme is considered a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 and therefore Highway England proposes to submit an application for a Development Consent Order (DCO) to provide the appropriate planning consent for the proposed scheme.
- 1.1.2 The proposed scheme falls under the criteria included in the Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017 (SI 2017/572 HMSO) ‘the EIA Regulations’ and is therefore an ‘EIA Development’. The application for DCO must therefore be accompanied by a statutory Environmental Statement (ES) describing the findings of an Environmental Impact Assessment undertaken in compliance with the EIA Regulations.
- 1.1.3 This report is the EIA Scoping Report for the proposed scheme and has been prepared in line with Regulation 10 the EIA Regulations, the Design Manual for Roads and Bridges LA 103¹, and guidance on EIA Scoping² to accompany a written request to the Planning Inspectorate for a Scoping Opinion.
- 1.1.4 This Scoping Report describes the proposed scope of the EIA, including a description of the aspects which will be considered within the EIA and reported in the ES. It describes the environmental setting and potential impacts that could arise from the proposed scheme. A reasoned conclusion on the Likely Significant Effects of constructing and operating the proposed scheme on the environment is provided, with justification supported by evidence, for scoping aspects and matters in or out of the proposed EIA. A description of the level of environmental assessment and the proposed assessment methodology to be undertaken for those aspects scoped in has been provided. The Scoping Report also provides an initial identification of mitigation measures and enhancements. The structure of the Scoping Report is set out in Table 1-1.

Table 1-1 Structure of the EIA Scoping Report

Chapter	Contents
1. Introduction	Provides an overview of the proposed scheme and the purpose of this report.
2. The project	Provides a statement on the need for the scheme, sets out the scheme objectives, and provides a description of the scheme location and design.
3. Assessment of alternatives	Provides a summary of the development of the proposed scheme and the various options considered during the design process. Also includes consideration of how the environmental assessment has influenced the option selection process.
4. Consultation	Provides a summary of consultation undertaken to date and consultation strategy going forward.

¹ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA103 Scoping Projects for Environmental Assessment*. Available at: <https://www.standardsforhighways.co.uk/dmrb/> (Accessed January 2021)

² The Planning Inspectorate (2020) *Advice Note Seven Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping*. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/12/Advice-note-7.pdf> (Accessed January 2021)

Chapter	Contents
5. Environmental assessment methodology	Provides an overview of the environmental assessment methodology, including significance criteria and surveys and predictive techniques.
6-15 Topic chapters	There is a chapter for each environmental aspect. Each sets out the baseline environment including the study area used and the value of existing receptors within the study area. Each chapter also describes the potential impacts, likely significant effects, and proposed assessment methodology.
16. Assessment of cumulative effects	Provides a summary of how the cumulative effects assessment will be undertaken.
17. Summary of assessment scope	Summarises the aspects and matters that will be scoped in and out of the EIA.
Acronyms, glossary, references	Description of acronyms, definitions of technical terms, and a reference list of document sources.
Appendices	Figures and supporting information are provided in the appendices.

1.2 Overview of the proposed scheme

- 1.2.1 The proposed scheme is part of a programme of improvements planned along the A303/A358 corridor aimed at improving connectivity between London, the south-east and the south-west. The A303, alongside the A30, forms part of the strategic road network (SRN) and together with the A358, provides the link between London, the south-east and the south-west.
- 1.2.2 The programme of improvements, as set out in the Government’s *Road Investment Strategy*³ made a commitment to, “...upgrade all remaining sections of the A303 between the M3 and the A358 to dual carriageway standard, together with creating a dual carriageway link from M5 at Taunton to the A303, as part of a long-term commitment to creating a new Expressway to the South-West”.
- 1.2.3 The proposed scheme directly addresses this long-term commitment and would provide the new dual carriageway link from the M5 at Taunton to the A303.
- 1.2.4 Funding for delivery of the scheme has been confirmed within the second Road Investment Strategy (RIS2)⁴, which covers the period between 2020 and 2025 which was published on the 11 March 2020.
- 1.2.5 The A303/A358 corridor is heavily used by long-distance, local business and leisure traffic. It is critical to the economy of the south-west of England and connects several local towns including Andover, Amesbury, Salisbury, Shaftesbury, Warminster, Yeovil, Honiton and Taunton.
- 1.2.6 The existing A358 between the M5 at Junction 25 at Taunton and the Southfields Roundabout on the A303 is predominantly single carriageway with a short dual carriageway section (about 1.2 miles long) in the vicinity of Thornfalcon and a three-lane section (about 0.4 miles long) on the westbound approach to the junction at Mattock’s Tree Hill. The existing road has many local roads and private accesses joining directly with it and it is regularly congested and is frustrating for people travelling to school and work. As a result, many drivers/road users try to

³ Department for Transport (March 2015) *Road investment strategy: 2015 to 2020*. Available at: <https://www.gov.uk/government/publications/road-investment-strategy-for-the-2015-to-2020-road-period> (Accessed 29 January 2020)

⁴ Department for Transport (March 2020) *Road investment strategy: 2020 to 2025*. Available at: <https://www.gov.uk/government/publications/road-investment-strategy-2-ris2-2020-to-2025> (Accessed 11 March 2020)

avoid the traffic by diverting onto smaller local roads which increases the level of traffic in surrounding villages.

- 1.2.7 This proposed scheme proposes to upgrade the A358 to high-quality dual carriageway between Southfields Roundabout on the A303 and the M5 at Taunton to address the traffic issues and long delays currently experienced along the route.
- 1.2.8 The existing A358 is currently maintained by the local highway authority, Somerset County Council. The aim is for the sections of the existing A358 required for this scheme to be adopted into the strategic road network. It will then be trunked, with the Secretary of State for Transport becoming the highway authority.
- 1.2.9 Further information on the proposed scheme is provided in Section 2.4 of this report.

1.3 Legislative context and the need for environmental impact assessment

- 1.3.1 Highways England has determined that the proposed scheme is a NSIP under the *Planning Act 2008* Section 2 as amended by the *Highway and Railway (NSIP) Order 2013* as it meets the following criteria:
- The proposed scheme would involve the construction of a highway that is wholly within England for which the Secretary of State is the highway authority; and
 - The proposed scheme would involve the construction or alteration of a highway, other than a motorway, where the speed limit for any class of vehicle is expected to be 50 miles per hour or greater, and the area of development is greater than 12.5 hectares.
- 1.3.2 As a result, an application to the Planning Inspectorate (PINS) for a DCO is being progressed.
- 1.3.3 Highways England has determined that the proposed scheme is deemed to be an EIA development under the EIA Regulations, therefore, an EIA should be carried out in accordance with the requirements of the EIA Regulations, and an ES prepared and submitted in support of the application for DCO.

1.4 Planning policy context

National Policy Statement for National Networks

- 1.4.1 The National Policy Statement for National Networks (NPSNN)⁵ 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-

⁵ Department for Transport (2014) *National Policy Statement for National Networks*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf (Accessed January 2021)

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 The environmental requirements of the NPSNN have been considered in preparing this Scoping Report, as described in each on the technical assessment Chapters 6 to 16. Evidence that the EIA has been undertaken in compliance with the NPSNN will be presented in the ES.

National Planning Policy Framework

- 1.4.3 The National Planning Policy Framework (NPPF)⁶, last updated in February 2019, sets out the government's planning policies for England and the requirements for the planning system. It provides a framework within which local authorities and residents can produce local and neighbourhood plans reflecting the needs and priorities of communities.
- 1.4.4 The NPPF seeks to achieve sustainable development through three overarching objectives which are interdependent but need to be pursued in mutually supportive ways. The three objectives comprise:
- **an economic objective** - to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and identifying and coordinating the provision of infrastructure.
 - **a social objective** - to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; including a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being.
 - **an environmental objective** - to contribute to protecting and enhancing our natural, built and historic environment; including the effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
- 1.4.5 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 (NPSs) for major infrastructure. For highways schemes, the relevant NPS is the NPSNN, details of which are outlined above.

⁶ Ministry of Housing, Communities and Local Government (2019) *National Planning Policy Framework*. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2> (Accessed January 2021).

2 The proposed scheme

2.1 Need for the proposed scheme

2.1.1 Along the A358, there are a number of common issues that result in the poor level of operation often experienced by motorists, businesses and residents. These can be broadly summarised as:

- Mixed road typology – the corridor is comprised of a mix of dual 2-lane, single 3-lane and single 2-lane carriageway which leads to localised congestion where the standard reduces, impacting on journey times and journey time reliability.
- Accidents – several sections of the corridor suffer from accidents as a result of alignment not in accordance with current standards, poor junction visibility, changes in road provision and number of private means of access linking onto the road.
- Environment and Historical Environment – the route passes through a number of sensitive environmental and historic environmental areas which results in challenges in improving the network on these online sections.
- High traffic flows – many sections of the route experience traffic demand above that for which they were designed.

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

2.1.3 The Highways England Delivery Plan⁷ set out Highways England's long-term plans for the modernisation and renewal of the road network over the 5-year period from 2015-2020. It provided a brief outline of what Highways England delivered during 2015-16 and set out a clear programme of activity for 2016-17, as well as annual and future commitments. In this Highways England committed to further exploring options identified during feasibility studies to improve the A303/A30/A358 corridor.

2.1.4 In March 2020, the government published its second Road Investment Strategy (RIS2), which covers investment in and management of the SRN from April 2020 to March 2025. The Highways England Delivery Plan 2020-2025⁸ describes the proposed investment to support delivery of RIS2 and the Strategic Business Case. This government approved plan further commits to the delivery '*a high-quality and high-performing dual carriageway route along the A303/A358 corridor between the south-west and the south-east*'. Highways England also commits to '*create a dual carriageway link from the M5 at Taunton to the A303, incorporating upgraded stretches of the existing A358 into the SRN where appropriate*'.

⁷ Highways England (2015) *Highways England Delivery Plan 2015 – 2020*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/424467/DSP2036-184_Highways_England_Delivery_Plan_FINAL_low_res_280415.pdf (Accessed July 2017)

⁸ Highways England (2020) *Highways England Delivery Plan 2020-2025*. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910866/5-year_Delivery_Plan_2020-2025_FINAL.pdf (Accessed January 2021)

2.2 Proposed Scheme objectives

- 2.2.1 The project objective is to create a dual carriageway link from the M5 at Taunton to the A303, incorporating upgraded stretches of the existing road into the strategic road network, where appropriate, which would address the traffic issues and long delays currently experienced along the route, and the negative impact this has on the south west economy.
- 2.2.2 The Road Investment Strategy, Strategic Business Plan 2020 to 2025, and Strategic Delivery Plan 2020 to 2025 all outline an overall ambition to improve connectivity between the south east and south west.
- 2.2.3 In order to deliver this ambition, the following scheme objectives have been set by Highways England:
- **Support economic growth:** facilitate growth in jobs and housing by providing a free-flowing and reliable connection between the south east and the south west.
 - **Resilience:** to improve journey time reliability and resilience and provide extra capacity to make it easier to manage traffic when incidents occur.
 - **Connectivity:** to improve the connectivity of the south west to the rest of the UK and improve business and growth prospects.
 - **Local communities:** to reduce community severance and promote opportunities for improving their quality of life.
 - **Safety:** to improve safety for all, including pedestrians, cyclists and other non-motorised users.
 - **Environment:** to avoid unacceptable impacts on the surrounding landscape, natural historic environment while exploring opportunities for enhancement.
 - **Capacity:** to reduce delays and queues that occur during peak hours and at seasonal times of the year.
- 2.2.4 These project objectives also ensure contribution to compliance with requirements of the Highways England Licence⁹. Such as the need to:
- ensure the effective operation of the network;
 - ensure the maintenance, resilience, renewal, and replacement of the network;
 - ensure the improvement, enhancement and long-term development of the network;
 - ensure efficiency and value for money;
 - protect and improve the safety of the network;
 - cooperate with other persons or organisations for the purposes of coordinating day-to-day operations and long-term planning;
 - 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.
- 2.2.5 Other requirements of the Licence relevant to the scoping and assessment of environmental impacts and taken into account in this report include the need to:

⁹ Department for Transport (2015) *Highways England: Licence*. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/431389/strategic-highways-licence.pdf (Accessed July 2017).

- ensure that protecting and enhancing the environment is embedded into its business decision making processes and is considered at all levels of operations;
- ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money;
- consider the cumulative environmental impact of its activities across its network and identify holistic approaches to mitigate such impacts and improve environmental performance;
- where appropriate, work with others to develop solutions that can provide increased environmental benefits over those that the Licence holder can achieve alone, where this delivers value for money;
- calculate and consider the carbon impact of road projects and factor carbon into design decisions, and seek to minimise carbon emissions and other greenhouse gases from its operations;
- adapt its network to operate in a changing climate, including assessing, managing and mitigating the potential risks posed by climate change to the operation, maintenance and improvement of the network;
- develop approaches to the construction, maintenance and operation of the Licence holder's network that are consistent with the government's plans for a low carbon future; and
- take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices.

2.3 Proposed Scheme location

Existing route corridor

- 2.3.1 The existing section of the A358 between Taunton and Ilminster is approximately 8.5 miles (13.6 kilometres) long. The route predominantly comprises single carriageway, with a short section of dual carriageway (approximately 0.8 miles/1.3 kilometres) between Henlade and Mattock's Tree Green. This is preceded for 500m to the east by a section of single carriageway with an overtaking lane as the road rises up to the crest at Mattock's Tree Green. There is also a short section of dual carriageway on the approach to the M5 junction 25.
- 2.3.2 At the western limit of the scheme, the A358 forms one of five arms of the M5 junction 25 roundabout which is a partially signalised three-lane roundabout under the M5 motorway. This junction allows access from the A358 to the M5 and into Taunton. At the eastern end of the scheme, the A358 forms one of five arms of the Southfields Roundabout which is situated on the A303 at the western end of the Ilminster Bypass. This junction provides access into Ilminster, Horton Cross and to the A303.
- 2.3.3 Along the A358 between Taunton and Southfields Roundabout, there are numerous at-grade local road junctions, the most notable of which is the traffic signal controlled junction with the A378 at Mattock's Tree Green. Other local roads provide access to local villages such as Ilton, Ashill, Hatch Beauchamp, Bickenhall, Thornfalcon, Ruishton and Henlade.
- 2.3.4 There is currently one grade-separated crossing over the A358. This carries the A358 Hatch Beauchamp Bypass over Griffin Lane on a substantial structure

which has recently been strengthened following the identification of potential weaknesses.

- 2.3.5 Along the A358 motorists currently experience high traffic, primarily because, for many sections of the route the traffic demand is above that for which they were designed. This is exacerbated in the summer when there is typically 30% growth in traffic along the A303 corridor from holiday traffic. There are also capacity issues at M5 junction 25 in the morning, mainly on the A358 westbound approach.
- 2.3.6 As well as experiencing high levels of congestion, there are several locations along the A358 where clusters of accidents have been reported. The accident types were predominantly rear end collisions, vehicles turning in or out of local minor roads or head-on collisions. In addition, a number of public rights of ways (PRoWs) (footpaths, bridleways, byways open to all traffic, and restricted byways), undesignated paths and cycle routes are severed by the existing road.
- 2.3.7 The existing A358 has been the subject of a number of upgrades. The short dualled section at Mattock's Tree Green appears to have been upgraded in the 1960s or 1970s, possibly in response to the poor vertical alignment and associated visibility through this section which is likely to have made overtaking and turning manoeuvres at the A378 junction particularly dangerous on the single carriageway. The single carriageway section around Hatch Beauchamp was constructed as a bypass in the 1980s, the original route of the A358 having passed through the centre of the village. Similarly, the section of single carriageway around the village of Ashill was constructed as a bypass in the 1990s.

The surrounding environment

- 2.3.8 The existing A358 passes through a largely rural area between Taunton and Ilminster, with various agricultural land uses and villages, hamlets and scattered farms and individual dwellings.
- 2.3.9 The A358 provides direct access to local communities (such as Ruishton, Haydon, Henlade, Thornfalcon, West Hatch, Hatch Beauchamp, Ashill, Broadway and Horton Cross) and businesses including churches, indoor sports facilities, schools, care homes, doctor's surgeries and shops. Taunton Gateway Park and Ride is located within 500m of the M5 at Taunton. Twenty-three public rights of ways (PRoW) as well as other routes cross or meet the A358 and have been identified as potentially impacted by the proposed scheme.
- 2.3.10 The land adjacent to the A358 is predominantly grade 3 agricultural land, with pockets of grade 4 at the southern end of the proposed scheme and land associated with Venner's Water further north; elements of grade 1 and 2 lie in close proximity to the A358. It is estimated that 25-30 individual farm holdings are present along the route.
- 2.3.11 A number of potentially contaminative land uses have been identified along the route, including historical landfills, sewage works, commercial activities and fuel storage sites as well as evidence of Made Ground of unknown quality. Six records of historic landfills have been identified within 500m of the A358, two of which intersect the route.
- 2.3.12 There are two Air Quality Management Areas (AQMA) near to the A358 – East Reach AQMA (2km west) and Henlade AQMA (300m north) – which were

declared by Somerset West and Taunton Council (SWTC) for exceedance of the national annual mean objective for NO₂. There are currently no AQMAs associated with the A358.

- 2.3.13 Existing noise and vibration in the area is likely to be dominated by road traffic noise from the A358, A303, A378 and M5. Noise sensitive areas along the A358 are associated with individual or small groups of dwellings.
- 2.3.14 Several ecological designated sites are located near to the A358. These comprise, but not limited to: Somerset Levels and Moors Special Protection Area (SPA) and Ramsar (3.5km); Severn Estuary Special Area of Conservation (SAC) and Ramsar site (7km north); Thurlbear Woods and Quarrylands Site of Special Scientific Interest (SSSI) (1.5km south west); and Barrington Hill Meadows SSSI and National Nature Reserve (NNR) (1.7km south); Bickenhall Orchard Local Nature Reserve (LNR) (550m south west); South Taunton Streams LNR (690m west of the link road to Junction 25 on the M5); and Children's Wood / Riverside Park LNR (900m north). A further 15 SSSI are located within 200m of the A358.
- 2.3.15 Along the A358 are existing hedgerows, veteran trees and watercourses that have the potential to support flora and fauna of ecological importance. Ecological records identify a number of protected species present in the surrounding environment, including Bewick's swan, bats and dormouse.
- 2.3.16 There are 12 known watercourse crossings along the A358 route. The channels that are officially designated under the EU Water Framework Directive (WFD), as enacted by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, as WFD waterbodies are:
- Broughton Brook;
 - West Sedgemoor main drain;
 - Fivehead rivers (2 main channels);
 - River Ding; and,
 - River Isle.
- 2.3.17 However, all watercourses that cross the A358 route are located within catchments that are associated with these designated waterbodies.
- 2.3.18 A number of these watercourses are considered minor and therefore would be accommodated by piped culverts. However Back Stream, Cad Brook, Venner's Water, Fivehead River and Broughton Brook are accommodated by larger structures, such as underpasses. The A358 crosses areas of Flood Zones 2 and 3 and is in an area at risk of flooding from the Clatworthy and Luxhay Reservoirs located to the west of Taunton and from Chard Reservoir located to the north east of Chard.
- 2.3.19 Blackdown Hills Area of Outstanding Natural Beauty (AONB) is located approximately 2.2km west at its nearest point to the proposed scheme.
- 2.3.20 The proposed scheme will pass through three National Character Areas (NCA): NCA 140, Yeovil Scarplands; NCA 143, Mid Somerset Hills; and NCA 146, Vale of Taunton and Quantock Fringes. An additional NCA (NCA 147, Blackdowns) is located approximately 1.5km to the south west at its nearest point to the route. It also passes through the local landscape character areas (LLCA) from the Taunton Deane Landscape Character Assessment: 1a, Vale of Taunton Deane; 4a, Fivehead Farmed and Wooded Vale; and 5a, North Curry; and will also pass through the following Lower Lias Foothills and Lowland LLCA within Region 2

(Blackdown Hills Plateau Foothills and Valleys) of the Landscape of South Somerset character assessment.

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

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

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

2.3.23 Further information on the existing baseline is presented within the technical assessment chapters 6 to 15 of this report.

2.4 Proposed scheme description

2.4.1 The location and an overview of the proposed alignment is provided in Figure 1.1; the indicative horizontal alignment and footprint of the proposed scheme are shown in Figure 2.1 provided in Volume 2 of this report.

2.4.2 The proposed scheme would provide 8.5 miles (13.6km) of new, rural all-purpose dual carriageway for the A358. The new dual carriageway would connect the existing A303 at Southfields Roundabout near Ilminster and with junction 25 of the M5 at Taunton. The new dual carriageway would be completed in-line with current trunk road design standards.

2.4.3 The proposed scheme would commence at junction 25 of the M5. Modifications to junction 25 are included as part of the proposed scheme and include a designated left turn lane from Toneway (Taunton access) onto the M5 northbound carriageway. Widening is also proposed to southbound M5 off-slip.

2.4.4 From the west, the proposed scheme will commence from a roundabout junction that has been formed for the Nexus 25 Strategic Employment site which is located just south of the existing Taunton Gateway Park and Ride facility. From this location the proposed dual carriageway would be offline from the existing A358 and would be constructed on low embankment to remain above the local flood levels until the road crosses Broughton Brook. It would then continue in a cutting through a gap between the residential properties along Stoke Road in Henlade.

2.4.5 East of Henlade, the proposed scheme would run parallel to the existing A358, initially at ground level but then entering a deep cutting through Mattock's Tree

Hill where an all movements grade separated junction would be constructed. The proposed scheme would emerge from the cutting before it reaches the River Tone. It would continue at ground level through a gap between Bath Cottage and the Somerset Progressive School until it reaches West Hatch Lane.

- 2.4.6 Between West Hatch Lane and the existing Griffin Lane Underbridge, the proposed dual carriageway would gradually adopt the horizontal and vertical alignment of the existing A358 carriageway. The existing Griffin Lane Underbridge, which carries the single carriageway A358 over the top of Griffin Lane, would be retained to carry one half of the proposed dual carriageway. A new bridge would be constructed to carry the other half.
- 2.4.7 From Griffin Lane, the proposed scheme would follow the alignment of the existing A358 through to Southfields Roundabout. The proposed dual carriageway would initially follow the alignment of the existing A358 Hatch Beauchamp Bypass using asymmetrical widening until reaching Capland.
- 2.4.8 Between Capland and Kenny the proposed scheme would take an entirely offline route just to the north-east of the existing road. This would enable the existing road to be retained as a local route between Ashill and Hatch Beauchamp and provide access to existing properties along the route.
- 2.4.9 From Kenny, the line of the existing road would be followed with a dual carriageway being created through asymmetrical widening around the Ashill Bypass through to Southfields Roundabout.
- 2.4.10 At Ashill, a new all movements grade separated junction between the proposed dual carriageway and the local road network would be formed.
- 2.4.11 At the eastern limits of the proposed scheme, the proposed dual carriageway would connect to the existing Southfields Roundabout. The roundabout would receive minor improvements to accommodate the scheme.

Junctions

- 2.4.12 There would a total of 4 junctions associated with the proposed scheme. These are described in Table 2-1 below and shown in Figure 2.2 of Volume 2 to this report.

Table 2-1 Junctions in the proposed scheme

Junction name	Description
M5 Junction 25	A designated left turn lane is proposed from Toneway (Taunton access) onto the M5 northbound. This left turn lane will enable an improved connection from Taunton onto the northbound motorway. Widening is also proposed to the southbound M5 off-slip. This would enable an improved connection from the M5 southbound approaching the roundabout at junction 25.
Mattock’s Tree Green junction	An all-movements grade separated junction providing connection between the proposed dual carriageway and the adjacent local road network. This junction would comprise merging and diverging slip roads to and from both carriageways of the proposed road. These slip roads would enable connection between the proposed road and: <ul style="list-style-type: none"> • The existing un-named local road through Ash to Thurlbear and Slough Green • The A378 via the existing traffic signal-controlled junction at Mattock’s Tree Green

Junction name	Description
	<ul style="list-style-type: none"> The existing A358 carriageway at the traffic signal-controlled junction, which would be retained to provide continued access to Henlade and Hatch Beauchamp
Ashill junction	<p>An all-movements grade separated junction between the proposed dual carriageway and the local road network.</p> <p>This junction would comprise merging and diverging slip roads to and from both carriageways of the proposed road. These slip roads would enable connection between the proposed road and:</p> <ul style="list-style-type: none"> The existing un-named local road into Ashill The local road known as Rapps, which leads to Ilton' and Southfields Roundabout
Southfields Roundabout	<p>The existing Southfields Roundabout between the A358 and A303 would be retained. The A358 arm would be widened from single to dual carriageway. The circulatory carriageway would also be widened to accommodate additional traffic and road markings would be upgraded to assist circulating traffic with lane discipline. A number of the other entry arms would also be widened in order to provide sufficient capacity. The A303 eastbound exit (Ilminster Bypass) would also be widened in order to provide sufficient capacity.</p>

Structures

- 2.4.13 Although there are currently no structures crossing over the existing alignment, there are a number of existing structures providing crossings underneath the existing A358. To accommodate the proposed wider carriageway, these structures would need to be widened or lengthened, or a new adjacent structure constructed before the existing structure is demolished or infilled. At some locations, where there is sufficient separation of the carriageways, the existing structure will convey the northbound carriageway with a new, parallel, structure constructed for the southbound carriageway. The assessment and selection of the most appropriate option to be implemented at each location will be undertaken during the design development and considered in the EIA.
- 2.4.14 New structures would be required at grade separated junctions, proposed road crossings and where proposed offline sections of the A358 cross existing roads and water courses.
- 2.4.15 Table 2-2 provides an indicative summary of the types of structure that would be included in the proposed scheme design. Selection and development of the appropriate design solution will take place during preliminary design development.

Table 2-2 Indicative types of structures in the proposed scheme

Structure Type	No. Unmodified Structures	No. Improved Structures	No. New Structures
Rail Bridge	0	0	0
Road Overbridge	0	0	5
Road Underbridge	1	0	1
Watercourse structures	2	5	7
Viaduct	0	0	0
Underpass	0	2	0
Footbridge	0	0	0

Treatment of local roads

2.4.16 The proposed scheme has the potential to impact 25 local roads. These are described in Table 2-3 below and shown on Figure 2.2 in Volume 2 of this report.

Table 2-3 Treatment to local roads as part of the proposed scheme

Local road name	Description	Proposed treatment
Stoke Road	Local road between the A358 at Henlade and Lower Henlade.	This road would be kept open by providing a new bridge crossing of the proposed dual carriageway. There would be no connection with the proposed scheme dual carriageway.
Greenway Lane	Local road between the A358 near Thornfalcon and Lower Henlade.	This road would be permanently closed at the point where the proposed scheme crosses it.
Ash Road	Local road between the A358 at Ash Cross and Slough Green/ Thurlbear.	This road would be diverted to connect to Mattock's Tree Green junction.
A358 at Mattock's Tree Green	Existing A358 which provides access to Henlade and Hatch Beauchamp.	This road would be diverted to connect to Mattock's Tree Green junction.
A378 at Mattock's Tree Green	This connects to the A358 at the existing traffic signal controlled junction at Mattock's Tree Green.	This road would be diverted to connect to Mattock's Tree Green junction.
Un-named road into Hatch Beauchamp	Local road with a junction to the existing A358 which provides access into Hatch Beauchamp.	The existing junction of this road would be closed. There is an option to divert this road to connect to Mattock's Tree Green junction via a new local link road. The link road and its configuration would be confirmed during design development if taken forward.
West Hatch Lane	Local road between the A358 and West Hatch.	This road would be permanently closed at the point where the proposed scheme crosses it.
Griffin Lane	Local road that currently passes underneath the existing A358, providing connection between West Hatch and Hatch Beauchamp.	This road would remain open.
Bickenhall Lane	Local road which leads to Hatch Beauchamp from a junction on the existing A358.	The assessed design includes the permanent closure of this road. There would be no connection to the proposed scheme. Traffic would reroute to join the A358 at either Mattock's Tree Green junction or Ashill junction. Following the responses from the public consultation, diversion routes are to be assessed for agricultural vehicle suitability in Stage 3.

Local road name	Description	Proposed treatment
Bickenhall Lane	Local road which leads to Bickenhall from a junction on the existing A358.	The assessed design includes the permanent closure of this road. There would be no connection to the proposed scheme. Traffic would reroute to join the A358 at either Mattock's Tree Green junction or Ashill junction. Following the responses from the public consultation, diversion routes are to be assessed for agricultural vehicle suitability in Stage 3.
Village Road	Local road which leads to Hatch Beauchamp from a junction on the existing A358.	The existing junction with the A358 would be permanently closed, although an overbridge would be provided so traffic could access Ashill/Bickenhall or join the A358 via the proposed Ashill junction.
Staple Fitzpaine Road	Local road which leads to Batten's Green from a junction on the existing A358.	The existing junction with the A358 would be permanently closed, although an overbridge would be provided so traffic could access Ashill/Hatch Beauchamp or join the A358 via the proposed Ashill junction.
Capland Lane	Local road which leads to the east from a junction on the existing A358.	The existing junction with the A358 would be permanently closed. Traffic from Capland would be required to pass through Stewley or Hatch Beauchamp to join the A358.
Folly Drove	Local road which leads to the west from a junction on the existing A358.	The existing junction is located along the section of A358 carriageway that will be retained as a parallel local road. It will therefore be retained, although there would no longer be a direct connection to the proposed A358 dual carriageway.
Stock's Lane/Radigan Lane	Local road which leads to the north from a junction on the existing A358.	The existing junction with the A358 would be permanently closed. However, a new link would connect this road to the 'Ashill Straight' via a new overbridge.
Wood Road	Local road which leads to the south from a junction on the existing A358.	The junction with the A358 would be permanently closed.
'Ashill Straight'	Local road which leads into Ashill from a junction on the existing A358 near Wood Road.	The junction with the A358 would be permanently closed, however the road through Ashill will be retained.
Park Barn Lane	Local road with a junction on the existing A358. This provides	The junction with the A358 will be permanently closed. Access to

Local road name	Description	Proposed treatment
	access to a small number of properties and serves as an emergency access to the Merryfield Airfield.	Park Barn Lane would be provided by upgrading a nearby track (Copse Lane).
Park Barn Lane	Local road with a junction on the existing A358.	The junction with the A358 would be permanently closed.
Rapps Road	Local road with a junction on the existing A358. This provides access to the settlements of Rapps and Ilton.	This road would be diverted to connect to Ashill junction.
Un-named local road to east Ashill from the A358	Local road with a junction on the existing A358. This provides access to Ashill.	This road would be diverted to Ashill junction.
Thickthorn Lane	Local road which runs parallel to the A358 and provides access to properties to south of Ashill.	This road would be closed permanently to make way for Ashill junction.
Cad Road	Local road with a junction on the existing A358. This provides access to Ilton.	The junction with the A358 would be permanently closed.
Broadway Street	Local road with a junction on the existing A358. This provides access to Horton and Broadway.	The junction with the A358 would be permanently closed.

Treatment of walking, cycling and horse riding facilities for the proposed scheme

- 2.4.17 There are several existing PRoW and local roads, that may also be popular for walking, cycling and horse riding (WCH), along the length of the proposed scheme. Those that are likely to be affected by the proposed scheme and a proposed treatment are described in Table 2-4 below. The locations of these WCH routes are shown in Figure 2.3 in Volume 2 of this report.
- 2.4.18 WCH proposals have been developed following consultation with user groups and local council rights of way officers, alongside an audit of facilities and user surveys undertaken as a part of the proposed scheme development.
- 2.4.19 Where the proposed road severs a WCH route, the majority would be retained by diverting across the nearest available road bridge. It is proposed to close a small number of PRoW that appear to provide no obvious through route as described in Table 2-4. There would be no dedicated WCH bridges along the proposed scheme.

Table 2-4 Proposed treatment to WCH Routes Part of the proposed scheme

Ref	Description
T 22/6	To be diverted via Stoke Road overbridge between Henlade and Lower Henlade.
T 22/7	To be diverted via Stoke Road overbridge between Henlade and Lower Henlade.
T 22/5	To be diverted via Stoke Road overbridge between Henlade and Lower Henlade.
Stoke Road	See Table 2-3
T 22/1	To be diverted via Stoke Road overbridge between Henlade and Lower Henlade.

Ref	Description
Greenway Lane	See Table 2-3
Ash Road	See Table 2-3
T 27/3	To be diverted via Mattock's Tree Green junction.
T 31/27	Crossing of the A358 to be closed. Diversion to Thornfalcon via Mattock's Tree Green junction and/or to Hatch Beauchamp via Griffin Lane Underbridge.
Griffin Lane	See Table 2-3
T 2/4 and T2/5	To be diverted through Griffin Lane Underbridge.
Bickenhall Lane	See Table 2-3
T 14/8	To be diverted via Fivehead River Underbridge.
T 14/5	To be diverted via Fivehead River Underbridge.
T14/25	To be diverted to connect with Capland Lane
T 14/4	No change. Existing A358 carriageway to be retained as local access road at this location.
CH 1/1	Diverted across Kenny Overbridge.
CH 1/2	To be stopped up.
CH 1/3	To be stopped up.
CH 1/5	To be diverted across Ashill Junction Overbridge.
CH 1/25	To be stopped up.
Rapps Road	See Table 2-3
CH 1/21	To be stopped up.
CH 1/26	To be stopped up.
CH 1/27	To be stopped up.
CH 1/6	To be diverted via Ashill Junction.
Broadway Street	See Table 2-3
CH 2/15	To be diverted via Ashill Junction.
CH 2/16	To be stopped up.

Drainage

- 2.4.20 The proposed scheme would have a total drainage catchment area of approximately 55Ha split over an anticipated eight new road catchments. Networks 1 and 2 to the north, and coincident with the offline section of the proposed scheme, would be constructed over undeveloped land and the remaining of the networks to the south would incorporate part of the existing A358 paved areas.
- 2.4.21 Runoff rates would be restricted to existing site conditions runoff rates for areas currently developed, or greenfield runoff rates for new offline road sections.
- 2.4.22 To suitably manage additional flows generated as a result of the proposed scheme and to reduce the risk of flooding, Sustainable Drainage Systems (SuDS) would be implemented throughout to act as surface water discharge features (via infiltration to ground if feasible) or as surface attenuation and runoff control prior to discharge to adjacent water bodies. Consideration to online oversized piped would be given to provide additional storage at constrained areas.

2.4.23 To maintain adequate mitigation against surface water flooding the proposed scheme drainage collection systems would be sized for the 1 in 1 year and 1 in 5 year return periods with a 20% allowance for climate change, for no surcharging and no flooding respectively, while the overall system would be designed to manage up to the 1 in 100 year storm events with a 40% climate change allowance. This allowance would minimise surface water flood risk throughout the design life of the proposed scheme.

Lighting

2.4.24 A lighting assessment concluded that there is justification to provide lighting at West Hatch Lane Junction, Southfields Roundabout and the proposed junction between the Kenny Link and the main road through Ashill. No other junctions would justify lighting.

2.4.25 The proposed lighting is expected to be LED mounted on either 8m, 10m or 12m columns. The extent of lighting for each junction and the associated connecting roads approaching / leaving these links will follow guidance in the Institution of Lighting Professionals (ILP) document PLG02¹⁰.

Signage and Technology

2.4.26 The proposed scheme would include the standard minimum technology provisioning for a dual 2-lane all-purpose carriageway. This is likely to be minor in nature and comprise of the provision of National Traffic Information Service (NTIS) equipment and Emergency Roadside Telephones (ERT) only. Ducting and cabling routes within the proposed verge to accommodate these installations may be required.

2.4.27 The proposed scheme would consider the technology requirements for expressways, the specific measures to be adopted are under development and will be defined in the preliminary design and specification; this may include:

- longitudinal ducting in both verges in areas where new structures constrain the verge;
- cross carriageway ducts across new or significantly modified slip roads;
- relocated Variable Message Signs (VMS);
- traffic counting sites; and
- speed enforcement may be included.

2.4.28 The proposed scheme would also impact connections with the M5 and the A303. Subject to engagement with Highways England and other stakeholders, the indicative design proposal on M5 and A303 would likely include the provision of a pair of VMS on the approaches displaying journey times as well as strategic messages and CCTV coverage of the junction / roundabout based on the changes to the junction based on the alignment. A series of radar MIDAS sites covering approaches to the junction may also be necessary on the M5. Ducting and cabling routes within the verge to accommodate these installations would be provided as appropriate.

¹⁰ Institution of Lighting Professionals (2013) *Professional Lighting Guide 02: The Application of Conflict Areas on the Highway*.
Institution of Lighting Professionals

Utilities

- 2.4.29 The proposed scheme would affect several statutory undertakers (including power, gas, water and telecommunications suppliers) but most notably nationally important infrastructure consisting of two National High Pressure (NHP) gas mains and the CenturyLink Atlantic Crossing Cable 1 and 2.
- 2.4.30 The NHP gas mains are towards the southern end of the proposed scheme. Records indicate one of the pipelines crosses the existing A303 Ilminster Bypass approximately 100m East of the Southfields roundabout, and the second crosses the A358 approximately 1.5km north of the roundabout. Outages and works may only be carried out in summer months, between the clocks changing in March and October.
- 2.4.31 The CenturyLink Atlantic Crossing cable follows the existing A358 corridor. Outages and works on the CenturyLink cables are restricted to one outage per 18-month period and will require co-ordination with CenturyLink where the timing may be set to align with other third parties.
- 2.4.32 In addition to the critical assets there is a relatively extensive network of water supply pipelines and sewers as well as overhead and underground high and low voltage electric and telecommunications across the area which will require diversion and/or protection. These works would be required for both the permanent works and potentially for any temporary works.
- 2.4.33 The proposals for managing utilities will be developed during the preliminary design stage and taken into account in the environmental assessment appropriate for the selected consenting regime; included in the DCO EIA if appropriate.

2.5 Construction

Construction programme and phasing

- 2.5.1 The proposed scheme is currently planned to be completed as a single project and is broken down into two sections:
- Section 1 encompasses the offline works between the new Nexus 25 roundabout at the M5 junction 25 through to the Hatch Lane junction on the existing A358.
 - Section 2 extends from Hatch Lane to the Southfields Roundabout on the A303 and follows the existing alignment of the A358. This section is further split into a new off-line south bound two lane carriageway that will be constructed to the east of the existing A358; and online works to convert the existing A358 carriageway into a two lane north bound carriageway.
- 2.5.2 Advanced works required to enable construction may include environmental, ecological, and archaeological works to ensure areas are clear for construction. The protection or diversion of existing utility services will also be required, as well as demolition and replacement of some existing structures where they are deemed unsuitable to retain or modify. Temporary arrangements and safe construction site crossing points for maintaining existing WCH access will also be addressed.
- 2.5.3 Once the enabling works are completed the offline earthworks and structures in both Section 1 and the south bound carriageway in Section 2 will commence. Once the new off-line carriageway within section 2 is completed traffic will be

switched to run on the new carriageway to allow working on the existing A358 carriageway (On-line section 2 Northbound).

- 2.5.4 The whole proposed scheme is currently programmed to take 44 months to construct, with an assumed opening to traffic in 2028. However, this will be reviewed as the design is refined and the construction programme developed.

Compounds and haul roads

- 2.5.5 A scheme of this size requires a main site compound along with several, smaller, satellite compounds at strategic work locations along the route. Potential locations for the main site compound at the northern end of the proposed scheme adjacent to junction 25 of the M5 are being considered.
- 2.5.6 Satellite compounds are envisaged to facilitate works at the major junctions at Mattock's Tree Green and Ashill. Small temporary office and laydown areas will be required at bridge locations and the tie-ins to the new Nexus 25 roundabout and A303 Southfields roundabout.
- 2.5.7 To reduce the amount of construction traffic using the existing road network, haul routes will be created. Where practicable, these are likely to be routed along the new mainline route, however, where this is not practicable, additional temporary land use may be required adjacent to the works.
- 2.5.8 Construction traffic that is required to use the existing road network will be restricted to using the strategic road network, as far as is reasonably practicable.

Traffic management

- 2.5.9 It is a project requirement to maintain two-way traffic along the existing A358 during the construction of the proposed scheme. However, where construction activities such as existing online bridge demolition, modification or construction (for example, bridge deck beam installation) prohibits safe road operation, limited temporary road closures may be required at night / weekend / bank holidays.
- 2.5.10 Although a substantial section of the works will be constructed offline at sections where side roads and the offline elements of the works tie into the existing A358 a higher degree of temporary traffic management measures during construction will be required, such as narrow lanes, lane closures, contraflow and two and three way lights. Reasonable endeavours will be made to phase the works to minimise disruption.

Plant and equipment

- 2.5.11 Construction activities would involve the use of heavy plant items with the potential to emit high levels of noise and vibration and contribute to pollution, e.g. excavators, dumper trucks, dozers and compaction equipment. Noisy activities also include demolition of existing features and piling for structures.
- 2.5.12 To mitigate the impacts associated with construction plant and equipment, the following measures would be undertaken, as necessary during the construction phase of the works:
- programming works, where practicable, so that the requirement for working outside normal working hours is minimised;

- all machinery used on site would be maintained according to manufacturers' instructions. Engines must be switched off during periods of prolonged inactivity;
- selection of low noise/vibration methods and equipment and use of hoods/shrouds/mufflers/noise blankets to minimise plant noise and vibration, where practicable;
- where practicable, keep noisy plant and vibration generating activities away from sensitive receptors, position plant to face away from receptors, use temporary noise screens and adopt working hours which avoid sensitive times of the day; and
- where practicable, works that result in elevated noise levels would be confined to the hours between 8am and 6pm with no weekend working for these activities.

Earthworks

- 2.5.13 It is assumed that the material excavated will be suitable for reuse within the sections of construction works where fill is required, minimising the need for importing material onto site. Currently the design shows there to be a surplus of fill material generated from the construction works and, if suitable, opportunities for use in landscaping would be explored to mitigate the need to export offsite for re-use or disposal.

Carbon management

- 2.5.14 To deliver the projects aspirations with respect to the minimisation of carbon emissions and the efficient use of resources, the carbon intensity of the proposed scheme will be established and monitored throughout the design and construction phases. A sustainable procurement strategy will be implemented to ensure that low carbon materials are, where practicable, specified and that the carbon intensity of materials and sub-contract packages is measured and monitored throughout.

Materials and waste management

- 2.5.15 The recycling and re-use activities of site won (including demolition) materials arising from the proposed scheme will be implemented and where practicable construction materials will be sourced from local sources of supply.

3 Assessment of alternatives

3.1 Assessment methodology

- 3.1.1 This chapter summarises the alternative options that have been considered during the development stages of the proposed scheme. The options appraisal process has been undertaken in line with Highways England's Project Control Framework (PCF), the early stages of which are summarised below:
- **PCF Stage 0** – strategy, shaping and prioritisation. Early initial high-level sifting appraisal to assess the viability of a long list of transport solutions to the problem identified.
 - **PCF Stage 1** – options identification. A selected number of viable options are subject to further traffic, economic and environmental assessment and feedback sought by consultation.
 - **PCF Stage 2** – options selection. The option designs, traffic modelling and economic and environmental assessments are refined following feedback from the consultation. At the end of this stage a Preferred Route Announcement (PRA) is made.
 - **PCF Stage 3** – preliminary design. The Preferred Route becomes the proposed scheme and this single option is developed to the required Preliminary Design level to allow full assessment and appropriate planning consent applications to be made.
- 3.1.2 This project is at the beginning of Stage 3 and this report has been prepared based in early preliminary design information available.
- 3.1.3 For Stages 0 and 1 Initial option sifting was undertaken in accordance with the Transport Analysis Guidance – The Transport Appraisal Process or 'WebTAG'¹¹. The sift used the Early Assessment Sifting Tool (EAST)¹², 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 as described in paragraphs 3.2.2 to 3.2.7 below. The scoring mechanism process followed after using EAST was developed in accordance with the Transport Analysis Guidance – The Transport Appraisal Process or 'WebTAG', that identifies the need for analysts to 'identify their own criteria or thresholds for determining which options 'pass' or 'fail' the stage of process', also noting that this needs to be clearly explained in subsequent reporting. A brief summary of the findings of these early sifting and appraisal exercises is provided in section 3.2.
- 3.1.4 The Stage 2 Option Assessment methodology and conclusions are reported in the Scheme Assessment Report published as part the Preferred Route Announcement in 2019.¹³ A summary of the finding of this report is provided below in section 3.3.

¹¹ Department for Transport (2014, revised in May 2018) *Transport Analysis Guidance: The Transport Appraisal Process*

¹² Department for Transport (2011) *Early Assessment Sifting Tool (EAST)* [online] Available at: <https://www.gov.uk/government/publications/transport-business-case> (Accessed January 2021)

¹³ Highways England (2019) *A358 Taunton to Southfields Dualling Scheme – Scheme Assessment Report*. Available at: https://highwaysengland.citizenspace.com/he/taunton-to-southfields-dualling-scheme/results/a358_scheme_assessment_reportoctober2019.pdf (Accessed January 2021)

3.2 Stages 0 and 1 options appraised

3.2.1 A total of 28 options were originally identified as part of the options identification stage during Stage 1 in 2016 to ensure a broad range of alternatives were considered. These can be broadly classified as central, northern, or southern routes:

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

Sifting of options

3.2.2 The 2016 Stage 1 sift was divided into two phases covering the five cases of the option assessment framework contained in Appendix A of WebTAG. In phase 1, the alternatives were scored against the strategic case within EAST. At the end of this phase, two alternatives (options 3 and 16) were discounted due to having a significantly lower score than the others. Phase 2 measured the options against the economic, financial, managerial, and commercial aspects of EAST.

3.2.3 Phase 1 considered potential impacts on environmental constraints, including statutory environmental designations such as the Blackdown Hills AONB, nearby Sites of Special Scientific Interest (SSSI), Local Wildlife Sites (LWS) and ancient woodland. Phase 2 considered impacts of the alternatives on statutory and non-statutory environmental designations and on air quality, noise, the natural environment, heritage and landscape, and streetscape and urban environment.

3.2.4 The remaining 26 options had a wide spread of results following the Phase 2 sift. The highest scoring options were all similar in nature and it was considered that a broader range of solutions was required to take forward for further assessment. A list was compiled of features that were considered to be important, to include in the range of shortlisted options and these are set out in Table 3-1. This was based on how well the options met the scheme objectives. Four options were selected such that these features were contained within at least one option.

3.2.5 Following Phase 2, the four options recommended to be taken forward for further appraisal were options 1, 2/2D, 8A/8B and 13, which ranked 12th, 3rd, 5th and 4th respectively following the phase 2 sift. These options were selected as important elements as detailed in Table 3-1 below were contained in at least one option.

Table 3-1 Important features to be included in the shortlist

Feature	Why was this considered important
Fully off-line route	This would ensure that an option is considered that facilitates simple construction.
Southern loop	This would lie roughly within the existing road corridor and provide an opportunity for re-use of the existing A358 corridor which is considered to comprise a suitable alignment for online widening.

Feature	Why was this considered important
Cross country at Rapps	This is considered to comprise a high speed, direct route.
Retention of Ashill Bypass	This would lie roughly within the existing road corridor and provide an opportunity for re-use of the existing A358 corridor which is considered to comprise a suitable alignment for online widening.
Retention of Hatch Beauchamp Bypass	This would lie roughly within the existing road corridor and provide an opportunity for re-use of the existing A358 corridor which is considered to comprise a suitable alignment for online widening. This would also provide the opportunity for retention of large bridge crossing (Griffin Lane).
A way of connecting to the M5 (all movements) that does not require the use of junction 25	This would ensure an option is considered in the shortlist that enables all traffic travelling between the new scheme and M5 motorway to be directed away from junction 25.
A separate Henlade Bypass	This would provide a way of managing all traffic travelling between the new scheme and M5 motorway and local traffic separately.
Route that passes through Stoke Road, Henlade	Route passes in a cutting reducing visual intrusion and noise effects.
A route that passes south of Stoke Road, Henlade	This would provide the opportunity to explore a corridor away from the Air Quality Management Area (AQMA) in Henlade.

3.2.6 The cost estimates for the four options to be taken forward were found to be significantly higher than those prepared for the Strategic Outline Business Case and for the strategy, shaping and prioritisation stage (Stage 0) Order of Magnitude Estimate (OME). Therefore, a further review was undertaken to identify rationalisations that could be introduced to the options without compromising the scheme objectives. Refinements were made to the four options including the removal of a free flowing connection to the A303 Ilminster Bypass, a separate Henlade Bypass, using the Hatch Beauchamp Bypass to a greater degree, using the existing Henlade Bypass, and rationalisation of the local road network. At this stage, option 13 was dropped as the rationalised version was no longer fundamentally different from option 8A/8B.

3.2.7 Alternative solutions were investigated that might alleviate congestion at junction 25 whilst providing a new route away from the AONB. The most viable of these was a new junction south of M5 junction 25 further north than option 1. A potential junction location in the vicinity of Killams Avenue was identified which could avoid direct impacts on a nearby property and would not require a southerly route. This location was found to be compatible with possible variations of option 2 or 8. An alternative version of option 8 was therefore developed to enable consideration of this alternative new junction providing an alternative to option 1 that would not raise the same environmental concerns. This new proposal was added to the shortlist and was called 'option 8/8B+NFS'.

Shortlisted options

3.2.8 The resulting rationalised options recommended to be taken forward for further appraisal were:

- option 1/1B + North Facing Slips (NFS);
- option 2A/2B;
- option 8/8B+J25; and,
- option 8/8B+NFS.

- 3.2.9 Overall, option 1 would have the greatest impact on the environment. Option 1 would have a highly significant impact on the landscape due to its proximity to the Blackdown Hills AONB. It would be more visible from the higher ground than the other options and would introduce a new road corridor in a tranquil area. Option 1 would also have a greater impact on biodiversity than the other options as it would have a Large Adverse effect on Thurbear Wood and Quarrylands SSSI. Due to these environmental impacts, it was decided that Option 1 should not be taken forward to public consultation in 2018.
- 3.2.10 The final three shortlisted options were as shown in Table 3-2. The options were renumbered to ensure they could be separately identified during the option appraisal process. Suffixes were used during the rationalisation process to distinguish between variations with a link to the north via the M5 junction 25 (Jct 25) or via north facing slip roads directly onto the M5 (NFS). This numbering system was later amended again to reduce confusion and the three options renamed as the Pink, Blue and the Orange options.

Table 3-2 Final shortlisted options for Stage 1 assessment and reporting

Original option	Rationalised option ref	Revised option reference
2/2D	2A/2B	Pink
8A/8B	8/8B+Jct25	Blue
8A/8B	8/8B+NFS	Orange

3.3 Stage 2 Further assessment of selected options

- 3.3.1 In 2017 the Orange option was taken to initial public consultation by Highways England and was presented as the proposed route as it met the scheme brief and was the most affordable. The outcome identified some key areas of importance including the concern about the scheme’s impact on the countryside and open space in light of the new motorway junction. A general request for further options to be considered was also made; therefore, Highways England further developed the three shortlisted route options (Pink/Blue/Orange) for presentation at the second public consultation in 2018.
- The Pink option commenced at a new junction on the M5 approximately 1.2 miles (2 kilometres) south of junction 25. South-facing slip roads from the M5 combined to become the new dual carriageway, which runs eastwards and north of Stoke Hill. Here a limited-movement junction was proposed with east-facing slip road connections to the new road which would allow traffic to travel between the new A358 and junction 25 via a new 0.9 mile (1.5 kilometre) dual carriageway link past the planned Nexus 25 site. The proposed route would then follow the existing A358 to Southfields Roundabout enabling the existing road to be upgraded from a single to a dual carriageway. The total length of the Pink option was 9 miles (14.6 kilometres), plus the 0.9 miles (1.5 kilometres) spur leading to M5 junction 25.
 - The Blue option commenced at the M5 approximately 1.2 miles (2 kilometres) south of junction 25 and runs eastwards on a more southerly alignment. At Stoke Hill a junction was proposed similar to that with the Pink option which would allow traffic to travel between the road and junction 25 via a new 1.2 miles (2 kilometres) dual carriageway link past the planned Nexus 25 site. The road would then continue in a south easterly direction to West Hatch Lane, where an all-movement, grade-separated junction was proposed to allow

access to Hatch Beauchamp, Henlade and surrounding communities, and the A378. This option was identical to the Pink option from this point onwards to Southfields Roundabout. The total length of the Blue option was 8.7 miles (14.1 kilometres), plus the 1.2 miles (2 kilometres) spur leading to M5 junction 25.

- The Orange option commenced at the M5 approximately 2.1 miles (3.5 kilometres) south of junction 25 at a proposed new 2-bridge roundabout which would form a new all-movements junction between the new A358 and the motorway. The proposed road initially took a north-easterly course towards Henlade before arcing around the north of Stoke Hill. In contrast to the Blue option, there was no link to junction 25 from this location, and therefore no junction at Stoke Hill; this option was identical to the Blue option from this point onwards. The total length of the Orange option was 9.5 miles (15.3 kilometres).

Assessment of Pink, Blue and Orange options

3.3.2 The Pink, Blue and Orange options were subject to further traffic, economic and environmental assessment to help inform the Preferred Route option as detailed below.

Economic assessment

3.3.3 A BCR value was calculated for each of the options considered in the assessment. This is used to assess the value of a transport project by weighing the benefits against the costs to indicate whether it is value for money and considers a wide spectrum of impacts.

3.3.4 In April 2018, it was determined that the Pink option had the highest Benefit to Cost Ratio (BCR) of 1.43 despite being the most expensive option. This was compared to the Blue Option BCR of 1.23 and the Orange Option BCR of 0.97.

Traffic assessment

3.3.5 It was determined that all three route options would reduce traffic in Henlade in the opening year (2023) and design year (2038). Pink performed the best and was the most favourable, with an 89% reduction in traffic flows in both the opening and design years. All three route options also reduced journey times in the design year for both AM and PM peaks. The Pink option and Blue options performed the best, with Orange the least favourable in relation to traffic.

Environmental assessment and design

3.3.6 An environmental assessment was carried out for each route option to identify the environmental impacts and help inform the preferred route decision. Table 3-3 outlines a summary of the environmental effects anticipated for each of the options.

Table 3-3 Potential effects from PCF 2 Stage 2 options

Option	Conclusions of the Stage 2 environmental assessment
Do nothing	This performs as the baseline to compare other options to.
Pink option	This option has the potential for Significant Adverse environmental effects however, it would have the least effect to ecology and landscape in comparison to the Blue and Orange options. There would be a Moderate Adverse effect to ecology during construction

Option	Conclusions of the Stage 2 environmental assessment
	<p>due to the loss of Road Verges West of Hatch Beauchamp LWS and part of Jordans LWS. There would also be a Moderate Adverse effect to ecology during operation due to the potential loss of veteran trees from Jordans LWS. This option is also expected to have a Moderate Adverse effect on bats during construction but is not anticipated to impact Ancient Woodland. For all options, a Slight Adverse effect is predicted on barn owls, dormice, badgers, otters, water voles, great crested newts and white-clawed crayfish due to habitat loss and fragmentation. There would be moderate adverse effects to landscape and visual amenity during construction and impacts are the least for this option due to its proximity to the existing A358. Furthermore, although this option is anticipated to produce the greatest noise benefit compared to the other two options, it is expected to expose the greatest number of new receptors to moderate or major noise increases in comparison to the Blue and Orange options. The construction of this option also has the potential have Large Adverse effect to the archaeological remains of a recorded Roman settlement and is anticipated to have a Large Adverse effect upon grade II* listed 'Musgrave Farmhouse and Outbuilding with wall adjoining south-east corner of Haydon House'. The alignment of this option is also anticipated to cause Slight Adverse effects to the water environment as it requires a permanent diversion of the River Ding. However, effects for all environmental aspects are likely to be lessened by the implementation of mitigation.</p>
Blue option	<p>As with the Pink option, this option has the potential to cause significant environmental effects. This option is anticipated to have Large adverse effects to ecology in comparison to the Pink option and the same effects as the Orange option due to the loss of Huish Copse East LWS, ancient woodland used by two rare species of bat (barbastelle and Bechstein's bat) during construction and operation. For all options, a Slight Adverse effect is predicted on barn owls, dormice, badgers, otters, water voles, great crested newts and white-clawed crayfish due to habitat loss and fragmentation. There would also be Large Adverse effects to landscape and visual amenity during construction due to the larger distance between this option and the existing road in comparison with the closer Pink option and the intrusion on the countryside south and west of Henlade. It is also likely that this option (and the Orange option) will have significant effects due to the requirement for the partial removal of a Mineral Safeguarded Area (MSA) for building stone, where the Pink option is anticipated to avoid this completely. The construction of this option also has the potential to have a Large Adverse effect on the archaeological remains of a recorded Roman settlement and is anticipated to have a Moderate Adverse effect on one grade I listed building (Church of St Aldhem and Eadburgha) and one scheduled monument (Cross in St Aldhelm and St Eadburgha) as with the other options and have a Large Adverse effect upon grade II* listed 'Henlade House and Outbuilding with wall adjoining south east corner of Haydon House'. It is also has the potential to effect a grade II* listed cross in St Aldhelm and St Eadburgha churchyard. This option is also expected to cause the greatest number of noise increases in the short term but has a lessened effect compared to the Pink option but a larger effect compared to the Orange option. The alignment of this option is also anticipated to cause Slight Adverse effects to the water environment as it requires a permanent diversion of the River Ding. However, effects for all environmental aspects are likely to be lessened by the implementation of mitigation.</p>
Orange option	<p>As with the Pink and Blue options, this option has the potential to cause significant environmental effects. This option is anticipated to have Large Adverse effects to ecology in comparison to the Pink option and the same effects as the Blue option due to the loss of Huish Copse East LWS, ancient woodland used by two rare species of bat (barbastelle and Bechstein's bat) during construction and operation. For all options, a Slight Adverse effect is predicted on barn owls, dormice, badgers, otters, water voles, great crested newts and white-clawed crayfish due to habitat loss and fragmentation. There would also be significant Large Adverse effects to landscape and visual amenity during construction due to the larger distance between this option and the existing road in comparison with the closer Pink option and the intrusion on the countryside south of Henlade and west of Stoke St Mary. It is also likely that this option (and the Blue option) will have the largest effects for materials due to the requirement for the partial removal of an MSA for building stone, where the Pink option is anticipated to avoid this completely. Furthermore, the alignment of this option is anticipated to cause Slight Adverse effects to the water environment as it</p>

Option	Conclusions of the Stage 2 environmental assessment
	<p>requires a permanent diversion of the River Ding the Black Brook and is therefore expected to have the largest effect to the water environment in comparison to the Pink and Blue options. However, although the construction of this option has the potential to have a Moderate Adverse effect on one grade I listed building (Church of St Aldhem and Eadburgha) and one scheduled monument (Cross in St Aldhelm and St Eadburgha) as with the other options and grade II* listed 'Henlade House and Outbuilding with wall adjoining south east corner of Haydon House' in similarity to the Blue option. It is also has the potential to effect a grade II* listed cross in St Aldhelm and St Eadburgha churchyard. However, it is not anticipated to effect the archaeological remains of the nearby Roman settlement and will cause the least predicted effects to heritage in comparison to the Pink and Blue options. This option is also expected to cause the smallest number of significant effects in relation to the exposure of receptors to increased noise. However, effects for all environmental aspects are likely to be lessened by the implementation of mitigation.</p>

Similar environmental effects

3.3.7 All three options were expected to have the same effects on air quality due to the production of construction dust and vehicle emissions (NO₂) during the operational phase. Effects on air quality on human health and designated ecological site receptors were predicted to be Slight Adverse. Effects were predicted to be not significant during construction and operation of all three options. All options are expected to have both beneficial and adverse effects to population and human health, where both types of effect are expected to be the same for all options. All three options are not expected to cause significant effects to climate or be vulnerable to changes in climate. All three options are also expected to cause a slight increase in greenhouse gas emissions due to an increase in journey length, although journey times are shorter.

Residual combined effects

3.3.8 The residual combined effect during construction and operation for the Pink, Blue and Orange options is anticipated to be Not Significant Adverse, and therefore residual combined effects were considered not significant.

Residual cumulative effects

3.3.9 Construction of all three route options were considered to cause Significant Adverse effects to the cultural heritage, landscape and biodiversity of Junction 25 of the M5, Nexus 25, Land at Coldharbour Farm and Killams Drive. No other effects were considered significant.

3.3.10 Although operation of all three route options were considered to cause Significant Adverse effects to all three schemes to the cultural heritage, landscape and biodiversity of Junction 25 of the M5, Nexus 25, Land at Coldharbour Farm and Killams Drive, overall, operational effects were deemed to be Not Significant Adverse.

Further options considered flowing 2018 consultation

3.3.11 As a result of the 2018 consultation three alternative route options were proposed by the public and a Parish Council, a brief description is provided below:

- a combination route with elements from the Pink and Orange options (Pink/Orange) - would be approximately 16 kilometres long between the M5 and Southfields roundabout connections. It would include an additional 1.5km

dual carriageway link between the proposed dual carriageway and Junction 25 of the M5

- a combination route with elements from the Blue and Orange options (Blue/Orange) - would be approximately 15.3km long between the M5 and Southfields roundabout connections. It would include an additional 2km dual carriageway link between the proposed dual carriageway and Junction 25 of the M5.
- Ruishton and Henlade Parish Council proposed an option (named the Green option) - contains elements of the Pink and Orange options, with a novel element between the A368/A378 junction at Mattock’s Tree Green and coarsely follows the same corridor as the other three options. There would be three junctions along Section 1 comprising Junction F (Killiams), Junction D (Henlade) and Junction C (Mattock’s Tree Green).

Method to identify the Preferred Route option

3.3.12 The methodology employed to appraise Pink, Blue and Orange options from the 2018 consultation plus the three alternatives identified by consultees was based on the elimination process outlined in the DMRB and comparing option in pairs against the main categories of the Appraisal Summary Table (AST). The option with the least number of significant advantages was eliminated. The remaining option was taken forward for comparison with the next option.

3.3.13 The Pink option performed significantly better than the Blue and Orange options in the elimination process in terms of economics and the landscape and was the most favourable option. All other options were compared to the Pink option to establish if the options identified as part of the consultation process offered benefits greater than the best performing option (Pink). A summary of the conclusions of this appraisal is provided in Table 3-4.

Table 3-4 Potential impacts from PCF 2 Stage 2 additional consultation options

Option	Key conclusions of the Stage 2 environmental scheme report
The Pink option	The Pink option would be the least expensive of all the schemes costing £521m and has the highest Benefit to Cost Ratio (BCR) of 1.43. This option was estimated to cause a Moderate Adverse impact to the landscape, which would cause the least level of impact of the options. In relation to air quality, this option would reduce NO ₂ by 1005.9 and PM ₁₀ by 356.5 and lead to the removal of Henlade AQMA. Traffic would also be reduced by 91%. Noise impacts were estimated at a net disbenefit of -£2.3 m and greenhouse gases (change in carbon over 60 years) were estimated at -£25.880m. This option also avoids Huish Copse Ancient Woodland with Neutral severance.
The Blue/Orange option	The Blue/Orange option would be more expensive than the Pink option costing £534.1m with a lower BCR of 1.10. This option was anticipated to have a Large Adverse impact to the landscape. This option would cost more in relation to air quality compared to the Pink option (0.8m compared to £0.3m respectively). This option would perform better in relation to noise costs with a net benefit of £0.6m compared to the net disbenefit of the Pink option. This option shows a smaller cost in relation to greenhouse gases (-£24.189m) but a smaller reduction in traffic (-77%) compared to the Pink option. This option would cause permanent loss of Ancient Woodland at Huish Copse and would cause Slight Adverse severance.
The Pink/Orange option	The Pink/Orange option would be more expensive than the Pink option costing £533m with a lower BCR of 1.28. This option was anticipated to have a Large Adverse impact to the landscape. This option would perform marginally better than the Pink option in relation to air quality (£0.6m compared to £0.3m respectively) and noise (with a net benefit of £0.2m). This option shows a higher cost in relation to greenhouse gases (-

Option	Key conclusions of the Stage 2 environmental scheme report
	£28.2m) and a smaller reduction in traffic (-90%) compared to the Pink option. This option would avoid Huish Copse Ancient Woodland but would cause Slight Adverse severance.
The Green option	The Green option would be more expensive than the Pink option costing £550m with a lower BCR of 1.20. This option was anticipated to have a Large Adverse impact on the landscape. This option would perform marginally better than the Pink option in relation to air quality (1069.7 reduction in NO ₂ and 459.9 reduction in PM ₁₀) and noise (with a net benefit of £0.5m). This option shows a higher cost in relation to greenhouse gases (-£28.9m) and a smaller reduction in traffic (-87%) compared to the Pink option. This option would avoid Huish Copse Ancient Woodland but would cause Slight Adverse severance.

3.3.14 The Pink option performed significantly better than the Blue/Orange, Pink/Orange and Green options in in terms of economics and landscape. All three options were more expensive than the Pink option and caused more significant environmental damage. Where these options did perform better than the Pink option, the differences were not considered to outweigh the economic and landscape advantages of the Pink option. Therefore, all three of the options identified by consultees at the 2018 consultation were not taken forward.

Development post 2018 consultation – The Pink Modified option

3.3.15 All three options were within budget set for the scheme prior to the 2018 consultation. However, following this consultation, the proposed routes were re-costed to accommodate for further design developments, the change in the scheme delivery programme for the 2018 consultation and the delayed opening year for the scheme. Further scheme risks were also identified. This resulted in two of the proposed route options exceeding the budget. Further work was therefore taken to review the updated costs and deliver a route option within the budget, whilst still in compliance with the RIS/RIS2 objectives.

3.3.16 The Pink option was the most expensive option, but as the best performing of the three options and the option attracting strongest support from the 2018 consultation, it was trialled for modification to reduce the cost. This revised option is referred to as the Pink Modified option.

Description of the Pink Modified option

3.3.17 The Pink Modified option takes a similar route to the Pink option through Section 1. This option follows a single alignment to connect into the gyratory at M5 junction 25 and would be approximately 13.6 kilometres in length between the M5 and Southfields roundabout connections. This option retains the bypasses of Henlade, connecting with the A378 and connecting directly to junction 25 on the M5. Additional assessment work on M5 junction 25 has also been undertaken to develop the design and mitigate the impact to junction 25. Removing Junctions A and B and the road in-between delivers the right balance between the Scheme objectives and cost. It also responds to the public feedback concerning the impact that these junctions and the road in-between, might have on homes, public open space and the countryside.

Assessment of the Pink Modified option

3.3.18 The stage 2 economic, traffic and environmental assessment of the Pink Modified option in comparison to the Pink, Blue and Orange options is summarised in Table 3-5.

Table 3-5 Economic, traffic and environmental assessment of PCF Stage 2 Pink Modified option

Aspect	Pink Modified option
Economic assessment	
Affordability and BCR	Modifying the Pink option decreased the footprint of the works and reduced the area of land impacted by a new route, responding to concerns raised during the consultation about minimising the impact on the countryside. The removal of the link and junctions would also generate a more affordable option and increased the BCR due to the journey time reliability and wider economic benefits, resulting in the Pink Modified option the most affordable and viable option.
Traffic assessment	
Traffic improvement	The Pink Modified option would reduce traffic flows through Henlade by 88% in the opening year (2023) and design year (2038), similar to the Pink option (89%). This option also shows journey times improvements similar to the Pink option.
Environmental assessment	
Air Quality	The Pink Modified option is predicted to have the same effects to air quality as the other three options previously assessed.
Cultural heritage	The construction of the Pink Modified option has the potential have a Large Adverse effect to the archaeological remains of a recorded Roman settlement. This option is also considered to have a Moderate Adverse effect upon one grade I listed building (Church of St Aldhem and Eadburgha) and one scheduled monument (Cross in St Aldhelm and St Eadburgha). Large adverse effects upon grade II listed 'Musgrave Farmhouse and Outbuilding with wall adjoining south-east corner of Haydon House' are also expected, as with the Pink option. This option also has the potential to affect a grade II* listed cross in St Aldhelm and St Eadburgha churchyard. The Pink Modified option has lower potential to affect archaeological remains in comparison with the Pink and Blue options as it requires the shortest length of new road construction, but still passes through areas containing possible high value Roman remains, where the Orange option does not.
Landscape	For the Pink Modified option, there would also be Large Adverse construction effects and Moderate Adverse long-term effects during operation to landscape and visual amenity. However, similar to the Pink option, effects are the least for this option due to its proximity to the existing A358. The offline section of Pink Modified would also be situated closer to the existing A358 than all other options, causing slightly less visual disturbance.
Ecology	There would likely be a Moderate Adverse effect to ecology during construction of the Pink Modified option due to the loss of Road Verges West of Hatch Beauchamp LWS, part of Jordans LWS and the potential loss of veteran trees from Jordans LWS. A Slight Adverse effect is also predicted on Bickenhall Wood LWS, Saltfield Copse LWS and River Rag LWS for the Pink Modified option, where the other options are not expected to cause effects. The Pink Modified option would be at a sufficient distance to not affect Stoke Wood LWS and Ancient Woodland, resulting in a Neutral effect during construction. This option is also expected to have a Moderate Adverse effect on bats and a Slight Adverse effect on Ancient Woodland as with the Pink option but less effect than the Blue and Orange options. For all options, a Slight Adverse effect is predicted on barn owls, dormice, badgers, otters, water voles, great crested newts and white-clawed crayfish due to habitat loss and fragmentation.
Noise and vibration	The Pink Modified option performs the best of the four options in relation to noise but is still expected to cause significant adverse and beneficial effects at different receptors. It is anticipated to produce the greatest number of short-term noise decreases, the least number of effected receptors and the greatest noise benefit compared to the other three options.

Aspect	Pink Modified option
Population and health	For construction, the Pink Modified option is not likely to cause significant effects to population and health, however, during operation, this option is expected to have the least benefits of all the options. However, this option does not directly impact open space.
Drainage and the water environment	The Pink Modified option is expected to cause Slight Adverse effects to the water environment as it requires a permanent diversion of the River Ding. The lack of a link to Blackbrook in the design for the Pink Modified option means that the effects on the water environment would be reduced slightly compared to the other options.
Climate change	The Pink Modified option is predicted to have the same effects to climate as the other three options previously assessed.
Summary	Overall, the Pink Modified option would have a similar impact to most aspects as the Pink option, and lower effects in comparison to the Blue and Orange options.

The Preferred Route announcement

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

- **Capacity** - The Pink Modified option will provide relief to the traffic congestion in Henlade. The average daily traffic would reduce from 33,500 vehicles to 4,000 vehicles in 2038. By reducing congestion and increasing capacity it will allow mile-a-minute travel as the norm along the new A358.
- **Safety** - The new A358 will see the existing road junctions and private accesses closed with new connections and junctions provided, making journeys safer by avoiding conflicting traffic-turning movements. The Scheme will also improve safety by encouraging road users to use the new A358, rather than seeking alternative local routes to avoid congestion into Taunton.
- **Local communities** - The Pink Modified option will allow local traffic using the A378 to connect with the upgraded A358 at Junction C. This would improve local journeys into Taunton. The Pink Modified option will also cause less disruption to existing patterns of movement for local communities. The reduction in traffic congestion at Henlade will improve residents' quality of life.
- **Connectivity** - Connectivity to the south-west from the south-east and London will be improved, making Taunton and the south-west region more accessible. Daily travel for commuters and local traffic into Taunton will be safer and more reliable, by separating local movements from traffic passing through the area.
- **Resilience** - The new road offers connection between the new A358, Nexus 25 and M5 junction 25. This will help reduce congestion between West Hatch and M5 junction 25.
- **Economic growth** - The Pink Modified option provides direct access to Nexus 25, as well as connecting to the A378. This will help Taunton to become a more attractive place to work and do business and helps facilitate growth in Somerset and the south-west.
- **Environmental impact** - The Pink Modified option avoids the Ancient Woodland at Huish Copse and at Stoke Wood and removes the need to impact the open space.

3.3.20 The Pink Modified option was, therefore, identified as the preferred route as it meets the scheme objectives, is more affordable and reduces the impact on the countryside.

4 Consultation

4.1 Consultation undertaken to date

4.1.1 Following a stakeholder mapping exercise, the first of a series of workshops with key statutory stakeholders took place in December 2015. The workshop was attended by representatives from:

- Local authorities: Somerset County Council, South Somerset District Council, and Taunton Deane Borough Council;
- Statutory environmental bodies (SEBs): Environment Agency, Natural England, and Historic England; and
- A non-statutory consultee, the National Trust, who were invited due to key interests in this area.

4.1.2 The purpose of the workshops was to keep the key statutory stakeholders up to date with the project’s progress, seek views to ensure the project was aligned with local plans and receive input into the ongoing stakeholder engagement programme.

4.1.3 During the initial meeting, the attendees identified a number of additional stakeholders that possessed additional technical knowledge, information, and local area expertise that would be beneficial during the options development stage. The additional stakeholders were subsequently included in the stakeholder engagement programme. Details of the workshops held, the topics discussed, and the location are summarised in Table 4.1.

Table 4-1 Stakeholder workshops

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

4.1.4 In addition to the stakeholder workshops, a group was formed to assist with the development of the Statement of Community Consultation (SoCC). The SoCC development group comprised local authority communications, planning and community engagement officers. Many of the group’s suggestions and local information knowledge was incorporated into a draft SoCC, which included recommendations about identifying and engaging with different sectors of the community, including hard to reach groups.

- 4.1.5 A period of key stakeholder engagement commenced during the summer of 2016 with a series of meetings with key and statutory stakeholders. The information and views captured during the meetings was considered during the planning of the public consultation processes.
- 4.1.6 Early consultation has been held with local parishes along the route. Parish council area group (PCAG) meetings were held in November 2016 with all of the parish councils within the vicinity of the proposed scheme extents. These provided a forum for the parish councils to discuss their priorities, perceptions and concerns about the proposed scheme.
- 4.1.7 A period of non-statutory public consultation commenced on 28 March 2017. A series of consultation events were held for key and local stakeholders, where the scheme proposals could be viewed and discussed with the project team. Stakeholders were encouraged to provide their feedback about the proposed scheme proposals through a questionnaire, which was available to collect at the stakeholder events, as well as being available to complete online. The consultation period was scheduled to end on 20 May 2017. However, this was extended due to a period of purdah for the General Election. The final scheduled event on 8 May 2017 was postponed and rescheduled for 30 June, and the consultation period close date was moved to 16 July 2017.
- 4.1.8 A strong feedback theme from the initial 2017 consultation was a wish to see more options for connecting with the M5, for providing traffic relief for Henlade, and for connecting more directly with the future 'Nexus 25' development (a major new employment site planned in the southeast quadrant of the existing M5 junction 25). This feedback was carefully considered and informed the decision that it would be beneficial to re-consult and seek further views on the whole scheme with alternative options presented. The second non-statutory public consultation for the scheme commenced on 16 January 2018 and ran until 27 February 2018.
- 4.1.9 The design further developed following feedback on the options received from the public consultations during Stage 2. A Community Liaison Forum meeting was held in February 2019 before the preferred route announcement (PRA) was made in 2019, followed by a second forum meeting in September 2019.

4.2 Proposed consultation

- 4.2.1 The Planning Inspectorate will consult relevant bodies on this Scoping Report and feedback collated and used to inform their formal Scoping Opinion issued in response to the Applicants request in compliance with the EIA Regulations.
- 4.2.2 During PCF Stage 3 and the preparation for DCO Application submission, Highways England will consult with consultees described Section 42 of the Planning Act 2008. This includes, for example, the Statutory Environmental Bodies (Environment Agency, Natural England, and Historic England), Taunton Dean Borough Council, Somerset County Council and South Somerset District Council.
- 4.2.3 An Environmental Technical Working Group was established in Stage 2 and this membership will be reviewed and developed to provide the appropriate technical groups(s) to discuss technical environmental aspects and matters of the proposed EIA, and findings as they emerging during the assessment process.

- 4.2.4 Relevant bodies and the general public will be consulted on the proposed scheme in line with Section 47 of the Planning Act 2008. This is a statutory consultation where members of the local community, will be asked for their feedback on the proposed scheme. The feedback received during this consultation period can influence the final design. A Statement of Community Consultation (SoCC) will be produced and published before this statutory consultation period, describing how Highways England will formally consult with the local community about the proposed scheme.
- 4.2.5 As part of the statutory consultation, a Preliminary Environmental Information Report (PEIR) will be published. This PEIR will describe the findings of a preliminary environmental assessment to allow both technical and non-technical consultees to understand the likely significant environmental effects of the proposed scheme, and measures proposed to mitigate such effects, and assist in informing their consultation response

5 Environmental assessment methodology

5.1 Approach to aspects of EIA regulations

Design manual for roads and bridges

- 5.1.1 The environmental assessment will be based on the general standards set out within DMRB LA 104 Environmental Assessment and Monitoring¹⁴, as well as aspect specific DMRB standards. DMRB is the established guidance for assessing the environmental impacts of highway schemes and has been developed by Highways England in collaboration with relevant stakeholders.
- 5.1.2 In 2020 DMRB was extensively updated to ensure full compliance with the requirements of the EIA Regulations. Regulation 14 and Schedule 4 of the EIA Regulations identifies the information for inclusion in an ES. This includes the identification of environmental aspects considered likely to be significantly affected by the proposed scheme. These significant effects may be direct or indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent or temporary, beneficial or adverse¹⁵.
- 5.1.3 Aspects of the environment that should be considered as part of the EIA¹⁶, and where they have been addressed in DMRB and in this Scoping Report are shown in Table 5-1. Further information on elements listed in the EIA Regulations, not covered by subject specific assessment guidance in DMRB is provided in subsequent paragraphs of this section.

Table 5-1 EIA environmental aspects and their location in the Scoping Report

Aspects within the EIA Regulations	DMRB Guidance	Topics in this Scoping Report
Population	LA 112 - Population and human health LA 105 - Air quality LA 111 - Noise and vibration	Chapter 13 Population and health. Will also draw on information provided in: Chapter 6 Air quality Chapter 12 Noise and vibration
Human health	LA 112 - Population and human health LA 105 - Air quality LA 111 - Noise and vibration	Chapter 13 Population and health. Will also draw on information provided in: Chapter 6 Air quality Chapter 12 Noise and vibration
Biodiversity (for example fauna and flora)	LA 108 – Biodiversity LA 115 - Habitats Regulations assessment	Chapter 9 Biodiversity
Land (for example land take)	LA 109 - Geology and soils	Chapter 10 Geology and soils
Soil (for example organic matter, erosion, compaction, sealing)	LA 109 - Geology and soils	Chapter 10 Geology and soils

¹⁴ Highways England (2019) *Design Manual for Roads and Bridges (DMRB) Sustainability and Environmental Appraisal. LA104 Environmental Assessment and Monitoring*. Available at: <https://www.standardsforhighways.co.uk/dmrb/> (Accessed January 2021)

¹⁵ Schedule 4, Paragraph 5, EIA Regulations

¹⁶ Schedule 4, Paragraph 4, EIA Regulations

Aspects within the EIA Regulations	DMRB Guidance	Topics in this Scoping Report
Water (for example hydromorphological changes, quantity and quality)	LA 113 - Road drainage and the water environment	Chapter 14 Road drainage and the water environment
Air	LA 105 - Air quality	Chapter 6 Air quality
Climate (for example greenhouse gas emissions, impacts relevant to adaptation)	LA 114 - Climate	Chapter 15 Climate change
Material assets	LA 110 - Material assets and waste	Chapter 11 Materials assets and waste
Cultural heritage (including architectural and archaeological aspects)	LA 106 - Cultural heritage assessment	Chapter 7 Cultural heritage
Landscape	LA 107 - Landscape and visual effects	Chapter 8 Landscape and visual effects

5.1.4 Each aspect will consider the potential environmental effects associated with the construction and operational phases of the proposed scheme. The proposed scheme is unlikely to be decommissioned as it would form an integral part of the Strategic Road Network. As such, decommissioning has not been considered within this Scoping Report, and it is proposed that decommissioning is scoped out of the EIA and ES.

Transboundary effects

5.1.5 Regulation 32 of the EIA Regulations outlines a requirement to consider the likely significant effects of the proposed scheme on the environment of another European Economic Area State.

5.1.6 Advice Note Twelve: Transboundary Impacts and Process¹⁷ provides further guidance upon the consideration of transboundary effects. Following this guidance, a screening matrix has been completed regarding potential transboundary effects for the proposed scheme which is provided in Appendix A. This concludes that proposed scheme would not result in likely significant transboundary effected and this is therefore **scoped out** of further assessment.

Major accidents and disasters

5.1.7 The EIA Regulations require the developer to assess the expected significant effects (on the environment) arising from the vulnerability of the proposed scheme to ‘major accidents or disasters that are relevant to that development’.

5.1.8 There is no clear definition of the term ‘major accident and / or disaster’ in the Regulations therefore the following definitions from the Institute of Environmental Management and Assessment (IEMA) Major Accidents and Disasters in EIA¹⁸: A Primer (hereafter referred to as the ‘IEMA Primer’) has been adopted. This states:

¹⁷ The Planning Inspectorate (2020) *Advice Note twelve: Transboundary Impacts and Process*, (Version 6) Available from: <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-twelve-transboundary-impacts-and-process/> (Accessed January 2021)

¹⁸ Institute of Environmental Management and Assessment (2020) *Major Accidents and Disasters in EIA: A Primer*. Available at: <https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer> (Accessed January 2021)

- Accident – something that happens by chance or without expectation.
- Disaster – a natural hazard (e.g. earthquake) or a man-made / external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.
- Major Accident – events that threaten immediate or delayed serious environmental effects to human health, welfare and / or the environment and require the use of resources beyond those of the client or its appointed representatives to manage.
- Risk – the likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur.
- Risk event – an identified, unplanned event, which is considered relevant to the proposed scheme and has the potential to result in a major accident and / or disaster, subject to its potential to result in a significant adverse effect on an environmental receptor.
- Vulnerability – describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Regulations vulnerability refers to ‘exposure and resilience’ of the proposed development to the risk of a major accident and / or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.
- Significant environmental effect (in relation to a major accident and / or disaster assessment) – includes the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.

5.1.9 The aim of the scoping stage of the EIA, as described by the IEMA Primer, is ‘to determine in more detail whether there is potential for significant effects as a result of major accidents and/or disasters associated with a development, and the resulting scope of and approach to the assessment if required.’

5.1.10 The IEMA Primer states that the major accidents and disasters topic can be scoped out of the EIA if the chapter can demonstrate:

- there is no source-pathway-receptor linkage of a hazard that could trigger a major accident and/or disaster or potential for the scheme to lead to a significant environmental effect; or
- all possible major accidents and/or disasters are adequately covered elsewhere in the assessment or covered by existing design measures or compliance with legislation and best practice.

5.1.11 A Risk Identification exercise has been undertaken the findings of which are presented in Appendix B. This considered risk events identified in the Register of Civil Emergencies with respect to natural disasters, transport incidents, construction incidents, system failures and security.¹⁹ A source-pathway-receptor model was employed in terms of risks to environmental designated sites, heritage assets and the local community during construction and operation of the proposed scheme. Finally, the Risk Identification considered the existing known mitigation measures and whether there is the potential for major accidents and disasters with the known mitigation place.

¹⁹ Cabinet Office (2017) *National Risk Register of Civil Emergencies*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/644968/UK_National_Risk_Register_2017.pdf (Accessed February 2021)

- 5.1.12 A review of nearby sites listed by the Health and Safety Executive (HSE) under the Control of Major Accident Hazards Regulations 2015 (COMAH) has been undertaken. This review confirmed that there are no COMAH sites within the HSE land use planning distances and therefore risks associated with COMAH sites were not considered further.
- 5.1.13 The following assumptions have been applied to the Risk Identification exercise reported in Appendix B when considering risk events:
- The Risk Identification exercise assumes all health and safety risks are adequately covered by the Contractor's health and safety documentation and risk assessments.
 - The assessment only covers those risks associated with the infrastructure to be built and does not consider those risks associated with the operation and maintenance of a major highway project.
 - Risks to road safety and users during construction and operation are assumed to be considered and assessed as part of the Road Safety Audit for this type of major highway project.
 - The Risk Identification exercise does not consider risks where there is no 'source-pathway-receptor' linkage (e.g. an oil spill occurring at an oil depot that is not located near to a watercourse and for which there is no pathway from source to receptor).
 - The Risk Identification exercise does not consider major accidents and disasters where risk events are not applicable to the geographic location of the proposed scheme (e.g. volcanic activity, earthquakes etc).
- 5.1.14 The Risk Identification exercise considered the potential risk of major accidents and disasters in relation to the construction and operation of the proposed scheme, including:
- flooding;
 - severe weather;
 - poor air quality;
 - wildfires;
 - widespread electricity failure;
 - system failures;
 - pollution Incidents;
 - unexploded ordnance (UXO), construction only; and
 - attacks during operation.
- 5.1.15 The Risk Identification exercise concluded that all relevant major accidents and disasters considered would be appropriately assessed and mitigated through other environmental topics proposed in the EIA for the proposed scheme and reported in the ES. Appropriate risk and environmental mitigation measures would be considered, developed, and adopted through compliance with DMRB design standards, applicable legislation and best practice measures employed by Highway England.
- 5.1.16 As reported in Appendix B, there are no risks of major accidents and disasters anticipated and therefore this topic is **scoped out of the EIA and ES**.

Heat and radiation

- 5.1.17 Schedule 4 (Regulation 14(2)) of the EIA Regulations outlines a requirement to consider the emission of heat and radiation from the proposed scheme and the likely significant effects on the environment resulting from it.
- 5.1.18 The proposed scheme is a road improvement scheme, as such it would not generate any notable emission of heat and/or radiation from the proposed works, technology or operation that could result in likely significant effects on the environment. Therefore, the further consideration or assessment of heat and radiation is **scoped out of the EIA and ES**.

5.2 Surveys and predictive techniques and methods

Surveys

- 5.2.1 Several surveys were undertaken during PCF Stage 2 and the finding therefore available to inform this report, these included:
- Site Walkovers;
 - Phase 1 Habitats survey;
 - National Vegetation Classification (NVC) survey;
 - Hedgerow survey;
 - Bat surveys (including tree and building roost potential assessments, tree climbing roost inspections, tree and building emergence/re-entry, activity transects, crossing points, static monitoring, hibernation checks, trapping and radio tracking);
 - Dormouse surveys (habitat suitability and presence/absence);
 - Badger survey (field signs and bait marking);
 - Otter surveys (habitat suitability and presence/absence);
 - Water vole surveys (habitat suitability and presence/absence);
 - Breeding bird surveys;
 - Great crested newt survey (Habitat suitability index assessment, eDNA, population size class surveys);
 - Reptile survey (habitat suitability and population size surveys);
 - White-clawed crayfish survey (habitat suitability and presence/absence survey);
 - Aquatic invertebrates survey;
 - Terrestrial invertebrates survey; and,
 - Fish surveys.
- 5.2.2 Further information on baseline data gathered and used to inform this Scoping Report is provided in each of the technical assessment chapters.
- 5.2.3 As part of this scoping exercise the requirement for further surveys to inform a robust baseline for the EIA is identified in each assessment technical chapter as appropriate. A brief summary of the type of surveys proposed is provide below:
- UK Habitat Classification surveys;
 - NVC surveys;
 - River corridor survey;
 - Water quality;
 - Hedgerow survey;

- Bat surveys (including tree and building roost potential assessments, tree climbing roost inspections, tree and building emergence/re-entry, crossing points, static monitoring, hibernation checks, trapping and radio tracking);
- Hazel dormouse surveys (habitat suitability and presence/absence);
- Badger survey (field signs and bait marking);
- Otter surveys (habitat suitability and presence/absence);
- Water vole surveys (habitat suitability and presence/absence);
- Breeding bird surveys;
- Wintering bird surveys;
- Barn owl surveys;
- Great crested newt (Habitat suitability index assessment, eDNA, population size class surveys);
- Reptile (habitat suitability and population size surveys);
- White-clawed crayfish survey (habitat suitability and presence/absence survey);
- Aquatic invertebrates survey;
- Terrestrial invertebrates survey;
- Brown hairstreak butterfly surveys;
- Landscape photography for winter and summer and both day and night;
- Detailed soil and ALC surveys;
- Tree survey;
- Noise surveys;
- Farm viability survey; and
- Farm Impact Assessments.

Modelling

- 5.2.4 Predictive modelling will be used in assessment of some environmental aspects following industry best practice, for example, air quality, noise and fluvial modelling. Further information on these proposed methods are provide in the relevant technical aspect chapters of this report.

Future baseline scenario

- 5.2.5 The baseline, or existing environmental conditions, will be described in the ES, as outlined in the technical aspect chapter of this report. To inform the assessment of impacts a prediction of the future environmental conditions, that would exist if the proposed scheme was not constructed, is required against which the impact of the proposed scheme can be assessment. Typically, this includes conditions at:
- the time construction of the proposed scheme is expected to start, for example, taking into account any other developments that are under construction or like to be complete by this time;
 - the time the proposed scheme is expected the be open to traffic, the opening year; and
 - the Design Year – 15 years after the proposed scheme opened to traffic.
- 5.2.6 Further information on how each aspect considers and predicts the future baseline for that assessment is provided in the technical chapters of this report.

5.3 General assessment assumptions and limitations

- 5.3.1 Aspect specific assumptions and limitations have been outlined in each of the individual environmental technical chapters of this report (Chapters 6 to 16). Should any relevant guidance or standards be updated during the EIA process, consideration will be given to adopting the new guidance, considering the likely impact to the assessment and programme for DCO application submission. Relevant stakeholders will be engaged to seek approval on the appropriate approach to be taken at that time.
- 5.3.2 The proposed scheme is at an early stage of preliminary design development. A fully developed preliminary design, and construction methodology and programme, was not available at the time of writing. Therefore, there could be changes to the currently proposed indicative red-line boundary. The location and provisional red-line boundary use to inform this Scoping Report are outlined in Figure 1.1 in Volume 2 to this report and includes a current indication of anticipated areas required for construction and environmental mitigation. This provides a 'worst case' on which to base this Scoping Report and offers flexibility in adapting to minor changes that may occur during preliminary design development while maintaining a robust assessment approach. The land affected by the proposed scheme will be reviewed as the design develops, and the boundary refined to give the final DCO boundary for the ES and reported on submission of the application.

Rochdale envelope

- 5.3.3 The development of the preliminary design on which the EIA will be based, and on which will be submitted as part of the application for the DCO, is an ongoing iterative process with environmental effects to be taken into account. Following PINS Advice Note Nine on the Rochdale Envelope, the EIA will continue to be based on a reasonable 'worst case scenario'. Realistic worst-case scenarios will be based the maximum extent within which a degree of flexibility in final design details can be maintained; therefore, allowing detailed design to be developed without affecting the validity or robustness of the conclusions of the EIA.

Traffic modelling

- 5.3.4 Traffic data for use in relevant assessments such as noise, air quality and climate, will be generated by appropriate strategic modelling updated for PCF Stage 3. This data was not available at the time of writing. Relevant assumptions and limitations in the generation and use of this data will be reported in the ES.

5.4 Mitigation and enhancement

- 5.4.1 The ES will include a description of the measures envisaged to prevent, reduce and, where relevant, offset any significant adverse effects.
- 5.4.2 In line with IEMA Guidance and professional best practice, consideration will be given to three key types of mitigation:
- embedded or design mitigation;
 - standard or good practice mitigation; and
 - additional or bespoke mitigation.

Embedded mitigation

- 5.4.3 Defined as “*an intrinsic part of the project design*”, this mitigation is a result of design evolution. Embedded mitigation describes efforts undertaken to prevent or reduce potential significant adverse effects by iteratively altering design throughout the evolution of the proposed scheme. This is mitigation that will inherently be delivered and is therefore considered to form part of the proposed scheme and will be taken into account in the initial assessment of effects of the EIA. For example, landscape screening in the highway verges.

Good practice mitigation

- 5.4.4 Defined as “*required regardless of any EIA assessment*”, this is mitigation which will be in place as a result of standard good practice and due to legislative requirements. For example, this would include practices to manage contractor activities and minimise nuisance effects contained within the EMP that the contractor will be obliged to implement, and license requirements for activities subject to legislation. This good practice mitigation will be delivered and therefore is considered to form part of the proposed scheme and will be taken into account in the initial assessment of effects of the EIA.

Additional mitigation

- 5.4.5 Individual technical assessments will develop additional mitigation that is to be implemented to reduce identified significant adverse effects. These measures are expected to be secured through the application of appropriate planning mechanisms.

Environmental Management Plan

- 5.4.6 An initial EMP will be prepared as part of the DCO Application in line with DMRB LA 120 Environmental Management Plans which will describe all measures to manage environmental effects in construction and operation. This will form the equivalent of a draft Code of Construction Practice to be certified through the DCO examination process and form the basis of an updated EMP to be developed by the appointed contractor, as a requirement of the DCO.
- 5.4.7 Embedded and good practice measures will form part of the proposed scheme and the initial EMP. The assessment will take account of these as inherent and inexorable. If significant adverse construction effects are identified and further mitigation is required, additional bespoke mitigation will be considered, developed and included in the EMP as the mechanism for securing their delivery.

5.5 Significance criteria

- 5.5.1 The conclusions of the environmental assessment report the likely significance of environmental effects using established significance criteria, as presented within DMRB LA 104 Section 3 to comply with the EIA Regulations. Significance of effect is derived through a combination of the sensitivity of a receptor affected (value or importance) and the magnitude of the impact.
- 5.5.2 For each environmental discipline DMRB provides guidance for assigning magnitude of impact, receptor sensitivity, and significance of effect; however, DMRB states that the approach to assigning significance of effect relies on reasoned argument, the professional judgement of competent experts, and taking

on board the advice and views of appropriate stakeholders. For some disciplines, predicted effects may be compared with quantitative thresholds and scales in determining significance.

- 5.5.3 The generic criteria for magnitude of impact, sensitivity/value of receptors and how they are combined to give the five proposed criteria for significance of effect, both adverse and beneficial, are replicated from DMRB in Table 5-2 below for ease of reference. Where discipline specific criteria and descriptors are available, they are described in each technical chapter of this report.

Table 5-2 Assessing significance of potential effects

	Magnitude of potential impact (degree of change)					
		No change	Negligible	Minor	Moderate	Major
Environmental value (Sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

- 5.5.4 Generic descriptions for each category of significance and how they relate to the planning decision process is shown in Table 5-3 below. However, in all cases, professional judgement will be applied to the assessment to underpin the conclusion identified through the matrix or calculation assessments. Where professional judgement is used, this will be accompanied by a reasoned justification in the ES.

Table 5-3 Descriptions of the significance of effect categories

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

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

5.6 Cumulative effects

- 5.6.1 Schedule 4 of the EIA Regulations (Regulation 14(2) and the NPSNN (paragraph 4.16) state that consideration of how the effects of the proposed scheme would

combine and interact with the effects of other developments should be included. Paragraph 4.17 of the NPSNN goes on to say that the interrelationship between effects should be considered.

- 5.6.2 Further advice in relation to cumulative effects is also outlined in Advice Note 17²⁰ and DMRB states that a cumulative impact can arise as the result of:
- a. the combined impact of a number of different environmental factors-specific impacts from a single project on a single receptor/resource; and/or
 - b. the combined impact of a number of different projects within the vicinity (in combination with the environmental impact assessment project) on a single receptor/resource.
- 5.6.3 The proposed approach to the assessment of cumulative effects in accordance with current advice and legislation is outlined in Chapter 16 of this report.

5.7 Supporting assessments

- 5.7.1 In addition to the statutory EIA and ES required to support the application for DCO for the proposed scheme, several technical assessments undertaken in line with specific policy or legislation are proposed. These provide additional information to inform the design and ES and will be prepared separately to avoid duplication of assessment through appropriate cross-referencing. The scope of these assessment will be agreed with relevant stakeholder during separate consultation outside of the EIA scoping exercise. An outline of these proposed assessments is provided below for information.

Habitat Regulations Assessment

- 5.7.2 Habitat Regulations Assessment (HRA) is a recognised step-by-step process to determine the likely significant effects and (where appropriate) assess adverse impacts on the integrity of European designated sites. Where likely significant effects are identified, the assessment examines alternative solutions and provides justification for imperative reasons of over-riding public interest (IROPI).
- 5.7.3 The HRA Stage 1 (Screening) identifies the likely significant effects of a project upon the integrity of a European designated site, either alone or in combination with other plans and projects and considers whether the impacts are likely to be significant.
- 5.7.4 An initial/draft Stage 1 assessment has been undertaken for PCF Stage 2 to determine whether the proposed scheme would have any likely significant effects on European sites. The assessment requires further survey data in order to provide full confidence in the significance of impacts, particularly relating to bat species. However, early assessment indicates that significant impacts cannot be ruled out for European sites scoped in for assessment at this stage, (except Bracket's Coppice SAC), when considered alone or in combination with other plans and projects. Therefore, a full HRA will be undertaken in parallel to the EIA which will incorporate all available and contemporary survey data.

²⁰ The Planning Inspectorate (2019) *Advice Note Seventeen: Cumulative Effects Assessment*. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf> (Accessed February 2021)

Water Framework Directive

- 5.7.5 The EU Water Framework Directive (WFD) (2000) was enacted into domestic law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. It provides a framework for the protection and enhancement of surface fresh water, estuaries, coastal waters and groundwater.
- 5.7.6 The WFD aims to enhance the current status of all waterbodies (with a target to achieve Good Ecological Status) and prevent deterioration of waterbodies from their current status due to pollution. The requirements of the WFD will be taken into account when planning all activities that may impact the water environment.
- 5.7.7 A WFD assessment will form part of the ES to determine the status of the waterbodies in the vicinity of the proposed scheme. Further detail on these waterbodies and the proposed assessment is provided in Chapter 14 of this report.

Flood Risk Assessment

- 5.7.8 A Flood Risk Assessment (FRA) will be undertaken in accordance with the National Planning Policy Framework (NPPF). This FRA will form part of the ES as an appendix, and it will consider flood risk both to and from the proposed scheme. It will also demonstrate how this risk is intended to be managed in the future, considering the influence of climate change. Further detail on the proposed FRA is provided in Chapter 14 of this report.

Health Impact Assessment

- 5.7.9 The impact of the proposed scheme on human health will be assessed in the population and health chapter of the Environmental Statement, as described in Chapter 13 of this report. This will be supported by technical appendices and cross references to other technical assessments of the ES as required. A standalone Health Impact Assessment is not required and will not be undertaken.

5.8 Environmental Statement

- 5.8.1 The Environmental Statement is likely to comprise 4 volumes:
- Volume 1: Non-Technical Summary;
 - Volume 2: Main Assessment Report;
 - Volume 3: Figures; and
 - Volume 4: Technical Appendices.
- 5.8.2 The Main Assessment Report is currently anticipated to be structured as below:
- Chapter 1 – Introduction;
 - Chapter 2 – The Proposed 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 – Material Assets and Waste;
- Chapter 12 – Noise and Vibration;
- Chapter 13 – Population and Human Health;
- Chapter 14 – Road Drainage and the Water Environment;
- Chapter 15 – Climate;
- Chapter 16 – Assessment of Cumulative Effects;
- Chapter 17 – Assessment Summary; and
- References and Glossary.

6 Air quality

6.1 NPSNN requirements

6.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

6.1.2 Key policies from the NPSNN relevant to this aspect includes:

- Paragraphs 5.3-5.4 of the NPSNN state the potential impact of construction or operation of national network projects (i.e. changes in pollutant emissions) on human health and protected species and habitats. The paragraphs also state that UK legislation sets out air quality objectives (AQOs) and limit values (LVs) for the main pollutants of concern to health.
- Paragraphs 5.6-5.9 of the NPSNN state that where the impacts of any project may have a significant effect on air quality, then an assessment must be undertaken as part of the environmental statement. The paragraphs state that the environmental statement should include information on existing air quality conditions, forecasts of air quality at the time of project opening using the Department for Environment, Food and Rural Affairs' (Defra) future national projections of air quality, and describe any significant air quality effects, mitigation and residual effects. In addition, a *“judgement on the risks as to whether the project would affect the UK's ability to comply”* with the LVs must also be included.
- Paragraph 5.12 of the NPSNN states that:
 - *“the SoS must give air quality considerations substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and/or where they lead to a deterioration in air quality in a zone/agglomeration”*.
- Paragraph 5.13 of the NPSNN states that:
 - *“the SoS should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will result in a zone/agglomeration currently reported as being compliant...becoming non-compliant; or affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported...at the time of the decision”*.
- Paragraphs 5.14-5.15 of the NPSNN state that mitigation measures should be included to reduce any negative impacts caused by the proposed project. The SoS should then consider whether the proposed mitigation measures are sufficient.

6.1.3 The AQOs and LVs for the protection of human health, vegetation and ecosystems which are applicable to this assessment are presented in Table 6-1.

Table 6-1 Air quality objectives and limit values

Pollutant	Averaging period	AQOs and LVs	
		Concentration	Allowance
Nitrogen dioxide (NO ₂)	Annual mean	40µg/m ³	-
	1-hour mean	200µg/m ³	18 (µg/m ³)
Nitrogen oxides (NO _x)(a)	Annual mean	30µg/m ³	-
Particulate matter (PM ₁₀)	Annual mean	40µg/m ³	
	1-hour mean	50µg/m ³	35 (µg/m ³)

Source: Air Quality (England) Regulations 2000 (SI 2000/928 HMSO)

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

6.2 Study area

6.2.1 The study area for the local air quality assessment covers human health receptors and ecologically designated sites within 200m of roads where traffic volumes, vehicle speeds and road alignments are affected by the proposed scheme.

6.2.2 The local air quality assessment involves estimating the change in pollutant concentrations between the Opening Year Do-Minimum (DM) and Do-Something (DS) scenarios at sensitive receptors resulting from the operation of the proposed scheme. Under the Design Manual for Roads and Bridges (DMRB) LA 105²¹ standard for air quality, affected roads for the local air quality assessment are defined as those roads inside the traffic reliability area (TRA) where:

- Road alignment will change by 5m or more
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more or
- There is a change in speed band
- Horizontal road alignment changes by 5m or more

6.2.3 All roads that trigger the traffic screening criteria and adjoining roads within 200m is defined as the affected road network (ARN) in line with DMRB LA 105.

6.2.4 At this stage, traffic data for PCF Stage 3 is not yet available, however based on the outcomes of the PCF Stage 2 assessment it is expected that an assessment will be required.

6.2.5 As modelled traffic data is not yet available, baseline conditions and potential receiving environment sensitivity in this scoping report have been assessed based on the study area which is determined by the PCF Stage 2 ARN. Figure 3.2 of Appendix B.1 in the A358 Taunton to Southfields Dualling Stage 2 Environmental Assessment Report: Addendum²² shows the extent of the PCF Stage 2 ARN.

²¹ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. *LA105 Air Quality*. Available at: <https://www.standardsforhighways.co.uk/dmrbl/> (Accessed January 2021)

²² Mott MacDonald Sweco Joint Venture (2019) *A358 Taunton to Southfields Dualling Stage 2 Environmental Assessment Report: Addendum*. Mott MacDonald Joint Venture, HE551508-MMSJV-EGN-000-RP-LP-0030.

- 6.2.6 The PCF Stage 3 assessment will include updated traffic data to that applied at the previous PCF Stage 2. It has been advised by the project transport team that the PCF Stage 2 traffic data will be used for the Preliminary Environmental Information Report (PEIR). It is noted that due to the changes in screening criteria between the previous DMRB standard and LA 105, the study area may change. The PCF Stage 2 traffic data will be screened against the DMRB LA 105 thresholds and baseline conditions and receiving environment sensitivity reviewed for the PEIR. The PCF Stage 3 traffic data will be used for the Environmental Assessment Report (EAR). As and when PCF Stage 3 traffic data is available for the EAR, the study area will be determined and baseline conditions and receiving environment sensitivity reviewed.
- 6.2.7 Following a review of the PCF Stage 2 assessment, a construction dust assessment will be carried out following the standards outlined in DMRB LA 105. As the construction phase is expected to last more than three years, upon receipt of vehicle movements in the construction phase, traffic data will be screened and a 'simple' assessment will be carried out in line with the assessment for operational effects if the vehicle movements exceed the thresholds stated in section 6.2.2.
- 6.2.8 In accordance with DMRB LA 105 and based on recommendations in the PCF Stage 2 assessment, operational traffic will also be assessed using the 'simple' approach. This is because the proposed scheme has been defined as low risk and a "simple" approach is therefore considered proportional. A "simple" approach will provide sufficient information to confirm that the project would not result in exceedances of the air quality thresholds. PM₁₀ was not considered in the PCF Stage 2 local air quality assessment as Defra's predicted background concentrations are well below the AQO in the study area and vehicle emission factors for PM₁₀ are relatively low and at least an order of magnitude lower than for NO_x. On the basis of the PCF Stage 2 assessment, PM₁₀ has been scoped out of further assessment for the PEIR and EAR. There are no AQMAs in the study area declared for any exceedances of the PM₁₀ AQOs and Defra projected background concentrations have not indicated that there is a risk of exceeding the PM₁₀ AQO or LV and therefore modelling of PM₁₀ in the base year will also not be undertaken.

6.3 Baseline conditions

- 6.3.1 Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. For the purposes of this assessment, latest available data has been obtained from the local authorities in the vicinity of the study area, which includes Somerset West and Taunton Council (SWTC)²³, South Somerset District Council (SSDC)²⁴ and Sedgemoor District Council (SDC)²⁵. Data has also been obtained from the Department for Environment, Food and Rural Affairs (Defra)²⁶.

²³ Somerset West and Taunton Council (2020) 2019 *Air Quality Annual Status Report (ASR)*, Available at: <https://www.somersetwestandtaunton.gov.uk/media/2195/swt-air-quality-annual-status-report-2019.pdf>

²⁴ South Somerset District Council (2018) *Air Quality Annual Status Report*. Available at: https://www.southsomerset.gov.uk/media/1530/asr_2018.pdf (Accessed January 2021)

²⁵ Sedgemoor District Council (2020) *Air Quality Annual Status Report*. Available at: <https://www.sedgemoor.gov.uk/article/1014/Air-Quality-in-Sedgemoor> (Accessed January 2021)

²⁶ Department for Environment Food & Rural Affairs (2020) *Background maps. Tools. Local Air Quality Management Support - Defra, UK*. [online]. Available at: <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>. (Accessed January 2021)

Local authority review and assessment

- 6.3.2 SWTC has declared two Air Quality Management Areas (AQMA) in the local authority which are shown in Figure 6.1. This comprises the East Reach AQMA and Henlade AQMA which were both declared in 2003 for exceedances of the annual mean NO₂ AQO. The East Reach AQMA is located approximately two kilometres west of the proposed scheme and the Henlade AQMA is located approximately 300m north of the proposed scheme. The A358 currently goes into the Henlade AQMA and the new alignment of the A358 for the proposed scheme will bypass the Henlade AQMA, which is expected to lead to improvements in air quality.
- 6.3.3 SSDC has declared one AQMA within the borough which is presented in Figure 6.1. This is the Yeovil AQMA which was declared in 2002 for exceedances of the annual mean NO₂ AQO. It is located approximately 17 kilometres east of the proposed scheme and is not in the study area.
- 6.3.4 There are no AQMAs declared by SDC.
- 6.3.5 Once the revised PCF Stage 3 traffic data for the Environmental Statement is available, the study area will be re-defined and this will confirm which of the AQMAs will be included in the assessment.

Local authority monitoring

- 6.3.6 There is no automatic monitoring undertaken by SWTC or SSDC. SDC undertake automatic monitoring of PM₁₀ within the borough but the sites are located more than 200m from the study area. The closest PM₁₀ automatic monitor is located approximately 1 kilometre from the northern section of the study area. There are no Defra Automatic Urban and Rural Network (AURN) sites located nearby, the closest site being in Charlton Mackrell which is located approximately 20 kilometres east of the proposed scheme.
- 6.3.7 SWTC and SDC operate 18 diffusion tubes within 200m of the study area. Figure 6.2 shows the locations of these monitoring sites. Table 6-2 presents the results from 2015 to 2019 for these diffusion tubes. Exceedances of the annual mean NO₂ AQO (40µg/m³) were recorded at five of 18 diffusion tube monitoring sites between 2015 and 2019. These diffusion tube monitoring sites which measured exceedances are located at the Henlade AQMA, approximately 300m north of the proposed scheme and at or close to the East Reach AQMA, approximately 2.5 kilometres west of the proposed scheme. However, in 2019, all diffusion tube monitoring sites within 200m of the study area were below the annual mean NO₂ AQO of 40µg/m³.
- 6.3.8 Diffusion tube monitoring is also undertaken by SSDC. However, there are no diffusion tubes located within 200m of the study area.

Table 6-2 Diffusion tube results

Site ID	Site name	Site type	Local authority	OS grid reference		Annual mean NO ₂ concentration (µg/m ³)				
				X	Y	2015	2016	2017	2018	2019
2	Henlade East	Roadside	SWTC	3269720	1240710	27	32	21	30	22

Site ID	Site name	Site type	Local authority	OS grid reference		Annual mean NO ₂ concentration (µg/m ³)				
				X	Y	2015	2016	2017	2018	2019
3	Monks Close	Roadside	SWTC	3236681	1251096	24	25	23	-(a)	-(a)
15	Haydon Road	Roadside	SWTC	3233495	1245958	23	26	20	24	19
16	Park Gate	Roadside	SWTC	3235233	1246272	20	22	17	20	17
18	Hurdle Way	Roadside	SWTC	3229866	1243485	28	32	27	32	26
19	Ilminster Road	Roadside	SWTC	3250017	1248375	28	30	27	31	25
25	Creech Castle	Roadside	SWTC	3249458	1256018	25	26	23	28	23
27	Henlade West	Roadside	SWTC	3264261	1243323	31	30	27	30	23
44	East Reach Lights	Roadside	SWTC	3231193	1245322	37	37	33	44	36
45	East Street	Roadside	SWTC	323064	124508	33	34	30	36	30
51	Bridgewater Road	Kerbside	SWTC	324923	125428	25	30	25	33	25
62	Thornfalcon	Roadside	SWTC	327585	123724	23	25	23	25	-(a)
71	Henlade AQMA west	Roadside	SWTC	326783	124138	-(b)	47	32	54	39
72	Henlade AQMA east	Roadside	SWTC	326871	124093	-(b)	49	41	45	37
73	East Reach AQMA east	Roadside	SWTC	323271	124553	-(b)	42	41	46	37
74	East Reach AQMA west	Roadside	SWTC	323188	124539	-(b)	42	41	50	38
DT18	Huntworth	Roadside	SDC	330584	134059	30	28	29	28	24
DT33	Bristol Road, Dunball	Roadside	SDC	331130	140751	35	34	34	32	29

Source: Somerset West and Taunton Council 2019 Annual Status Report and Sedgemoor District Council 2020 Annual Status Report

Notes: (a) Monitoring site is closed

(b) Monitoring site was not yet operational

Exceedances of the NO₂ annual mean AQO of 40µg/m³ are shown in bold

Defra projected background concentrations

6.3.9 Defra provides estimates of background pollutant concentrations for NO_x, NO₂ and PM₁₀ across the UK for each one kilometre grid square, for every year from 2018 to 2030²⁶. Future year projections have been developed from the base year for the background maps, which is currently 2018. The maps include a breakdown of background concentrations by emission source, including road and industrial sources which have been calibrated against 2018 UK monitoring data. This data can be used to provide specific background pollutant concentrations at receptors included in the assessment and to supplement local monitoring data.

6.3.10 Table 6-3 presents the maximum background concentrations for the area covered by the proposed scheme alignment for the year 2019, which are all well below the relevant AQO's.

Table 6-3 Defra projected background concentrations for the proposed scheme (2019)

1km grid square (OS grid reference)		NO _x (µg/m ³)	NO ₂ (µg/m ³)	PM ₁₀ (µg/m ³)
X	Y			
325500	124500	19.1	14.3	14.2

Notes: The proposed scheme covers multiple OS grid squares. Therefore, the results presented above are taken from the grid squares which have the highest pollutant concentrations for 2019 as this is consistent with the latest year of local authority monitoring.

Limit value compliance

6.3.11 Defra's Pollution Climate Mapping (PCM)²⁷ is used to report UK compliance with the LVs. The current published version of the PCM model was developed using a base year of 2018. Considering the current version, and based on the concentrations reported for 2019, no modelled links exceeding the AQOs are present within the 10 kilometres of the study area.

6.3.12 There are five PCM links identified which overlap with the study area which are presented in Figure 6.3. This includes the A358, A38 and A3038. The highest modelled PCM 2019 NO₂ concentrations at these links is 36µg/m³ on the A358, close to the junction with the M1, which is below the annual mean NO₂ AQO of 40µg/m³ and is the closest PCM link to the proposed scheme.

6.4 Potential impacts

Construction

Human health and ecological receptors

6.4.1 The proposed construction works have the potential to impact upon sensitive receptors within 200m of construction activities as a result of construction related dust and emissions. According to the PCF Stage 2 Environmental Assessment Report (EAR), the construction phase is expected to last at least three years, exceeding the two-year threshold defined in the DMRB LA 105 standards. At the time of writing, information on construction traffic flows are not yet available. When the construction traffic data is provided, it will be screened against the criteria outlined in section 6.2.2.

6.4.2 The main risks to sensitive receptors during the construction stage includes on-site dust emissions arising from construction activities and vehicle movements, if screened in.

6.4.3 Dust has the potential to cause nuisance to property, and very high levels of soiling can affect plants and ecosystems. There is the potential for dust nuisance on receptors within 200m of construction and haulage routes associated with the proposed scheme. This nuisance, which is separate from adverse effects on health, can arise through annoyance caused by the soiling of windows, cars,

²⁷ Department for Environment Food & Rural Affairs (2020) Pollution Climate Mapping 2018 based predictions

washing and other property. There is a potential for adverse impacts for those receptors which could be directly affected by dust nuisance associated with proposed scheme works or construction vehicle traffic. In accordance with DMRB LA 105, with best practice mitigation measures in place, the impacts should be temporary, neutral and negligible.

- 6.4.4 Should vehicle movements for construction traffic be screened into the assessment, the proposed scheme has the potential to affect ambient concentrations at sensitive human and ecological receptors within 200m of the construction ARN.

Operation

Human health and ecological receptors

- 6.4.5 The human health receptors identified during PCF Stage 2 include mostly residential properties. However, there may be additional human health receptors identified when the study area is redefined in the PEIR and EAR.
- 6.4.6 In the PCF Stage 2 assessment, none of the human receptors along the PCF Stage 2 ARN were predicted to exceed the annual mean AQO for NO₂ in the opening year DS scenario.
- 6.4.7 PM₁₀ was not considered within the PCF Stage 2 local air quality assessment as Defra's predicted background concentrations showed that background PM₁₀ concentrations are well below the AQO in the study area. It was also mentioned that vehicle emission factors for PM₁₀ are relatively low and at least an order of magnitude lower than NO_x. It was considered unlikely that the effect of the proposed scheme on PM₁₀ would lead to exceedances of the PM₁₀ AQO.
- 6.4.8 An assessment of PM₁₀ has therefore been screened out as there are no AQMAs in the study area declared for any exceedance of the PM₁₀ AQOs and Defra projected background concentrations have not indicated that there is a risk of exceeding the PM₁₀ AQO or LV.
- 6.4.9 The ecological receptors identified during PCF Stage 2 included four Sites of Special Scientific Interest (SSSI). However, since the PCF Stage 2 assessment, the HA 207/07 and associated IANs have been superseded by the DMRB LA 105. There are additional site types which have been defined as a designated habitat. A preliminary desk study using the study area has been undertaken to identify ecological receptors which have the potential to be impacted. This review identified that there are seven SSSIs, two Special Protection Areas (SPA), three Local Nature Reserves (LNR), one Ramsar and seven ancient woodland sites within the study area.
- 6.4.10 A comprehensive list of relevant designated sites as defined in DMRB LA 105, including local wildlife sites and veteran trees, within 200m of the ARN will be identified and assessed when the study area is redefined in the PEIR and ES.
- 6.4.11 The operational phase of the proposed scheme has the potential to directly affect ambient concentrations of NO₂ (for human health receptors) and nitrogen deposition (for ecological receptors) as:
- The change in road alignment associated with the proposed scheme has the potential to introduce a new source of traffic pollution within 200m of

receptors, or partially / completely remove existing sources of traffic pollution from within 200m of receptors; and

- The proposed scheme has the potential to affect traffic flows and speeds on the road network, and so affect local air quality beyond the physical extent of the proposed scheme at human health and ecological receptors.

6.4.12 The proposed scheme has the potential to affect ambient concentrations at the sensitive receptors outlined in paragraphs 6.4.5 and 6.4.9. The potential impact upon receptors will be assessed when the updated traffic data for the PEIR and ES is available and the ARN is determined.

6.5 Design, mitigation and enhancement measures

Construction

6.5.1 The assessment of construction impacts would be restricted to within 200m of construction activities, as stated in DMRB LA 105. During construction, there is a potential for changes in air quality due to dust emissions from construction activity (e.g. earthworks, batching, soil storage etc.), emissions from site plant equipment, HGV movements and also from changes in traffic flows along the proposed scheme and wider road network with traffic management in place.

6.5.2 Best practice mitigation measures to reduce effects from construction dust would be included in the Environmental Management Plan (EMP), activity permits and Traffic Management Plan (TMP) to ensure that construction dust does not result in a significant impact.

6.5.3 In relation to mitigating the impact from construction vehicles, mitigation measures summarised in the standards from DMRB LA 105 and industry best practice will be followed and included in the EMP.

Operation

6.5.4 The PCF Stage 2 assessment states that none of the human receptors along the PCF Stage 2 ARN were predicted to exceed the annual mean AQO for NO₂ in the opening year DS scenario. It was determined that the proposed scheme would result in a 'large' improvement (i.e. a significant benefit). The predicted NO_x concentrations at all ecological receptors were below 30µg/m³.

6.5.5 It should be noted, however, that the PCF Stage 2 assessment was based on DMRB HA207/07 and associated IANs which has been superseded by DMRB LA 105. The air quality assessment will be carried out in accordance with DMRB LA 105 in the PEIR and EAR but it is unlikely that the proposed scheme will be assessed as high risk.

6.5.6 On the basis that the proposed scheme would have a significant positive impact (due to relieving congestion and moving the road away from the Henlade AQMA) on local air quality concentrations, no specific mitigation or Air Quality Action Plans are expected to be required for the operation of the proposed scheme.

6.6 Description of the likely significant effects

Construction

6.6.1 It is unlikely that significant adverse construction phase effects will occur with mitigation measures implemented through the EMP. Following the receipt of more

detailed construction information, a qualitative construction dust assessment in accordance with the requirements of the DMRB LA 105 will be undertaken. Construction traffic data will be screened according to the criteria set out in section 6.2.2. Should vehicle movements during the construction phase be screened in, a 'simple' assessment will be undertaken in line with the assessment of operational effects and likely significant effects at sensitive receptors will be determined.

Operation

Human receptors

- 6.6.2 The proposed scheme has the potential to directly affect ambient concentrations of NO₂ during the operational phase. Likely significant effects will be determined at sensitive receptors that are within the study area. The locations of sensitive receptors will be agreed with the relevant local authorities. The study area for the PEIR will be redefined using the PCF Stage 2 traffic data following screening against the LA 105 screening criteria. The study area for the ES will be determined once traffic data becomes available.

Ecological receptors

- 6.6.3 The proposed scheme has the potential to directly affect nitrogen deposition during the operational phase. Significant effects will be determined based on traffic impacts which are yet to be assessed.

PCF Stage 2 'Pink Modified Preferred Option'

- 6.6.4 There were 30 sensitive human receptors and four sensitive ecological receptors which were modelled as part of the PCF Stage 2 A358 Taunton to Southfields Dualling Stage 2 Environmental Assessment Report²⁸ for the 'Pink Modified Preferred Option'.
- 6.6.5 The impacts of the 'Pink Modified Preferred Option' on local air quality were assessed by determining the number of worst case sensitive receptors likely to result in an improvement or deterioration in air quality and the associated risk of exceeding the annual NO₂ AQO in a future assessment (acknowledging that this was limited to the information available at the time of assessment).
- 6.6.6 The modelled results indicate that none of the human receptors along the PCF Stage 2 ARN are predicted to exceed the annual mean AQO for NO₂ of 40µg/m³ in the opening year of 2023 in the DS scenario. There was one receptor where the AQO was exceeded in the DM opening year scenario which was predicted to be 45.4µg/m³ at Receptor 7 (a property in Henlade AQMA). This receptor was predicted to have the largest change in annual mean NO₂ concentrations with a predicted decrease of 29.7µg/m³ between the DM and DS opening year scenario. The predicted NO₂ concentration in the DS scenario was 15.7µg/m³.
- 6.6.7 The predicted NO_x concentrations at all ecological receptors were below 30µg/m³ for all scenarios and annual mean NO_x concentrations are predicted to decrease as a result of the proposed scheme.

²⁸ Mott MacDonald Sweco Joint Venture (2019) 'A358 Taunton to Southfields Dualling Stage 2 Environmental Assessment Report'. Mott MacDonald Joint Venture HE551508-MMSJV-EGN-000-RP-LP-0001.

6.6.8 In accordance with the guidance available at the time of assessment, IAN 174/13, the PCF Stage 2 EAR for the 'Pink Modified Preferred Option' determined that the proposed scheme would result in a 'large' improvement in annual mean NO₂ concentrations. It was concluded that the proposed scheme would not result in significant adverse effects and the overall significance of the proposed scheme had the potential to be described as significant beneficial as:

- No other AQOs would be breached;
- Improvements would continue for a long time;
- No designated sites would be affected; and
- There is a low risk of non-compliance with the LVs within the assessment period.

6.6.9 Since PCF Stage 2 assessment, HA 207/07 and associated IANs have been superseded by the DMRB LA 105.

6.7 Assessment methodology

Proposed level and scope of assessment

Construction

- 6.7.1 Dust emissions arising from construction and demolition activities are likely to be variable in nature and would depend on the type and extent of activity, soil type and moisture, road surface conditions and weather conditions.
- 6.7.2 Construction, demolition and earthwork activities from the proposed scheme may all have an impact on local air quality. Trackout of material onto local roads where it can be re-suspended may also affect air quality. Trackout refers to the transport of dust and PM₁₀ from construction areas onto the road network.
- 6.7.3 A qualitative assessment of the impacts of nuisance dust arising during construction will be undertaken, using standards set out in section 2.56 of DMRB LA 105. Properties and ecological receptors within 200m of dust producing activities will be identified and appropriate mitigation recommended where required.
- 6.7.4 It is expected that the construction phase will last for more than three years and when information on construction traffic volumes is available, the data will be reviewed following the standards in DMRB LA 105, screened into the assessment and assessed using the "simple" approach if required.
- 6.7.5 The emissions from construction traffic follow the same modelling methodology set out for the operational phase.
- 6.7.6 The emissions from site equipment have been scoped out of the assessment due to the temporary nature of the works and the minimal impact the site equipment would have on overall pollutant concentrations. Best practice measures to reduce emissions from site equipment will be included in the EMP.

Operation

- 6.7.7 The proposed scheme is anticipated to improve air quality in the Henlade AQMA as the new alignment of the A358 for the proposed scheme will bypass the AQMA. The PCF Stage 2 operational assessment was carried out using a "simple" approach. In accordance with DMRB LA 105, and based on

recommendations in the PCF Stage 2 assessment, a “simple” assessment of operational air quality effects will be undertaken using the DMRB screening tool, or following alternative proportionate assessment methods, to estimate concentrations at identified worst-case sensitive receptors. This is because the proposed scheme has been defined as low risk and a “simple” approach is therefore considered proportional. A “simple” approach will provide sufficient information to confirm that the project will not result in exceedances of the air quality thresholds.

Air quality legislation, policy and guidance

Air quality legislation

Environment Act 1995

- 6.7.8 Part IV of the Environment Act 1995 (1995, c.25) requires the UK Government to produce a national air quality strategy, which contains standards, objectives and measures for improving ambient air quality. The air quality strategy sets out objectives that are maximum ambient concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale.

Air Quality Standard Regulations (amendment) 2016

- 6.7.9 The ambient air quality standards and objectives are given statutory backing in England through the Air Quality Standard Regulations 2010 and amendments have been made in 2016 (SI 2010/1184 HMSO). The AQOs and LVs for the protection of human health, vegetation and ecosystems which are applicable to this assessment are presented in Table 6-1.

Environmental Protection Act 1990

- 6.7.10 Generally, dust is only a cause of annoyance but when of sufficient scale and frequency it may become a statutory nuisance. The relevant legislation dealing with statutory nuisance is given in Part III of the Environmental Protection Act 1990 (1990, c.43 HMSO). A statutory nuisance in relation to dust and deposits is defined under Section 79 of the EPA 1990 as follows:

“(d) Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance.

(e) any accumulation or deposit which is prejudicial to health or a nuisance.”

- 6.7.11 Under the provisions of the EPA 1990, where a local authority is satisfied that a statutory nuisance exists, it is under a mandatory duty to serve an Abatement Notice requiring abatement or cessation of one or more activities deemed to be causing the nuisance. In the absence of any kind of standard, identification of a nuisance is dependent on the professional judgement of the local authority as to whether Best Practical Means (BPM) are being employed to control emissions. If BPM is evident or can be clearly demonstrated, then a particular activity cannot be deemed to be causing a statutory nuisance.

Policy

National Planning Policy Framework (NPPF)

- 6.7.12 The NPPF²⁹, published in 2012 and revised in February 2019, sets out the Government's planning policies for England and how these are expected to be applied. The NPPF revokes 44 planning documents including: Planning Policy Statement 23: Planning and Pollution Control.
- 6.7.13 Paragraph 181 considers impacts of developments on air quality:
- 6.7.14 *“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”*
- 6.7.15 The NPPF therefore requires:
- That consideration of the proposed scheme air quality impacts should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of AQMAs and Clean Air Zones; and
 - Consideration of opportunities to improve air quality or mitigate impacts, such as through traffic and travel management, and green infrastructure provision and enhancement.
- 6.7.16 However, the NPPF does not provide guidance on how to come to a judgement on sustaining compliance with the Air Quality Directive.

NPSNN

- 6.7.17 The key policies from the NPSNN are stated in section 6.1.

Dust

- 6.7.18 Dust is the generic term used in British Standard BS 6069 Characterization of air quality, Glossary (Part Two)^j to describe particulate matter in the size range 1–75µm in diameter. Under provisions in the EPA 1990 dust nuisance is defined as a statutory nuisance.
- 6.7.19 There are currently no formal standards or guidelines for dust nuisance in the UK. In addition, formal dust deposition standards are not specified. This reflects the uncertainties in dust monitoring technology and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. Complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory

²⁹ Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2> (last Accessed January 2021).

nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

Local planning policy

6.7.20 The following local planning policy documents are relevant to the air quality assessment and will be reviewed in detail in the PEIR and EAR:

- Taunton Deane Local Plan 2004³⁰;
- Taunton Deane Core Strategy 2011-2028³¹;
- Sedgemoor Local Plan (2011-2032)³²;
- South Somerset Local Plan 2006-2028³³;
- South Somerset Environment Strategy³⁴; and
- West Somerset Local Plan to 2032³⁵.

Determination of significant effects

Construction phase

6.7.21 A qualitative assessment for construction dust in accordance with the requirements of the DMRB LA 105 will be undertaken following the receipt of more detailed construction information. It is expected that the construction phase will last for more than three years and when information on construction traffic volumes is available, the data will be reviewed following the standards in DMRB LA 105, screened into the assessment, and assessed using the 'simple' approach if required.

Operational phase

6.7.22 The simple air quality assessment approach will follow the standards set by DMRB LA 105 and the Defra Local Air Quality Management Technical Guidance 2016 (TG16)³⁶.

6.7.23 The simple level assessment will include:

- An assessment of air quality effects using the most recently published version of the DMRB Screening Tool (v8);
- Verification of model outputs using published local monitoring data; and
- Prediction of NO₂ concentrations in the base year, projected base year, DM and DS scenarios at sensitive human health receptors and ecological receptors.

³⁰ Somerset West and Taunton Council (2004) *Taunton Deane Local Plan 2004*. Available at: <https://www.somersetwestandtaunton.gov.uk/planning-policy/adopted-local-plans/taunton-deane-local-plan-2004/> (Accessed January 2021)

³¹ Somerset West and Taunton Council (2011) *Taunton Deane Core Strategy 2011-2028*. Available at: <https://www.somersetwestandtaunton.gov.uk/media/1061/adopted-core-strategy-2011-2028.pdf> (Accessed January 2021)

³² Sedgemoor District Council (2019) Sedgemoor Local Plan 2011-2032 [online]. Available at: <https://www.sedgemoor.gov.uk/LocalPlan> (Accessed January 2021)

³³ South Somerset District Council (2015) South Somerset Local Plan 2006-2028. Available at: <https://www.southsomerset.gov.uk/your-council/your-council-plan-and-strategies/planning-policy/local-plan/> (Accessed January 2021)

³⁴ South Somerset District Council (2019) South Somerset Environment Strategy. Available at: <https://www.southsomerset.gov.uk/media/2690/environment-strategy-document-3-final.pdf> (Accessed January 2021)

³⁵ Somerset West and Taunton Council (2016) Adopted West Somerset Local Plan to 2032. Available at: <https://www.somersetwestandtaunton.gov.uk/media/1074/adopted-west-somerset-council-local-plan-to-2032-document.pdf> (Accessed January 2021)

³⁶ Department for Food, Environment and Rural Affairs (2018) Local Air Quality Management Technical Guidance (TG16). Available at: <https://laqm.defra.gov.uk/technical-guidance/> (Accessed January 2021)

- 6.7.24 There are no AQMAs in the study area declared for any exceedance of the PM₁₀ AQOs and Defra projected background concentrations have not indicated that there is a risk of exceeding the PM₁₀ AQO or LV and therefore, as recommended in PCF Stage 2, modelling of PM₁₀ in the base or opening year will not be undertaken.
- 6.7.25 The assessment will be desk based and based upon traffic data generated for the Environmental Statement and use existing baseline data collected by local authorities.
- 6.7.26 The GIS software, ArcMap, will be used to assist in inputting the road link information into the DMRB Screening Tool.
- 6.7.27 The assessment will be undertaken for the baseline, DM and DS scenarios in the opening year. For local air quality, the opening year of the proposed scheme is likely to be the worst-case scenario as vehicle emissions and background pollutant concentrations are anticipated to decrease over time due to improvements in vehicles and fuel technologies.
- 6.7.28 Evidence from monitoring across the UK has indicated concentrations of pollutants are not reducing as quickly as predicted by Defra despite improvements to engine technology. To account for this, the future baseline projections scenarios will also be calculated for the opening year following the methodology in Section 2.47 of DMRB LA 105.

Receptors

- 6.7.29 Human receptors and ecological receptors will be identified and added to the air quality assessment using the following criteria and professional judgement:
- Proximity to the affected roads within the ARN;
 - Representativeness of maximum effects of the proposed scheme in that region; and
 - Whether they are at risk of exceeding the annual mean NO₂ AQO.

Designated habitat sites

- 6.7.30 To assess the impacts on ecosystems, the study area will be reviewed to identify designated ecological habitats within 200m of the ARN following sections 2.25 to 2.26.1 of DMRB LA 105.
- 6.7.31 The potential effects on designated ecological sites will be assessed through the determination of significant effects as part of the Environmental Statement. Nitrogen deposition will be calculated for all designated ecological sites within 200m of the ARN for comparison against the critical loads for the habitat based on the approach set out in DMRB LA 105.

Traffic data

- 6.7.32 Traffic data will be provided for the air quality assessment by the Project transport team.
- 6.7.33 Traffic data will be provided representing the AADT conditions. The following data parameters will be provided:
- Traffic flow, defined as average annual vehicles per hour;
 - Percentage HDV;

- Average vehicle speeds, in kilometres per hour (kph); and
- Speed band information for use in calculation of emission factors in accordance with DMRB LA 105.

Model verification

6.7.34 A comparison of modelled and measured NO₂ concentrations, known as model verification, will be undertaken as part of the PIER and EAR. The objectives of model verification are to evaluate model performance, determine whether model adjustment is required, and to provide confidence in the assessment. The approach for model verification will follow Defra's TG 16.

NO_x to NO₂ conversion

6.7.35 The approach to calculating the conversion of roadside NO_x to NO₂ will follow the guidance in Defra's TG16. This approach allows the calculation of NO₂ from NO_x concentrations, taking into account the difference between ambient NO_x concentrations with and without the proposed scheme, the concentrations of ozone and the different proportions of primary NO₂ emissions in different years. This approach is available as a spreadsheet calculator: the latest version released in August 2020 (v8.1) will be used³⁷ (Defra, 2020).

Compliance risk assessment

6.7.36 DMRB LA 105 provides a method for the assessment of the risk of the proposed scheme being non-compliant with the LVs. The compliance risk assessment will be undertaken using the modelling results from the local air quality assessment. To undertake the compliance risk assessment, the following information will be gathered:

- Local published air quality model results;
- Defra's Pollution Climate Mapping (PCM) model outputs for the compliance road network; and
- Defra's zones and agglomerations maps³⁸.

6.7.37 To determine the study area for the compliance risk assessment, the local air quality study area will be compared to the compliance link locations in the PCM model. Where the two networks intersect, these links will form the basis of the assessment of compliance risk. A review will be carried out to identify any qualifying features as defined in section 2.64 of DMRB LA 105.

6.7.38 To determine the compliance risk of the proposed scheme, the Compliance Risk Flow Chart in Figure 2.79 in DMRB LA 105 will be followed.

6.7.39 Evaluation of the significance of the local air quality findings will be undertaken in accordance with DMRB LA 105 (section 2.103). In order to determine whether the proposed scheme triggers a significant air quality effect we will assess:

- The effects on human health;
- The effects on designated habitats; and
- The outcomes of the compliance risk assessment.

³⁷ Department for Environment Food & Rural Affairs (2020) *Background Maps: NO_x to NO₂ Calculator* [online]. Available at: <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html> (Accessed January 2020)

³⁸ Department for Environment Food & Rural Affairs (2019) *Air Quality Plan for nitrogen dioxide (NO₂) in UK (2017): Zone Plans*. Defra, UK

Human health operational assessment criteria

- 6.7.40 For human health, the outcomes of the assessment will be screened following the DMRB LA 105 (section 2.89). If a concentration is greater than the AQO and the proposed scheme is predicted to have a greater than 1% change (compared with the relevant objective, e.g. 0.4µg/m³ for annual mean NO₂), then the results are assigned to the change criteria shown in Table 6-4.
- 6.7.41 To aid the interpretation of significance of public exposure as a result of the proposed scheme, Table 2.92N in DMRB LA 105 provides the criteria which will be used in this assessment. Where predicted annual mean NO₂ concentrations are below the AQO or the magnitude of change is ≤0.4µg/m³, effects are considered to be imperceptible.

Table 6-4 Guideline to number of properties constituting a significant effect

Magnitude of change in concentration	Number of receptors with:	
	Worsening of air quality already above AQO or creation of a new exceedance	Improvement of an air quality already above AQO or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2)	10 to 30	10 to 30
Small (>0.4)	30 to 60	30 to 60

Ecological assessment criteria

- 6.7.42 Determining the significance of the potential changes to nitrogen deposition requires habitat specific advice from the project Ecology team. Once the predicted changes in pollutant concentrations and deposition rates are available, the project Ecology team will be consulted to jointly consider and assess the potential impacts predicted at the ecological sites. The flow chart (Figure 2.98) in DMRB LA 105 will be used to determine significance at ecological sites.

WebTAG

- 6.7.43 A WebTAG assessment will be produced to calculate the monetary cost of the changes to NO_x, PM2.5 and CO₂ emissions. This assessment will be carried out following the TAG Unit A3 Environmental Impact Appraisal guidance³⁹.

6.8 Assessment assumptions and limitations

- 6.8.1 Air quality dispersion modelling has inherent areas of uncertainty, including:
 - The traffic data used in the model;
 - The traffic emissions data calculated which uses average UK vehicle fleet emission factors;
 - Simplifications in model algorithms and empirical relationships that are used to simulate complex physical and chemical processes in the atmosphere;
 - The background concentrations of air quality pollutants; and
 - The meteorological data used in the assessment.

³⁹ Department for Transport (2019) *TAG Unit A3 Environmental Impact Appraisal*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940947/tag-unit-a3-environmental-impact-appraisal.pdf (Accessed January 2021)

- 6.8.2 To reduce uncertainty, air quality assessment undertaken for the Environmental Statement will be verified using the air quality measurements from any local authority data that is within the study area and has suitable data capture of above 75% in a year, in accordance with Defra's TG16. The verification process will be undertaken in line with best practice guidance produced by Defra.
- 6.8.3 Sensitivity testing of emissions data will be carried out using the most recent standard from Highways England, set out in DMRB LA 105. The methodology used in this assessment is designed to provide a robust assessment, reducing uncertainty caused by the above limitations.
- 6.8.4 The most up to date vehicle emission factors and background pollutant concentrations will be used to calculate emissions and process results in the assessment.
- 6.8.5 It will not be possible to determine the long-term impacts of the Covid-19 pandemic on traffic patterns and the consequential impact this may have on air quality in relation to the proposed scheme impacts on traffic emissions.
- 6.8.6 The assessment will be carried out based on the best information available at the time of the assessment.
- 6.8.7 The construction of the proposed scheme will be undertaken in phases. The qualitative assessment of construction dust effects will consider the construction of the proposed scheme as a whole, including all phases of the works. If a quantitative assessment of construction phase vehicle movement emissions is carried out, it will consider a single phase of construction, where construction vehicle movements associated with the proposed scheme will be the most frequent.
- 6.8.8 Whilst there is the potential for the proposed scheme to open in phases, for the air quality assessment, it will be assumed that there will be a single year of opening. The quantitative assessment of road traffic emissions will therefore consider the point of full opening, at which the greatest change in road traffic movements would be experienced.

7 Cultural heritage

7.1 NPSNN requirements

7.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

7.1.2 Key policies from the NPSNN relevant to this discipline includes:

- Paragraph 5.122 which states that the historic environment holds value to this and future generations because of their historic, archaeological, architectural or artistic interest. Heritage assets may be buildings, monuments, sites, places, areas of landscapes. The sum of the heritage interests that a heritage asset holds is referred to as its significance. Significance derives not only from a heritage asset's physical presence, but also from its setting.
- Paragraph 5.126-127 of the NPSNN requires that, where the development is subject to EIA, the applicant should assess any likely significant heritage impacts. The applicant should describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the asset's importance. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation.
- Paragraph 5.131-2 states that great weight should be given to the conservation of heritage assets. The more important the asset, the greater the weight should be. Substantial harm to or loss of a grade II Listed Building or a grade II Registered Park or Garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including World Heritage Sites, Scheduled Monuments, grade I and II* Listed Buildings, Registered Battlefields, and grade I and II* Registered Parks and Gardens should be wholly exceptional.
- Paragraph 5.139-5.140 of the NPSNN, which states that a documentary record is not as valuable as retaining the heritage asset and, therefore, the ability to record evidence of the asset should not be a factor in deciding whether consent should be given. Where the loss of the whole or part of a heritage asset's significance is justified, the Secretary of State should require the applicant to record and advance understanding of the significance of the heritage asset before it is lost (wholly or in part). The extent of the requirement should be proportionate to the importance and the impact.

7.2 Study area

7.2.1 The cultural heritage assessment will be based on a one-kilometre study area from the proposed DCO boundary; professional experience has shown that for a linear infrastructure scheme significant effects are unlikely to occur beyond this distance. However, designated heritage resources lying outside the study area and with potential views of the scheme will also be considered for inclusion in the assessment. This study area allows an appropriate understanding of the context and setting of designated heritage resources identified, facilitating an assessment of the potential effects of the scheme during construction and

operation upon heritage resources. Designated heritage resources within the one-kilometre study area are shown on Figure 7.1. A smaller study area extending 250m from the proposed DCO boundary will be used to identify non-designated heritage resources; it is considered that this provides sufficient context for the assessment of significant effects through the construction and operation of the scheme.

7.2.2 These study areas have also been used for the preparation of this Scoping Report.

7.3 Baseline conditions

7.3.1 Information on nationally designated cultural heritage in the UK has been obtained from Historic England's National Heritage List for England (NHLE)⁴⁰. For designated and non-designated local heritage resources, the South West Heritage Trust's Historic Environment Record (HER)⁴¹ has been consulted.

Designated heritage resources

7.3.2 There is one scheduled monument within one kilometre of the scheme: The Cross in St Aldhelm and St Eadburga churchyard (NHLE 1017250) which is located approximately 270m to the south-west of the scheme in Broadway at the south-eastern end of the route. This is also a Grade II* listed building (NHLE 1057005).

7.3.3 There are 141 listed buildings within the one-kilometre study area, including four Grade I listed buildings, 10 Grade II* listed buildings and 127 Grade II listed buildings. The Grade I listed buildings are:

- The Church of St John the Baptist (NHLE: 1060442), located approximately 970m east of the proposed scheme within the parkland at Hatch Beauchamp.
- The Church of St George (NHLE 1177015), located approximately 720m east of the scheme at its northern end at Ruishton.
- The Church of the Holy Cross (NHLE 1177251), located approximately 720m east at Thornfalcon.
- The Church of St Aldhelm and Eadburga (NHLE 1248912) which is located north-east of the village of Broadway, approximately 270m west.

7.3.4 The Grade II* listed buildings are:

- The Remains of churchyard cross in churchyard about 7m south of porch Church of St George (NHLE 1060396), approximately 850m east of the scheme at Ruishton.
- Outbuilding with wall adjoining south-east corner of Haydon House (NHLE 1177118), approximately 735m west at Haydon.
- Musgrave Farmhouse (NHLE 1177045), approximately 30m south at Henlade.
- Henlade House (NHLE 1060397), approximately 430m west of the scheme, south of Henlade.
- The Old Rectory, with boundary wall attached to south-east corner (NHLE 1295733), approximately 215m west of the scheme at Ashill.
- The Church of the Blessed Virgin Mary (NHLE 1057100), approximately 390m west of the scheme at Ashill.

⁴⁰ <https://historicengland.org.uk/listing/the-list/>

⁴¹ <https://swheritage.org.uk/historic-environment-service/historic-environment-record/>

- Churchyard Cross, about 5m south of nave, Church of St Aldhelm and Eadburgha, Broadway, (NHLE 1057005), approximately 270m west of the scheme (also a Scheduled Monument).
- The Grotto at Jordans NGR ST 3388 1601 (NHLE 1057070), approximately 290m east of the scheme, north-east of Horton Cross.
- Rowland's farm house, and attached outbuildings around the north side of a courtyard, including well (NHLE 1057097), approximately 800m east of the scheme, north-east of Horton Cross.
- Rowland's Mill (NHLE 1345847), approximately 520m east of the scheme, north-east of Horton Cross.

7.3.5 There are 127 Grade II listed buildings within one kilometre of the proposed scheme. Although all the listed buildings will be fully assessed, there are 10 that are within 100m of the scheme and are, therefore, particularly likely to be impacted:

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

7.3.6 There is one Grade II registered park and garden: Hatch (Beauchamp) Court, located approximately 490m east (NHLE: 1001146) near Hatch Beauchamp.

7.3.7 There are three conservation areas located within one kilometre: those at Hatch Beauchamp, Thornfalcon and Ilminster.

7.3.8 There are no world heritage site or registered battlefields within the study area.

Non-designated heritage resources

7.3.9 Archaeological remains dating to the prehistoric period (10,000 BC – AD 43) that have been recorded within the study area include:

- a multi-period settlement site, dating from the Late Bronze Age to Late Iron Age, excavated at the Taunton Gateway Park & Ride access road junction in the northern part of the site; and,

- several cropmarks along the Park & Ride connection road tentatively dated to the Iron Age/Roman periods.

7.3.10 Archaeological remains dating to the Roman period (AD 43 – 410) that have been recorded within the study area include:

- Roman settlement site excavated in the early 1970s as part of the construction of the M5 junction 25. The extent of the settlement was thought to be much larger than excavated and associated, undisturbed remains could be located within the footprint of the scheme; and
- a possible Roman building, Romano-British field system and a Romano-British inhumation cemetery with 30 burials was identified at the northern end of the Taunton Gateway Park & Ride access road, adjacent to Junction 25 of the M5.

7.3.11 No non-designated early medieval (AD 410-1066) remains have been identified within the 250m study area.

7.3.12 Archaeological remains dating to the later medieval period (AD 1066 - 1485) that have been recorded within the study area include:

- a probable deer park, to the north-east of Ashill, has been identified based on surrounding place names and earthworks which resemble a possible park pale;
- two scatters of medieval pottery identified during fieldwalking for the A358 Ashill Bypass;
- remains of a medieval village of Horton Cross; and
- ridge and furrow earthworks formed by medieval cultivation.

7.3.13 Archaeological remains dating to the post-medieval period (AD1485 - 1901) that have been recorded within the study area include:

- much of the existing road layout, except for parts of the A358, including several 18th century turnpike roads;
- undated fishponds at Henlade;
- the line of the dismantled Taunton to Chard railway;
- a malt house (now a residential house) to the north of Bath House Farm; West Hatch;
- several milestones associated with 18th turnpike roads;
- large areas of earthwork and cropmarks reflecting patterns of post-medieval agriculture;
- the parkland associated with Jordans House; and
- a watermill recorded to the south-east of Ashill

7.3.14 Archaeological remains dating to the modern period (AD1901 – present) that have been recorded within the study area include Second World War installations, including searchlight battery sites and a large tented camp at Hatch Park.

Historic landscape

7.3.15 The historic landscape character is rural agricultural with small settlements and the estates of country houses, traversed by a road network which dates back in part to at least the early post-medieval period and probably earlier. This historic landscape was enclosed between the 18th and 20th centuries, initially through the Act of Enclosure, with later land enclosed as a result of changing agricultural practices; within this there are traces of anciently enclosed land. There are a

number of areas of woodland, some of which are categorised by Natural England as semi-natural ancient woodland, which contributes to the historic landscape character.

7.4 Potential impacts

- 7.4.1 Construction groundworks have the potential to adversely impact both known and unknown archaeological remains across a large area. Previous archaeological surveys and investigations, as well as the archaeological aerial survey and appraisal undertaken for a previous stage of the scheme design, demonstrate a high potential for multi-period archaeological remains from the prehistoric period to the present within the study area. There are also likely to be adverse impacts on non-designated resources relating to the historic landscape and built heritage, including historic parkland and gardens, mileposts and features of historic infrastructure. These resources have the potential to be permanently impacted by construction.
- 7.4.2 The Cross in St Aldhelm and St Eadburga churchyard, a scheduled monument (NHLE 1017250), has the potential to be adversely affected as a result of changes to its setting beginning during construction but continuing through operation. There is also likely to be an adverse impact on arising from changes to the settings of Grade I, II* and II listed buildings and the Grade II registered park and garden located within the study area.
- 7.4.3 There would be no operational impacts on archaeological remains as any change to sub-surface features would have occurred during construction. However, there is the potential for noise, lighting and traffic movement to have adverse impacts on the nearby scheduled monument, listed buildings and registered park and garden located within the study area. These would be assessed as part of the EIA.

7.5 Design, mitigation and enhancement measures

Construction

- 7.5.1 Where effects on heritage resources are unavoidable, mitigation would be included within the design. For remains of high or very high value, options for avoidance will be considered where possible. For effects arising from changes to the setting of heritage resources this may include planting, screening, noise attenuation and appropriate lighting, with the aim of reducing the impact on heritage resources in the vicinity. These works would take place within the setting of the resources and could, themselves, have an impact on the significance of the resource.
- 7.5.2 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 resources would be employed during construction through the implementation of an Environmental Management Plan (EMP), which would include details of all works to preserve and/or record and recover heritage resources.

Operation

- 7.5.3 Below ground archaeological deposits would not be affected by the operation of the new dual carriageway. However, the presence of faster moving traffic and the potential for air, noise and light pollution within the landscape of the offline section, as well as the presence of new roads across an area that is currently farmland, could have an effect on the setting of some heritage resources, including listed buildings. Where possible, opportunities for enhancement measures to heritage resources and their settings would be taken. This could take the form of screening vegetation, the placement of bunds, noise attenuation screening or appropriate lighting.

7.6 Description of the likely significant effects

- 7.6.1 The scheme is likely to result in adverse effects on designated and non-designated heritage resources during construction. The close proximity of a scheduled monument, registered park and garden and listed buildings to the scheme presents the potential for significant effects arising from changes to their settings. Under DMRB, designated heritage resources are considered to be resources of high or very high value/sensitivity, meaning that even a minor adverse magnitude of impact would result in a significant adverse effect. There is also the potential for adverse effects on below-ground archaeological remains from the prehistoric period onwards, the value/sensitivity of which is not yet known but could also be high. Therefore, there are potential significant adverse effects on archaeological remains as well as potential effects arising from changes to the setting of designated and non-designated heritage resources during construction.
- 7.6.2 It is unlikely that any below ground archaeological deposits remaining after construction would be further affected by the operation of the proposed scheme options, although there is the potential for effects of compression and dewatering of soils, which will be considered in the EIA. Further, the presence of traffic moving faster than previously along the A358, as well as the presence of potentially higher noise levels and new lighting could have operational effects on the setting of heritage resources, including those which are designated and of high value/sensitivity. Therefore, there is the potential for significant adverse effects arising from changes to the setting of designated heritage resources once in operation.

7.7 Assessment methodology

Proposed level of scope of assessment

- 7.7.1 The ES will include an assessment of the permanent construction effects due to the potential for significant effects upon buried archaeological remains. The ES will also include an assessment of the temporary and permanent setting effects on designated and non-designated heritage resources from construction activity including the presence of worksites and associated noise and from the permanent introduction of the scheme into the landscape.
- 7.7.2 Furthermore, there are a number of sensitive heritage resources within close proximity of the scheme. An assessment of operational effects arising from changes to setting caused by light, visual and noise intrusion will also be required.

Below ground archaeological deposits would, however, not be affected by the operation of the new dual carriageway and are scoped out of further assessment.

- 7.7.3 This assessment will be undertaken in line with DMRB LA 104: Environmental assessment and monitoring and LA 106: Cultural heritage assessment⁴² and will be used to inform the design of a historic environment strategy. The assessment will include the results of a geophysical survey, lidar survey, geotechnical ground investigations and a detailed map regression.

Policy requirements, guidance and advice

- 7.7.4 The method for determining and appraising baseline conditions will be undertaken in accordance with the published standards and guidance set out below:
- DMRB LA 104 – Environmental assessment and monitoring.
 - DMRB LA 106 – Cultural heritage assessment.
 - Historic England - Conservation Principles: Policies and Guidance⁴³.
 - Historic England - Historic Environment Good Practice Advice in Planning Note 2 (GPA2) – Managing Significance in Decision – Taking in the Historic Environment⁴⁴.
 - Historic England Historic Environment Good Practice Advice on Planning Note 3 (GPA3) – The Setting of Heritage Assets⁴⁵.
 - Chartered Institute for Archaeologists Standard and Guidance for historic environment desk-based assessment⁴⁶.

Proposed methodology for determination of significant effects

- 7.7.5 The assessment will consider known heritage resources, both designated and non-designated within the study area. These include scheduled monuments, listed buildings, registered parks and gardens, conservation areas, non-designated below-ground archaeological remains, locally recorded historically important buildings and historic landscapes. There are no registered battlefields or world heritage sites within the study area.
- 7.7.6 The assessment will consider both temporary and permanent construction and operational effects on heritage resources. 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 during construction or from effects on the setting of resources during operation.

Assessment of value/sensitivity

- 7.7.7 The value/sensitivity of historic environment receptors will be based upon the values given in Table 7-1 below. The assessment of value/sensitivity will be

⁴² Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB): Sustainability and Environmental Appraisal. LA 106 Cultural Heritage Assessment*. Available at: <https://www.standardsforhighways.co.uk/dmr/b/search/8c51c51b-579b-405b-b583-9b584e996c80> (Accessed January 2021)

⁴³ Historic England (2008) *Conservation Principles: Policies and Guidance*. Available at: <https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/conservationprinciplespoliciesandguidanceapril08web/> (Accessed January 2021)

⁴⁴ Historic England (2015) *Historic Environment Good Practice Advice in Planning Note 2 (GPA2): Managing Significance in Decision – Taking in the Historic Environment*. Available at <https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/gpa2/> (Accessed January 2021)

⁴⁵ Historic England (2015, updated 2017) *Historic Environment Good Practice Advice on Planning Note 3 (GPA3) – The Setting of Heritage Assets*. Available at: <https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heaq180-gpa3-setting-heritage-assets/> (Accessed January 2021)

⁴⁶ Chartered Institute for Archaeologists (2014, updated 2020) *Standard and Guidance for historic environment desk-based assessment*. Available at: https://www.archaeologists.net/sites/default/files/CifAS%26GDBA_4.pdf (Accessed January 2021)

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 Buildings).

7.7.8 The assessment will also recognise that occasionally some heritage resources have a lower or higher than normal value/sensitivity within a local context. Additionally, the 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 Environmental value (sensitivity) and descriptions

Value (sensitivity) of resource	Typical description
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

NOTE: taken from DMRB LA104 Environmental assessment and monitoring Table 3.2N

Assessment of magnitude of impact

7.7.9 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 Magnitude of impact and typical descriptions

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

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

NOTE: taken from DMRB LA104 Environmental assessment and monitoring Table 3.4N

Assessment of significance of effect

7.7.10 Effects will be evaluated by combining the assessment of both the value / sensitivity of an asset, with the magnitude of the impact. This allows the prediction of the significance of the effect, as shown in Table 7-3. 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.

Table 7-3 Significance Matrix

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

NOTE: Taken from DMRB LA104 Environmental assessment and monitoring Table 3.8.1

7.7.11 Table 7-4 is based upon DMRB LA 104 Table 3.7, with factor-specific examples of effect replacing the generic statement contained in LA104 Table 3.7. Effects are defined on a nine-point scale (very large beneficial, large beneficial, moderate beneficial, slight beneficial, neutral, slight adverse, moderate adverse, large adverse or very large adverse).

Table 7-4 Assessment Criteria

Significance of effect	Descriptor
Very large adverse	Partial or total loss of a resource of Very High Importance. Effects at this level are material in the decision-making process
Large adverse	Result in the total, or almost total, loss of heritage resources. Be highly intrusive and would seriously damage the setting of the heritage resource such that its significance is totally or almost totally degraded. Be in conflict with national policies for the protection of the heritage resource. Effects at this level are likely to be material in the decision-making process
Moderate adverse	Be highly intrusive in the setting and as a result adversely affect the significance of the resource. Result in loss of features such that their integrity of the heritage resource is compromised, but not destroyed.

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

7.8 Assessment assumptions and limitations

- 7.8.1 The site visit undertaken as part of the Stage 1 Historic Environment Appraisal was restricted to external visual inspection from publicly accessible areas only.
- 7.8.2 Non-designated built heritage resources are often not identified in HER data or other desk-based resources. As such, the extent of non-designated heritage

resources along the scheme cannot be considered to have been fully examined or determined as of yet. This scoping report assessment identifies the potential for significant adverse effects resulting from the loss or alteration of unknown built heritage resources.

- 7.8.3 Non-intrusive or intrusive archaeological surveys have not yet been undertaken across the study area for the scheme; therefore, the archaeological potential cannot be considered to have been fully examined or determined as yet. Further examination will be carried out for the ES.
- 7.8.4 The assessment of effects, in line with paragraph 5.126 of the NPSNN, set out below is based on what is known of the heritage resources from an initial PCF Stage 1 Historic Environment Appraisal only. This has identified key heritage resources from the HER and National Heritage List for England (NHLE) datasets (as well as the aerial survey results) likely to be. Further research into the study area is yet to be undertaken and will be followed by various stages of survey and evaluation. Additional baseline heritage resources may be identified during this process.
- 7.8.5 Information provided by the HER can be limited since it depends on previous opportunities for research, fieldwork and discovery. Where nothing of historic interest is shown in an area, this can be down to a lack of targeted research or investigation rather than the genuine absence of sub-surface archaeological deposits. This scoping report assessment identifies the potential for significant adverse effects resulting from the loss or alteration of unknown archaeological remains.
- 7.8.6 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. Professional judgement will be used in the interpretation of older primary sources
- 7.8.7 Where archaeological sites have been identified solely from aerial imagery without confirmation from archaeological excavation or supporting evidence in the form of findspots, it is possible the interpretation may be revised in the light of further investigation. The detailed assessment will include evidence from the geophysical survey, lidar survey, geotechnical ground investigations and detailed map regression to supplement the aerial imagery. 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, such as 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.

8 Landscape

8.1 NPSNN requirements

8.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

8.1.2 Key policies from the NPSNN relevant to this discipline includes:

- Paragraph 3.5 of the NPSNN states that *“Outside the nationally significant infrastructure project regime, Government policy is to bring forward targeted works to address existing environmental problems on the Strategic Road Network and improve the performance of the network. This includes [...] respecting and enhancing landscape character”*.
- Paragraph 4.15 of the NPSNN notes that the EIA Directive specifically requires an EIA to identify, describe and assess effects on the landscape.
- Paragraph 4.34 of the NPSNN states that *“there may be opportunities [...] to demonstrate good design in terms of siting and design measures relative to existing landscape and historical character and function, landscape permeability, landform and vegetation”*.
- Paragraph 5.36 of the NPSNN states that *“the applicant should demonstrate that [...] developments will be designed and landscaped to provide green corridors and minimise habitat fragmentation where reasonable”*.
- Paragraph 5.87 of the NPSNN states that *“The Secretary of State should be satisfied that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact on amenity from emissions of [...] artificial light. This includes the impact of light pollution from artificial light on local amenity [and] intrinsically dark landscapes”*.
- Paragraphs 5.142 to 5.161 of the NPSNN covers the topic of landscape and visual impacts, key points of which are noted below:
 - Paragraph 5.144 *“The landscape and visual assessment should include reference to any landscape character assessment and associated studies, as a means of assessing landscape impacts relevant to the proposed project. The applicant’s assessment should also take account of any relevant policies based on these assessments in local development documents in England”*.
 - Paragraph 5.145 *“The applicant’s assessment should include any significant effects during construction of the project and/or the significant effects of the completed development and its operation on landscape components and landscape character (including historic landscape characterisation)”*.
 - Paragraph 5.146 *“The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation”*.
 - Paragraph 5.149 *“Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints, the aim should be to avoid or minimise*

- harm to the landscape, providing reasonable mitigation where possible and appropriate”.*
- Paragraph 5.150 *“Great weight should be given to conserving landscape and scenic beauty in nationally designated areas. National Parks, the Broads and Areas of Outstanding Natural Beauty have the highest status of protection in relation to landscape and scenic beauty”.*
 - Paragraph 5.154 *“The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries of these areas which may have impacts within them. The aim should be to avoid compromising the purposes of designation and such projects should be designed sensitively given the various siting, operational, and other relevant constraints”.*
 - Paragraph 5.155 *“The fact that a proposed project will be visible from within a designated area should not in itself be a reason for refusing consent”.*
 - Paragraph 5.160 *“Adverse landscape and visual effects may be minimised through appropriate siting of infrastructure, design (including choice of materials), and landscaping schemes, depending on the size and type of proposed project. Materials and designs for infrastructure should always be given careful consideration”.*
 - Paragraph 5.175 *“Depending on the topography of the surrounding terrain and areas of population it may be appropriate to undertake landscaping off site, although if such landscaping was proposed to be consented by the development consent order, it would have to be included within the order limits for that application. For example, filling in gaps in existing tree and hedge lines would mitigate the impact when viewed from a more distant vista”.*
- Paragraph 5.162 of the NPSNN states that *“Where networks of green infrastructure have been identified in development plans, they should normally be protected from development, and, where possible, strengthened by or integrated within it. The value of linear infrastructure and its footprint in supporting biodiversity and ecosystems should also be taken into account when assessing the impact on green infrastructure”.*
 - Paragraph 5.180 of the NPSNN states that *“Where green infrastructure is affected, applicants should aim to ensure the functionality and connectivity of the green infrastructure network is maintained and any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network and other areas of open space, including appropriate access to new coastal access routes, National Trails and other public rights of way”.*
 - Paragraph 5.183 of the NPSNN states that *“Where a project has a sterilising effect on land use there may be scope for this to be mitigated through, for example, using the land for nature conservation or wildlife corridors”.*

8.2 Study area

- 8.2.1 DMRB LA 107 Landscape and visual effects⁴⁷ notes that the study area should be proportionate to the following factors for landscape effects:
- the project boundary/construction activity (including compounds and temporary land take);
 - the wider landscape setting within which the project/its works has the potential to influence;
 - the extent of the area visible by the project; and
 - the full extent of adjacent or affected landscape receptors of special value (i.e. conservation areas, designated areas) whose setting can be influenced by the project.
- 8.2.2 DMRB LA 107 Landscape and visual effects notes that the study area should be proportionate to the following factors for visual effects:
- the project/construction visual footprint (including compounds and temporary land take);
 - the wider visual envelope within which the project has the potential to influence;
 - the extent of representative viewpoints visible of the project; and
 - the extent of adjacent or affected visual receptors and the visual amenity of the area that can be influenced by the project.
- 8.2.3 The study area for both landscape and visual effects is illustrated by the zone of theoretical visibility (ZTV) (Figure 8.4) which has been based on the current vertical alignment of the scheme carriageway and associated structures. This illustrates the theoretical extent within which, subject to localised features and characteristics, there may be a visual relationship between landscape and visual receptors and the scheme.
- 8.2.4 Although the landscape study area covers a wide geographic area, the physical changes to the landscape will take place within the engineering footprint of the scheme only, with the potential to influencing the landscape character areas it physically passed through. For any character areas or landscape features beyond the engineering footprint, the landscape study area demonstrates the extent that only perceptual changes to landscape character will be considered as there will be no change to the pattern, landform, scale, vegetation.
- 8.2.5 Should there be a notable increase/decrease in height of the scheme, or removal/addition of structures through design development the landscape and visual study area will be revisited and an updated ZTV produced.

8.3 Baseline conditions

- 8.3.1 The baseline conditions have been considered separately for landscape and visual aspects; the conditions described have been informed through the following methods:
- review of reports from previous stages of the proposed scheme;

⁴⁷ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA107 Landscape and Visual Effects, Revision 2*. Available from <https://www.standardsforhighways.co.uk/prod/attachments/bc8a371f-2443-4761-af5d-f37d632c5734?inline=true>

- review of national and local planning policy;
- review of published landscape character assessments;
- digital mapping and analysis;
- site visits in January 2021; and
- consultation with Officers at Somerset and West Taunton Council, South Somerset District Council, and Blackdown Hills Area of Outstanding Natural Beauty (AONB).

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

- Figure 8.1, Landscape character and features;
- Figure 8.2, Topography and drainage;
- Figure 8.3, Visual receptors and visual barriers; and,
- Figure 8.4, ZTV and proposed viewpoints.

Landscape

8.3.3 The scheme passes through three National Character Areas (NCAs): NCA 140, Yeovil Scarplands⁴⁸, for approximately 1.8 km at the southern end of the scheme; NCA 143, Mid Somerset Hills⁴⁹, for the majority of the scheme length, and; NCA 146, Vale of Taunton and Quantock Fringes⁵⁰, for approximately 1.6 km at the northern end of the scheme. NCA 147, Blackdowns⁵¹, is located outside the scheme engineering footprint, but lies within the study area, situated approximately 1.5 km to the south-west at its nearest point.

8.3.4 NCA 140 is characterised by a contrast of the scarps and vales with the flatter Levels and Moors, with scattered woodlands, small villages. The scheme is located at the south-western tip of the NCA and it is noted within the NCA profile that there are relict open fields in the south-west, contrasting with extensive thick hedgerows with frequent mature to veteran trees elsewhere. The A30 and A303 cross the NCA, while the A37 forms the western boundary with NCA 140, Mid Somerset Hills. The existing A358 as it heads north-west from Southfields Roundabout is within this NCA.

8.3.5 NCA 143 is formed by several low hills and ridges rising out of the Somerset Levels and Moors. They lie between the Blackdowns NCA to the south and the Mendip Hills NCA to the north. The hills have a distinctive, predominantly pastoral character rich in hedgerows, farms, and small villages, and often with expansive views over the flat Somerset Levels and Moors. The Blackdown Hills AONB to the south dips into this NCA near Stable Fitzpaine. Ancient woodlands, species-rich hedgerows with trees, and veteran trees create a wooded feel despite there being little woodland cover present. Ash and maple woodlands are present on ridgetops and steeper side slopes. Most settlements retain a uniformity of building style and material, notably the use of Blue Lias limestone, still being quarried near Somerton, which adds to its sense of place. Disturbance to the NCA includes the A39 and A37 road corridors, with the A358 and A378 running east-west through the southern end of the NCA.

⁴⁸<http://publications.naturalengland.org.uk/publication/5731196449325056?category=587130>

⁴⁹<http://publications.naturalengland.org.uk/publication/4718827694718976?category=587130>

⁵⁰<http://publications.naturalengland.org.uk/publication/6601735426539520?category=587130>

⁵¹<http://publications.naturalengland.org.uk/publication/5233925605556224?category=587130>

- 8.3.6 NCA 146 lies between the Brendon Hills on the edge of Exmoor to the west and the Somerset Levels and Moors to the east. It overlooks the Bristol Channel to the north and the Blackdown Hills AONB to the south and encircles the Quantock Hills AONB. The area is densely settled with a largely dispersed pattern of hamlets and scattered farmsteads linked by sunken winding lanes. The exceptions are the towns of Taunton, Wellington, Minehead, Williton and Watchet. Taunton and Wellington lie along the M5 corridor; these towns are undergoing considerable expansion and development owing to access to, and proximity to, this main transport route, with associated development along the M5 itself.
- 8.3.7 NCA 147 extends from south of the M5 at its northern point to the English Channel in the south. Long, dark ridges, deep valleys and dynamic cliffs are the essence of the Blackdowns. The ridges create prominent backdrops when viewed from the wider landscape and offer far-reaching views. Woodland, much of which is of semi-natural origin, dominates the steep valley tops, creating sinuous dark edges to the ridges; some conifer plantations also exist and intrude onto the plateaux. Below the wooded edge, pastoral valleys feature with a medieval field pattern of small, irregular fields bounded by dense species-rich hedgebanks and hedgerow trees, creating an enclosed, tranquil setting. Approximately 78% of NCA 147 is designated as AONB, with 45% of the NCA within the Blackdown Hills AONB situated at the northern end of the area. In relation to the scheme, the steep slope and wooded ridge at the northern edge of NCA 147 and Blackdown Hills AONB, feature in many distant views looking south from landscape to the norths, but result in a limited extent of views north due to the enclosed nature of the woodland. However, the sudden revealing of open panoramic distant views to the north (from locations such as Staple Hill and Castle Neroche) provide dramatic change of character and assist with a wider sense of place. The Blackdown Hills is the fifth darkest AONB in England, and “*dark, star-filled skies contrasting with the brightness of the surrounding towns is one of the qualities that make the Blackdown Hills AONB such a special place*”⁵². Views of vehicles travelling along the A358 and M5, and Taunton to the north, on lower ground are a feature of distant views to the north and north-east. The elevation of the ridgeline from which they are seen provides a sense of separation and remoteness, although there is some disturbance from background road noise in the area.
- 8.3.8 There are two published local landscape character assessments that provide a baseline for the study area: Taunton Deane Landscape Character Assessment, Taunton Deane Borough Council (now Somerset and West Taunton Council), 2011⁵³, and; The Landscape of South Somerset, South Somerset District Council, 1993⁵⁴.
- 8.3.9 The scheme will pass through the following local landscape character areas (LLCAs) from the Taunton Deane Landscape Character Assessment: 1a, Vale of Taunton Deane; 4a, Fivehead Farmed and Wooded Vale; and 5a, North Curry.
- 8.3.10 The Vale of Taunton Dean LLCA defines much of the central area of the Borough. It stretches from the edges of Wellington in the southwest to the outskirts of the Clay and Peat Moors in the northeast. The low vale is frequently interspersed by the waters of River Tone and its tributaries and merges seamlessly with the

⁵² <https://blackdownhillsaonb.org.uk/discover/landscape/night-skies/>

⁵³ <https://www.somersetwestandtaunton.gov.uk/media/1343/taunton-deane-landscape-character-assessment.pdf>

⁵⁴ https://www.southsomerset.gov.uk/media/1297/j-plan_pol-web-site-2018-planning-webpages-the-landscape-of-south-somerset.pdf

higher landscape of the Farmed and Settled High Vale that surrounds it to the north, south and west. Woodland cover is limited but hedgerow trees (typically oak), punctuating the relatively dense and lush hedgerows, make a valuable contribution to tree cover and character overall. The hedgerows make a significant contribution to the vale by defining the field pattern. Usually occurring on low hedgebanks, the hedges are dominated by elm but also contain a range of woody species including hazel, field maple, holly and blackthorn, hedgerow trees are mainly oak. The mixed hedges give way to hawthorn hedges in areas of more recent field enclosure. Within the vale itself there is a definite sense of separation from the towns. This is largely due to the strong hedgerow network that limits views across the low-lying land. The Quantock Hills AONB (to the north-west of Taunton) and Blackdown Hills AONB (to the south) form a backdrop and sense of containment and enclosure to the vale. Building materials vary across the vale. In the north and west red sandstone is seen in several villages – relating to the underlying sandstone geology of the surrounding Quantock Hills and High Vale. In the south and east, stone-built properties are often of Blue or White Lias, reflecting the changing underlying geology moving east towards the Farmed and Wooded (Lias) Vale. Although low-lying and relatively flat in places, the Vale contains several small natural ridges and hills that have a significant influence on the character of the landscape at the local level. The A38 and M5 motorway have a visual and aural influence on many parts of the vale and the A358 passes through the area between M5 J22 and West Hatch. The lighting associated with the Taunton Gateway Park & Ride is visible across the landscape to the south. New development between the Park & Ride and M5 J22 will also influence the future baseline of the local landscape character in proximity to the site. The condition of the Vale of Taunton Deane LLCA is described as Moderate with the strength of landscape character varying across the vale and judged to be moderate to strong overall.

- 8.3.11 The Fivehead Farmed and Wooded Vale LLCA has a varied elevation – from 35m AOD in the east to 200m AOD in the west. The lower lying area of the vale extends beyond the Taunton Deane borough boundary – merging with the wider Fivehead Vale landscape, primarily occurring within South Somerset and through which the Fivehead River runs. The higher area of the vale in the west has a marked sense of elevation and a well-treed character as it gradually merges with the band of adjacent wooded escarpments. Wooded scarps that ascend to the Blackdown Hills AONB and form a strong visual backdrop. The higher western half of the Vale contains several woodlands – containing a mix of broadleaf and coniferous trees, including some semi-natural and some replanted ancient woodland sites. Hedgerow trees and trees within fields also contribute to a strong impression of a well-treed landscape although in some lower lying areas there are fewer hedgerow trees, creating a more open character. Blue Lias is widely used as a building material to the east of Taunton and the blue-grey and sometimes honey-coloured (White Lias) stone is prevalent throughout this landscape. There are individual dwellings and farms dispersed across the Vale with settlement clusters at the villages of Staple Fitzpaine and Hatch Beauchamp (both Conservation Areas) as well as hamlets such as West Hatch and Curland. Agricultural land use is predominantly defined by pasture (dairying and stock rearing) with some winter cereals on areas of higher (sometimes flatter) and drier ground. With many hedges embanked, views are often channelled, creating a sense of enclosure when passing through the vale along the rural lanes. The current A358 cuts through a short section of the hills, to the west of Hatch Court, and although the impact is limited, its influence is evident visually and aurally.

Formal, designed landscape character includes the Grade I Listed Hatch Court and its Grade II listed Parks and Gardens. The condition of the Fivehead Farmed and Wooded Vale LLCA is described as Moderate with the strength of landscape character varying across the vale and judged to be strong overall.

- 8.3.12 The North Curry Sandstone Ridge LLCA is a relatively prominent landscape – an undulating, clearly defined ridge that raises out of the surrounding Clay and Peat Moors. It is the ridge landform and its juxtaposition with the contrasting, flat Moors that defines the character of this landscape. Although relatively low-lying (the highest point being 57m AOD at Borough Post) there is a notable sense of elevation from the ridge top and from the sloping sides – both of which offer views to the much lower, and dramatically flat Clay and Peat Moors and beyond to the Vale of Taunton Deane, to the Quantock Hills AONB and to the Polden Hills. Thorn Hill is a dome-shaped hillock, at the south-west end of the ridge, topped by mature broadleaved trees that are bounded by a stone wall. A simple setting of undeveloped agricultural land offers clear and uninterrupted views of this distinctive feature, which is clearly pronounced on the skyline and identifiable over a very wide area of the wider landscape. In many places however, views are highly restricted by high hedge banks and sunken rural lanes. The mixed native species hedgerows form clearly defined irregular-shaped field boundaries. Hedgerow trees, where they occur, make an important contribution due to a landscape absent of woodland cover. The North Curry Sandstone (a green-grey stone) is a consistent building material found across the ridge, as is red brick, render and clay pan tiles. The A358 and the A378 both cross this landscape but their influence is limited to the southwest corner of the ridge, between Mattock’s Tree Hill and Stonyhead Hill. The condition of the North Curry Sandstone Ridge LLCA is described as Moderate with the strength of landscape character varying across the vale and judged to be strong overall.
- 8.3.13 Due to their position outside the engineering footprint of the scheme, the limited intervisibility and in consideration of the existing A358 within the wider landscape context, the following LLCAs from the Taunton Deane Landscape Character Assessment are in the vicinity of the A358 corridor and have been scoped out of the landscape assessment:
- 2a, The Tone, located to the north of the existing A358 at a lower elevation than the site of the scheme which will be situated to the south of the existing A358. There is little to no landscape relationship with the site of the scheme;
 - 10c, Blackdown Hills Limestone, the northernmost tip of this local landscape character area has some perceptual landscape relationship with the site of the scheme. Much of the character area is situated further south and has no landscape relationship with the site of the scheme. The baseline views and impact upon them from this character area will be considered as part of the visual study where appropriate; and
 - 10d, Wrantage, located to the north of the existing A358 at a higher elevation than the existing A358 with inter-visibility enclosed by woodland, hedgerows, and topographic features. There is little to no landscape relationship with the site of the scheme.
- 8.3.14 The proposed scheme will pass through the following Lower Lias Foothills and Lowland LLCA within Region 2 (Blackdown Hills Plateau Foothills and Valleys) of the Landscape of South Somerset character assessment. All other Regions and LLCAs have been scoped out of the landscape assessment due to their

distance and lack of landscape relationship to the existing A358 and site of the scheme.

- 8.3.15 The Lower Lias Foothills and Lowland LLCA, described as the Lowland Forest, is a rolling low-lying landform derived from the Lower Lias clays and shales. It is cut through by several winding streams, the courses of which are easily picked out in the landscape because of their tree-lined banks of alder, ash, willow, and black poplar. Fields are large in a rectilinear pattern with straight hedges, droves, and roads with hedgerows, including oaks and pines many of which date back to late 19th century enclosures. Older field patterns are present at Windmill Hill and Hastings with irregular boundaries and old oaks. The Lower Lias Foothills and Lowland LLCA includes 'Jordans' which is not a Registered Park and Garden but is a designed parkland landscape that has been impacted by changes to the A358 previously.
- 8.3.16 Through a process of desk-top review, and discussions with Tree Officers at Somerset and West Taunton Council and South Somerset District Council, it has been confirmed that no Tree Preservation Orders are present within or adjacent to the scheme. This, however, does not mean there are trees that would be of sufficient quality or value to warrant protection, just that they may not have been under threat to require evaluation and protection.
- 8.3.17 Initial Tree Constraints plans have been produced using Bluesky's National Tree Map dataset. The National Tree Map includes the location, height, and canopy/crown extents for trees 3m and above in height (described as having >90% of canopy coverage, increasing to >95% within 50m of buildings). It is created from high resolution aerial photography, accurate terrain and surface data, and colour infrared imagery.

Visual

- 8.3.18 The visual context of the study area varies throughout due to the nature of the landscape due to topographic features, woodlands, hedgebanks alongside rural roads contrasting with flat landscapes with large open fields and limited hedgerow trees.
- 8.3.19 Residential receptors are situated throughout the study area in a range of situations including small settlements, hamlets, and isolated properties, which includes properties fronting onto the existing A358. Most residential properties within the area have some form of rural outlook due to the low density of built form in the study area.
- 8.3.20 There are extensive networks of public rights of way throughout the area, including marked long-distance walking routes such as the Herepath and East Deane Way within the Blackdown Hills AONB. Views vary from enclosed woodland walks, to panoramic views from open fields and ridges. Traffic on the existing A358 is a feature of many existing longer and open views but is often filtered to some degree by existing roadside vegetation.
- 8.3.21 Views from the road network away from the existing A358 are generally well enclosed due to their narrow, meandering nature, and well-maintained hedgerows and hedgebanks. More distant views for road users are often limited to glimpses of the wider countryside through field gates or views in the direction of travel on straighter stretches of road. Due to the characteristics of existing views for road

users within the study area, road users have been scoped out of the visual assessment.

8.3.22 There are two specific viewpoints within the Blackdown Hills AONB with views towards the site of the scheme, at Staple Hill and Castle Neroche⁵⁵. From Staple Hill there is an 800 m circular accessible walk from the car park which includes two views to the north, created through clearance and management of woodland and signposted for visitors. The views from Staple Hill are almost 180o and include distant views towards Taunton, Fivehead ridge, and beyond. There are low views of traffic moving on the A358 in the distance, primarily with larger and/or light-coloured vehicles are visible against the wider rural landscape. From the viewpoint at Castle Neroche the view is directed north towards Taunton, views in the direction of the existing A358 are contained by trees adjacent to the viewpoint in both the winter and summer months.

8.3.23 Descriptions of visual receptor groups within the study area are described in Table 8-1.

Table 8-1 Visual receptor groups

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

⁵⁵ <https://blackdownhillsaonb.org.uk/location-key/viewpoints/>

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

Visual receptor group	Visual Baseline Description
Ash	The small settlement of Ash is nestled within a valley alongside the defunct Taunton to Chard Railway and adjacent to the A358. Residential properties appear in small clusters, along with light and heavy industry surrounded by arable fields. Middle and long-distance views are restricted in the western portion of the settlement within the valley, due to undulating landform and intervening vegetation. However, the east of the settlement is situated on higher ground adjacent to the A358 with open views across the land to the A358 and traffic forming a prominent feature in the short distance.
Stoke Hill	The settlement of Stoke Hill comprises small clusters of residences and isolated farmsteads within a steep and heavily wooded rural landscape. Views to the west, north west and south west are heavily restricted by Stoke Wood and to the east Henlade Wood restricts some views. To the north, north east, south, and south east expansive views are available of the gently undulating lowlands, residential receptors, and vegetation from PRowS. The A358 to the north is well contained within mature screening vegetation and undulating land.
Netherclay	A sparse settlement comprising isolated farmsteads and small clusters of houses surrounded by a rural landscape, to the north of the Blackdown Hills Downs AONB. Views to the south are restricted by the steep heavily vegetated Blackdown Hills. To the north views comprise middle and long-distance open views of a predominantly flat arable landscape from residences and PRowS. Views of transportation corridors are not available within these views.
Rapps	A flat rural landscape comprising arable irregular medium size fields with small clusters of residential properties and farmsteads. Views across the settlement are predominantly short and middle distance in nature and restricted by intervening vegetation along field boundaries and rural lanes. To the west of the settlement glimpsed views of high sided vehicles on the A358 are available in places where the road is not contained with linear screening vegetation.

8.3.24 To understand and communicate the range of views and visual amenity of the study area, and provide a baseline for assessment within the EIA, 44 representative viewpoint locations have been proposed, as shown in Figure 8.4 in Volume 2 to this report, based on the output of the ZTV, initial site visits to the study area, and initial discussions with Officers at Somerset and West Taunton Council, South Somerset District Council, and the Blackdown Hills AONB.

Future baseline

8.3.25 Future landscape baseline will be explored in further detail throughout the EIA; however, it is noted that there is a prominence of ash trees within the study area. Officers at the local authorities and Blackdown Hills have highlighted the risks to the landscape associated with ash dieback and the resultant impact on hedgerow trees and woodlands, and their contribution to character.

8.3.26 Additional development within the study area will include the mixed-use Nexus 25 site, potential development of the former Horlicks site in Ilminster and some small-scale developments within settlement limits of local villages.

8.3.27 Other considerations for future baseline include planned forestry operations on the edge of the Blackdown Hills AONB and the extent to which this may widen the landscape setting and availability of views in the direction of the scheme.

8.4 Potential impacts

Landscape

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

- Tree and vegetation removal;
- Presence and movement of construction machinery and HGV's delivering materials;
- Presence of fencing, compounds, earthworks, and material storage areas; and
- Reduction in tranquillity due to activities and night-time lighting.

8.4.2 Sources of potential adverse and beneficial impact on the landscape resource during operation include:

- tree and vegetation loss when compared to baseline (particularly at year 1, as any mitigation planting will be immature);
- presence of the widened A358 corridor and increased prominence in the landscape along the online section;
- the presence of the A358 corridor in some landscapes that did not previously have road infrastructure along the offline section;
- extent, scale, and design of earthworks;
- the materials and appearance of proposed structures for the works (e.g. junctions, bridges, and retaining walls);
- addition or removal of lighting along the A358 corridor;
- any changes to the existing strategic green infrastructure network; and
- establishment of landscape mitigation (particularly at year 15).

8.4.3 As NCA 140 includes the existing A358 north of Southfields Roundabout, and the NCA also includes other major road corridors, it is unlikely that the nature of the change would have the potential to result in significant effects on NCA 140. It is therefore proposed that NCA 140 is scoped out of landscape assessment. However, potential landscape impacts associated with the scheme as it passes through this area will be considered at a local landscape character area level.

8.4.4 Potential landscape impacts associated with NCA 143 will be as described within the LLCAs that are situated within it. In relation to NCA 143, the extent of change because of the scheme will result in a notable change that is limited to the south-western extent of the area. This will result from loss of vegetation and trees, alongside the presence of earthworks and construction activity that will result in a change to the character of the area. During operation the A358 corridor would have more prominence due to the schemes larger footprint and the presence of new structures, however by year 15 it is unlikely there will be a significant effect on NCA 143 subject to the design of effective landscape mitigation measures. Due to the length of the scheme as it passes through NCA 143 and to consider impact to local landscape character areas in combination, NCA 143 is scoped into the landscape assessment.

8.4.5 As NCA 146 includes the existing A358 south of M5 J22, and the NCA also includes other major road corridors, it is unlikely that the nature of the change would have the potential to result in significant effects on NCA 146. It is therefore proposed that NCA 146 is scoped out of the landscape assessment. However,

potential landscape impacts associated with the scheme as it passes through this area will be considered at a local landscape character area level.

- 8.4.6 NCA 147 and the Blackdown Hills AONB are physically separate from the scheme by approximately 1.5 km plus for the NCA and by approximately 2 km plus for the AONB. As noted in the landscape baseline, the majority of NCA 147 and the Blackdown Hills AONB as they relate to the A358 corridor are of wooded ridges with limited visual relationship, except for notable specific viewpoints, which include views of traffic on the A358 in the baseline condition. Therefore, at worst case, the scheme will result in perceptual changes to landscape character only as there will be no change to the pattern, landform, scale, vegetation. The landscape change resulting from the scheme, as it relates to NCA 147 and Blackdown Hills AONB, will result from an increased prominence of the A358 corridor during construction and due to vegetation removal at year 1. By year 15 it is anticipated that landscape mitigation would be established to return the corridor to a similar overall appearance in the landscape setting to the baseline condition. It is therefore unlikely that the nature of landscape change would have the potential to result in significant effects on landscape character of NCA 147 and the Blackdown Hills AONB. The ES will include a visual impact assessment, as described in this Scoping Report, which scopes in an assessment of potential impacts on those long-distance views towards the scheme from within the Blackdown Hills AONB. This will describe the changes to views and how people experience NCA 147 and the Blackdown Hills AONB in a comprehensive manner, it is therefore proposed that NCA 147 and the Blackdown Hills AONB are scoped out of the landscape assessment.
- 8.4.7 The Vale of Taunton Dean LLCA will experience direct landscape impacts through the presence of the offline section of the proposed scheme to the south of the existing A358. This is anticipated to be through loss of existing features such as elements of woodland blocks, hedgerow trees and changes to landscape pattern, appearance, and tranquillity. The proposed scheme will result in the presence of new embankments, cuttings, and structures within a landscape that does contain existing major road corridors and associated infrastructure including the M5 and A358.
- 8.4.8 The Fivehead Farmed and Wooded Vale LLCA will experience direct landscape impacts through the presence of the proposed scheme within it for approximately 4 km in length. The proposed scheme through this area will primarily include widening to the eastern side of the existing A358 and a new overbridge between Hatch Green and Capland. Potential impacts include the loss of vegetation and opening the previously enclosed A358 corridor to the landscape west of Hatch Beauchamp and the creation of a new structure with associated embankments in a landscape that does not contain similar features already. New side road alignments around the A358 and widening of the A358 itself will result in the potential loss of some high-quality trees within hedgerows and along watercourses.
- 8.4.9 The North Curry Sandstone Ridge LLCA will experience direct landscape impacts through the presence of the new A358/A378 junction and associated works. The junction would change the land use over a large area to the west of the existing A358, introducing a range of cuttings, embankments, and structures with associated lighting and signage, to facilitate required junction movements. Some individual hedgerow trees, and trees alongside existing road and property boundaries may be removed. Long-term it is assumed that extensive landscape

mitigation may be possible in this area to limit the influence of the junction on the wider landscape.

- 8.4.10 The Lower Lias Foothills and Lowland LLCA will experience direct landscape impacts through the presence of the proposed scheme within it for approximately 4 km in length. The impacts will arise through loss of existing vegetation and increased prominence of the A358 corridor. The potential presence of overbridges, and any lighting, associated with junctions will add new features to the landscape character with the potential to influence the landscape character. Any change may be more notable to the south of the A358 within this LLCA due to the nature of topography and vegetation and containment provided by established vegetation alongside the A358 limiting its influence on the area. The widening of the A358 to the north would potentially result in loss of the existing gateway with stone pillars and iron gates, and the high-quality trees near it within the 'Jordans' parkland landscape. Creation of a new access route to Merryfields Airfield has the potential to impact high quality trees on either side of the route, including the western edge of the Ancient and Semi-Natural Woodland and Planted Ancient Woodland at Ashill Wood/Every's Copse. With most of the scheme through this LLCA being widening alongside the existing road corridor, there is potential for considered landscape mitigation to be effective in avoiding significant landscape effects and restoring the baseline landscape character of the area in the long term.
- 8.4.11 Using the National Tree Map dataset, trees were classified as small, medium, and large using the Jenks natural breaks optimisation method⁵⁶ based on the two-dimensional crown area. The extent of potential tree removal has been identified as below based on the existing scheme design and engineering footprint):
- Removed (all trees with the crown centre point within the engineering footprint minus a 5m offset) – 1,999 small, 736 medium, 118 large;
 - Likely Removed (all trees with the crown centre point within the outer 5m of the engineering footprint) – 510 small, 182 medium, 34 large; and
 - Risk of Removal (all those not in Removed or Likely Removed categories, with tree canopy overlapping engineering footprint, or within large spaces between earthworks in the engineering footprint) – 508 small, 252 medium, 59 large.

Visual

- 8.4.12 Sources of potential impact on visual amenity during construction include:
- tree and vegetation removal;
 - presence and movement of construction machinery, and HGV's delivering materials, in views;
 - presence of fencing, compounds, earthworks and material storage areas; and
 - reduction in tranquillity due to activities and night-time lighting.
- 8.4.13 Sources of potential impact on visual amenity during operation include:
- tree and vegetation loss when compared to baseline increasing visibility of the A358 (particularly at year 1, as any mitigation planting will be immature);
 - presence of widened A358 corridor and increased prominence of traffic in views;

⁵⁶ https://en.wikipedia.org/wiki/Jenks_natural_breaks_optimization

- the presence of the A358 corridor and associated traffic in some views that did not previously have road infrastructure along the online section;
- extent, scale, and design of earthworks;
- the materials and appearance of proposed structures for the works (e.g. junctions, bridges, and retaining walls);
- addition or removal of lighting along the A358 corridor;
- engineering or environmental features enclosing or changing views towards the Blackdown Hills AONB or other landscape features; and
- establishment of visual mitigation (particularly at year 15).

8.4.14 All visual receptors near the engineering footprint of the scheme have the potential for adverse visual impact in construction and operation due to its nature and scale. Conversely, some visual receptors to the north of the existing A358 and west of the A358/A378 junction have the potential for beneficial visual impact due to the reduction in traffic movement and screening of the scheme provided by existing features and buildings – this includes properties within Ruishton and those fronting on to the existing carriageway.

8.4.15 For middle distance and long-distance views towards the scheme, there will likely be adverse visual impacts during construction and year 1, however it is likely that for views from many locations the visual amenity return to close to the baseline context by year 15 with established visual mitigation planting.

8.4.16 There is the potential for the scheme to adversely impact on views at night, subject to the design and position of any required lighting scheme. However, this would be in context of existing lighting along the A358 corridor in several locations.

8.5 Design, mitigation and enhancement measures

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

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

8.5.2 The Environmental Statement will report on the following categories of mitigation:

- Embedded mitigation: project design principles adopted to avoid or prevent adverse environmental effects or enhance beneficial effects; and
- essential mitigation: measures required to reduce and if possible offset likely significant adverse environmental effects, in support of the reported significance of effects in the environmental assessment.

8.5.3 Identification of potential landscape mitigation measures will be undertaken as early as possible to:

- maximise the time available to projects to re-design or make design changes to avoid or 'design out' significant adverse environmental effects;
- deliver the project in line with objectives and / or policy;

- identify land required for mitigation enabling early dialogue with stakeholders;
- maximise the time available to consult with authorities likely to be concerned by a project thereby ensuring mitigation is well informed and is widely accepted; and
- minimise costs associated with mitigating effects later in the project lifecycle when design parameters are 'fixed' and therefore harder to amend.

8.5.4 The landscape design for the scheme will be developed in accordance with DMRB LD 117 Landscape design, Revision 0, Highways England, 2020⁵⁷. A landscape strategy and defined set of scheme landscape objectives will be developed, with input from stakeholders, to form the basis for an environmental/landscape masterplan – identifying the functions and elements required to deliver the schemes proposed environmental/landscape design. The landscape design will be responsive to the range of LLCAs the scheme passes through.

8.5.5 The following landscape and visual mitigation measures could be applied during construction through the development of an Environmental Management Plan (EMP):

- keeping a well ordered and tidy site, minimise stockpiles, with delivery of goods on an “as needed” basis;
- vegetate soil storage areas where possible;
- within temporary works areas, position taller or more visually intrusive elements in lower or less visible areas;
- works limited to daylight hours in the most part, with any night works kept to a minimum;
- use solid site hoarding around compounds to reduce visibility of construction activities;
- minimal, low level and directional lighting should be used for compound security and night works, whilst successfully meeting safety requirements;
- existing trees and vegetation to be retained would be protected during the construction phase based on a pre-agreed Tree Protection Plan and associated drawings, with protective fencing or ground protection provided where deemed necessary, in accordance with BS 5837:2012;
- advanced planting of landscape and ecological mitigation areas where no engineering works are required;
- treat exposed earthworks with seed mixes to reduce visual prominence prior to final landscape scheme being implemented;
- explore potential to enable retention of vegetation and trees along the southern side of the A358 through design of the scheme and construction methodologies;
- explore potential to enable retention of notable specimen trees within or adjacent to the engineering footprint through adjustments to alignment, earthworks, local roads, and construction methodology; and
- seek to avoid impacts to Ashill Wood/Every's Copse through understanding the extent of tree root areas and careful siting, detailing, and construction of the proposed access route to Merryfields Airfield.

⁵⁷ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Design. LD117 Landscape Design*. Available from <https://www.standardsforhighways.co.uk/prod/attachments/82073bde-ec0c-4d4f-8eeb-afe0ace3c639?inline=true>

- 8.5.6 The following landscape and visual mitigation measures would be applied during operation:
- Native hedgerows, hedgerows with trees and blocks of planting to respond to the vernacular land cover, enhance green infrastructure networks crossing the A358, and reducing the visibility of the proposed scheme;
 - appropriate grass mixes used on cutting and embankment slopes in locations where tree and shrub planting may not be appropriate or possible
 - lighting should be kept to a minimum as required for safety purposes only.
 - all lighting columns should be kept to a minimum height and be directional to minimise effects on nearby properties and the wider night sky;
 - any new structures should be designed to have a low solid to void ratio and consideration would be given to colour, form and materials and its relationship to the local landscape character;
 - earthworks designed to reflect the form and characteristics of the surrounding landscape, which may change along the length of the proposed scheme;
 - explore opportunities for false cuttings or slackening slopes to allow for return to agriculture to smooth the appearance of the scheme within the landscape and minimise permanent footprint;
 - consider off-site landscape and visual mitigation where it would provide benefit to landscape character and/or visual receptors; and
 - reduce prominence of A358 on de-trunked sections through removal of lighting, decluttering of signage and highway features, narrowing highway corridor, and increasing green infrastructure.

8.6 Description of the likely significant effects

- 8.6.1 The greatest long-term landscape and visual effects of the proposed scheme options would be experienced where the proposed scheme would deviate from the existing road corridor and where new junctions are proposed.

Landscape

- 8.6.2 During construction there are likely to be significant effects on the LLCAs that the online section of the proposed scheme passes through due to anticipated extensive removal of roadside vegetation across a large strip of the landscape, and presence of machinery and earthworks operations.
- 8.6.3 At year 1 there are likely to remain significant effects on LLCAs that the proposed scheme passes through, due to anticipated removal of roadside vegetation across a large strip of the landscape and the exposure of passing traffic and new earthworks and structures to the surrounding landscape. By year 15 the majority of significant landscape effects will be reduced through establishment of landscape mitigation measures, however it is likely that significant landscape effects will remain for the Vale of Taunton Dean LLCA and the North Curry Sandstone Ridge LLCA due to the offline sections of the proposed scheme within the existing rural landscape and nature of proposed earthworks, junctions, and structures.

Visual

- 8.6.4 During construction there are likely to be significant effects on a range of visual receptors in both short and medium distance views. For residential properties located near the engineering footprint, such as those around Henlade and Ashill,

and individual properties with clear views across open fields towards existing vegetation alongside the A358 corridor. From public rights of way, significant effects are likely from elevated positions in relatively close proximity to the scheme, such as from Stoke Hill and Thorn Hill, where a length of the proposed scheme will be visible in the middle distance across a large proportion of the view.

8.6.5 At year 1 the likely significant visual effects will be similar to those during construction, due to anticipated removal of roadside vegetation across a large strip of the landscape and the exposure of passing traffic and new earthworks and structures resulting in a prominence of the A358 within views. These likely significant effects may also extend to night-time views in year 1 due to the visibility of headlights and scheme lighting in the absence of any established roadside planting. By year 15, likely significant visual impacts are anticipated to be limited to those residential properties:

- With views towards new elevated structures or junctions and the offline sections of the proposed scheme;
- in close proximity and facing the online section of the proposed scheme; and
- users of PRow around the offline section of the proposed scheme, including from Stoke Hill.

8.7 Assessment methodology

8.7.1 A Landscape and Visual Impact Assessment (LVIA) will be undertaken as part of the EIA as presented in the ES to identify and assess the significance of and the effects of change of the proposed scheme on the landscape as a resource, and people's views and visual amenity as part of the iterative steps in assessment and design development.

8.7.2 The LVIA will follow established guidance for such assessments identified below:

- DMRB LA 107 Landscape and visual effects, Revision 2, 2020⁴⁷;
- Guidelines for Landscape and Visual Impact Assessments, 3rd Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013; and
- TGN 06/19 Visual Representation of development proposals, Landscape Institute, 2019⁵⁸.

Baseline

8.7.3 Baseline studies shall identify important characteristics and receptors for landscape and visual amenity as described in DMRB LA 107. The landscape and visual baseline will be informed through a combination of desk study, digital analysis, ZTV, tree survey, site visits at summer, winter, day, and night, and discussions with stakeholders.

8.7.4 Third party data sources will include local planning policy and landscape guidance, published character studies, designations and datasets from Historic England, Natural England, Environment Agency, CPRE, Sustrans, and local authorities.

⁵⁸ https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf

8.7.5 Plans will be produced that illustrate topography and drainage, landscape character and features, visual receptors and visual barriers, tranquillity, and night light.

Assessment

8.7.6 Reporting the significance of the landscape's sensitivity to change shall include an evaluation of each key landscape element/characteristic affected by the proposed scheme. The significance of the landscape's sensitivity to change shall be informed by its: importance; quality/condition; rarity; value; scale of contribution to the landscape character; and degree to which it can be protected, mitigated, replaced, or substituted. The landscape sensitivity of receptors/resource in the assessment shall be reported in accordance with the criteria provided in Table 8-2 as adapted from DMRB LA 107.

Table 8-2 Landscape sensitivity

Landscape sensitivity (susceptibility and value) of receptor/resource	Typical description
Very high	Landscapes of very high international/national importance and rarity or value with no or very limited ability to accommodate change without substantial loss/gain (i.e. national parks, internationally acclaimed landscapes - UNESCO World Heritage Sites)
High	Landscapes of high national importance containing distinctive and characteristic features/elements with limited ability to accommodate change without incurring substantial loss/gain (i.e. designated areas, areas of strong sense of place - registered parks and gardens, country parks).
Medium	Landscapes of local or regional recognition of importance which are able to accommodate some change (i.e. features worthy of conservation, some sense of place or value through use/perception).
Low	Local landscape areas or receptors of low to medium importance with ability to accommodate change (i.e. non-designated or designated areas of local recognition or areas of little sense of place).
Negligible	Landscapes of very low importance and rarity, and which are able to accommodate change.

8.7.7 Assessment of the magnitude of effects on the landscape will report on a combined judgement of:

- The size and scale of effect;
- year 1 (opening year) and year 15 (design year) including summer and winter;
- the geographical extent of the area to be affected; and
- the duration of the effect and its reversibility.

8.7.8 The magnitude of effect (change) will be reported in the assessment in accordance with the criteria provided in Table 8-3 as adapted from DMRB LA 107.

Table 8-3 Landscape magnitude

Magnitude of effect (change)	Typical description
Major adverse	Total loss or large-scale damage to existing landscape character or distinctive features or elements; and/or addition of new

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

8.7.9 The visual sensitivity of receptors/resource in the assessment shall be reported in accordance with the criteria provided in Table 8-4 as adapted from DMRB LA 107.

Table 8-4 Visual sensitivity

Visual sensitivity (susceptibility and value)	Typical description
Very high	Static views from and of major tourist attractions. Views from and of very important national/international landscapes, cultural/historical sites (e.g. National Parks, UNESCO World Heritage sites). Receptors engaged in specific activities for enjoyment of dark skies.
High	Views by users of nationally important PRow / recreational trails (e.g. national trails, long distance footpaths). Views by users of public open spaces for enjoyment of the countryside (e.g. country parks). Static views from dense residential areas, longer transient views from designated public open space, recreational areas. Views from and of rare designated landscapes of national importance.
Medium	Static views from less populated residential areas, schools and other institutional buildings and their outdoor areas. Views by outdoor workers.

Visual sensitivity (susceptibility and value)	Typical description
	Transient views from local/regional areas such as public open space, scenic roads, railways or waterways, users of local/regional designated tourist routes of moderate importance. Views from and of landscapes of regional importance.
Low	Views by users of main roads or passengers in public transport on main arterial routes. Views by indoor workers. Views by users of recreational/formal sports facilities where the landscape is secondary to enjoyment of the sport. Views by users of local public open spaces of limited importance with limited variety or distinctiveness.
Negligible	Quick transient views such as from fast moving vehicles. Views from industrial area, land awaiting re-development. Views from landscapes of no importance with no variety or distinctiveness.

8.7.10 Reporting on the magnitude of visual effects shall be informed by the following:

- Scale, nature, and duration of change;
- distance, screening, direction, and focus of the view;
- year 1 (opening year) and year 15 (design year) including summer and winter
- removal of past mitigation or existing vegetation; and
- whether the receptor is static or moving.

8.7.11 The magnitude of visual effect shall be reported in the assessment in accordance with the criteria provided in Table 8-5 as adapted from DMRB LA 107.

Table 8-5 Visual magnitude

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

8.7.12 The descriptions for significance as outlined in Table 8-6 will be applied within the LVIA.

Table 8-6 Significance categories and typical descriptions

Significance category	Typical description
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.

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

8.7.13 The significance of effect matrix that will be applied within the LVIA is provided in Table 8-7 as adapted from DMRB LA 104⁵⁹. Where the table includes two significance categories, evidence will be provided to support the reporting of a single significance category.

Table 8-7 Significance matrix

	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

Photography and visualisation

- 8.7.14 Viewpoints have been proposed at 44 representative locations (Figure 8.4) based on the output of the ZTV, initial site visits to the study area, and initial discussions with Officers at Somerset and West Taunton Council, South Somerset District Council, and the Blackdown Hills AONB.
- 8.7.15 Further discussions will be held with Officers to identify a proportionate number of representative viewpoints to undertake during the hours of darkness and for visualisation. Where appropriate, visualisations will be prepared to show both the year 1 winter, and year 15 summer scenarios.
- 8.7.16 Table 8-8 is extracted from Landscape Institute (LI) Technical Guidance Note (TGN) 06/19, Visual Representation of Development Proposals, the definitions within that table and associated document will be used.

⁵⁹ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA104 Environmental Assessment and Monitoring*. Available at: <https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true> (Accessed January 2021)

Table 8-8 Visualisation types 1-4

Table 2 Visualisation Types 1-4		Type 1	Type 2	Type 3	Type 4
		Annotated Viewpoint Photograph	3D Wireline / Model (non-photographic)	Photomontage / Photowire	Photomontage / Photowire Survey / Scale Verifiable
Aim of the Visualisation		To represent context and outline or extent of development and of key features	To represent 3D form of development / context	To represent appearance, context, form and extent of development	To represent scale, appearance, context, form, and extent of development
Photographic Equipment	Tripod	Recommended but discretionary	Not relevant	Recommended	Necessary
	Panoramic head	Not relevant		Recommended for panoramas	Necessary for panoramas
	Minimum Camera / Lens	Cropped frame or FFS + 50mm	Not relevant	Cropped frame or FFS + 50mm	Full Frame Sensor (FFS) + 50mm FL lens ¹
Locational Accuracy	Source of camera/viewpoint location data	GPS, OS Maps, geo-referenced aerial photography	Varies according to technology	Use good quality data: GPS, OS Maps, geo-referenced aerial photography, LIDAR	Use best available data: High resolution commercial data, LIDAR, GNSS, or measured / topographic surveys
	Survey-verified ²	Not relevant			When appropriate
Data & Presentation	Verifiable (SNH) ³	Not relevant			Required
	3D model	Not required	Required		
	Image Enlargement ⁴	Typically 100%	Not relevant	Typically 100%	100% - 150%
	Form of Visualisation	sketch / outline / arrows	massing / wireline / textured	wireline / massing / rendered / textured to agreed AVR level ⁵	
	Viewpoint mapping	Dedicated viewpoint location plan			Dedicated viewpoint location plan, + individual inset maps recommended
	Reporting of methodology and data sources	Outline description of sources and methodology recommended		Data, sources and methodology recommended	

8.7.17 The Table references AVR (Accurate Visual Representation) Level, which is derived from the London View Management Framework (LVMF)⁶⁰. The definition of each AVR Level is provided below alongside photographs extracted from the LVMF document:

- AVR Level 0: Location and size of proposal. This equates to a photo wire and provides an outline of the proposal overlaid onto the photograph base.
- AVR Level 1: Location, size, and degree of visibility of proposal. This shows the massing of the proposal within a 3D context represented by the photograph - that is, what can and cannot be seen.
- AVR Level 2: As level 1 + description of architectural form. This illustrates architectural form such as doors, windows, and floors, and gives a sense of the form and shading of the development within its context.
- AVR Level 3: As level 2 + use of materials. This is a fully rendered photomontage, usually photo-realistic with texture, shading and reflections as appropriate.

8.7.18 The LVIA will use a combination of Type 1 and Type 4 visualisations as described in Table 8-8. Type 4 visualisations will be produced to illustrate the proposed scheme from a range of locations and distances at AVR Level 3. To ensure verification of the visualisations (accurate scale and position of the scheme) we are proposing to use a surveyor to accurately record camera position, direction, and reference points. The LI TGN glossary states that verified means subjected to a quality assurance process to confirm that what is being presented is an accurate reflection of the true situation.

⁶⁰ <https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/london-plan-guidance-and-spgs/london-view-management>

- 8.7.19 All photography will be taken using a Full Frame Sensor camera with 50 mm Fixed Focal Length Lens mounted on a tripod at a standard consistent height, regardless of Visualisation Type, to provide consistency between all viewpoints and visualisations. An image captured in this way is regarded as being the closest representative to that seen by the human eye when viewed at a width of 39 cm from a distance of 55 cm. Photographs will be captured as single-shot unless the view and position of the site is panoramic in nature – in which case multiple single-shot images will be captured in different directions, or a panoramic image will be taken.
- 8.7.20 Exports from the proposed scheme digital model will be generated to match the angle and field of view of the photographs and overlaid on photography, using the surveyed reference points to ensure it is positioned and scaled at an accurate and verifiable position. Once positioned, the scheme will be montaged into the baseline photograph to provide an AVR.

Tree survey and Arboricultural Impact Assessment

- 8.7.21 A Tree Survey will be undertaken during the production of the ES to identify any high-quality trees within or adjacent to the scheme and identify the Root Protection Areas of such trees to determine where impacts on high-quality trees can be avoided or reduced.
- 8.7.22 An Arboricultural Impact Assessment will be undertaken to determine which trees can be retained or need to be removed as a result of the scheme, and provide an overview of the quality and value of those trees to be removed, alongside quantitative calculations using the National Tree Map dataset.
- 8.7.23 The Tree Survey and Arboricultural Impact Assessment will be useful tools to inform the LVIA and appropriate landscape mitigation measures.

8.8 Assessment assumptions and limitations

- 8.8.1 All photography and site survey work will be undertaken from publicly accessible locations and not from private land or property. Where required, professional judgement will be made to identify impacts for receptors that are not accessible by public means.
- 8.8.2 It would be disproportionate to visit all PRoWs and visual receptors within the study area. Therefore, the locations for site work and representative viewpoints have been informed by a combination of desk study, ZTV, discussions with stakeholders and site visits. Representative views are used where large numbers of viewpoints cannot be included individually, with similar significance of effect.
- 8.8.3 It is assumed that not all trees within and immediately surrounding the corridor will require individual and fully detailed tree surveys. Tree Surveys will focus on identification of trees of high quality and value, to assist in design development to avoid impacts or understand the nature of high-quality specimens that are to be removed to inform mitigation. Where trees are in groups of no distinguishable quality, it is assumed that a written description of their species, quality, and value, accompanied by a quantitative assessment of trees to be removed using the National Tree Map dataset.

9 Biodiversity

9.1 NPSNN requirements

9.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

9.1.2 Key policies from the NPSNN relevant to this discipline include:

- Paragraph 5.22 of the NPSNN states that the applicant's assessment should describe any likely significant effects on internationally, nationally and locally designated sites of ecological conservation importance; protected species; habitats (including habitats of principal importance and irreplaceable habitats such as ancient woodland and veteran trees); and other species identified as being of principal importance for the conservation of biodiversity.
- Paragraph 5.23 states that the applicant should describe how the project plans to conserve and enhance biodiversity conservation interests.
- Paragraph 5.25 states that development should avoid significant harm to biodiversity conservation interests, including through appropriate mitigation and consideration of alternatives.
- Paragraph 5.32 states that development should not result in the loss or deterioration of irreplaceable habitats including ancient woodland and veteran trees.
- Paragraph 5.35 states that other habitats and species identified as being of principal importance should be protected from adverse effects of development.
- Paragraph 5.36 states that appropriate mitigation measures are considered an integral part of a proposed development and that the applicant should include these in their assessment, including identifying how these measures will be secured. The applicant should demonstrate that:
 - they will seek to ensure that activities will be confined to the minimum areas required for works during construction;
 - best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised during construction and operation;
 - developments and landscaping will be designed to provide green corridors and minimise habitat fragmentation; and
 - opportunities will be taken to enhance existing habitats and create new habitats within the site landscaping proposals.
- Changes in air quality, light pollution, noise, and the water environment due to project construction or operation should be assessed for their potentially adverse impacts on wildlife, biodiversity and nature conservation.

9.2 Study area

9.2.1 The study area for biodiversity relates to the areas of construction activity, including temporary works such as construction compounds, topsoil and other storage areas, haul and access roads and borrow pits. In addition, the study area incorporates habitats outside of the construction footprint, with a buffer of varying width applied forming an appropriate survey area based on the characteristics and sensitivity of the ecological receptor of focus and an assessment of the area of potential impact.

9.2.2 The survey areas for individual ecological receptors are provided in Appendix C with the zone of influence of each detailed in Table 9-5 in section 9.4.

Designated sites and habitats

9.2.3 The study area for European designated sites, including Special Protection Area (SPA) and Special Areas of Conservation, and internationally designated Ramsar sites for nature conservation follows that given in the Design Manual for Roads and Bridges (DMRB) LA 115 Habitats Regulations Assessment⁶¹. This includes where the proposed scheme:

- is within 2km of a Ramsar or European site or functionally linked land;
- is within 30km of a Special Area of Conservation (SAC), where bats are noted
- as one of the qualifying interests;
- crosses or lies adjacent to, upstream of, or downstream of, a watercourse which is designated in part or wholly as a Ramsar or European site;
- has a potential hydrological or hydrogeological linkage to a Ramsar or European site containing a groundwater dependent terrestrial ecosystem; or
- has an affected road network (ARN) within 200m of a Ramsar or European site.

9.2.4 Consideration is also given where there is a greater distance between the proposed scheme and Ramsar/European sites, and the site is not functionally linked land, but a pathway to effect potentially exists. For example, flight paths or feeding or roosting areas of birds that may be found using habitats outside the boundaries of a Special Protection Area (SPA). The sites under consideration were limited to those within 20km where wildfowl and waders are a qualifying feature.

9.2.5 The study area for national statutory designated sites (Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR)) and non-statutory designated sites (Local Nature Reserves (LNR)) is defined as 2km from the proposed scheme. Local, non-statutory, designated sites (Local Wildlife Sites (LWS) and Local Road Verges (LRV)) have a 1km study area from the proposed scheme.

9.2.6 A desk-based study of a 1km wide study area centred on the proposed scheme was used to identify ancient woodland and habitats of principal importance in England, referred to as 'priority habitats' in this report. A field survey of habitats was undertaken to ground truth these provisional classifications for an area of 500m around the proposed scheme. At the same time, any habitats that conformed to the criteria of Annex I habitat (habitats listed on Annex I of European Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ('the Habitats Directive')) were also noted.

Other habitats

9.2.7 Aerial photography and Ordnance Survey (OS) maps have been viewed within a 500m study area around the proposed scheme. The field survey area for habitats

⁶¹ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA115 Habitats Regulations Assessment*. Available at: <https://www.standardsforhighways.co.uk/dmrbl/> (Accessed January 2021)

is based on a 500m survey area around this same combined extent. Highly urbanised areas were excluded from the study area.

Air quality impact assessment

- 9.2.8 Assessment of the potential air quality impacts on sensitive statutory and non-statutory designated sites, and sensitive habitat receptors such as ancient woodlands and veteran trees, within 200m of the ARN will be undertaken in accordance with DMRB LA 105⁶² (see Chapter 6).

Protected and notable species

- 9.2.9 The desk-based study area for protected and notable species comprises an area of 2km around the proposed scheme, the search area will be extended to 10km for bats during an update of the desk-based data search to be undertaken in 2021. Additional aquatic ecological records (fish, macroinvertebrates, macrophytes and phytobenthos data) have been obtained up to 3km (for fish in the River Ding) up and downstream of where watercourses are directly crossed by the proposed scheme.
- 9.2.10 Field survey areas for species-specific surveys vary depending on the sensitivities and legal protection of the ecological receptor, using best practice species-specific guidance wherever possible. Field surveys began in 2016 and will continue through 2021. Appendix C provides detail on the survey methodology and programme proposed.

9.3 Baseline conditions

- 9.3.1 The following baseline sources have been used during the data gathering:
- Somerset Environmental Records Centre (SERC) provided data records in 2016 for protected and designated species, invasive species, non-statutory LWS and special road verges.
 - The Ancient Woodland Inventory⁶³ was reviewed to identify ancient woodland habitats.
 - Environment Agency (EA) monitoring data (Ecology and Fish Data Explorer) for aquatic ecological features (fish, white-clawed crayfish, macro-invertebrates and macrophytes) were reviewed in 2020.
 - The EA were contacted in 2016 for records of otter road casualties within the vicinity of the A358.
 - Aerial photography and OS maps from between 2016 and 2021 were reviewed.
 - International and national statutory designated sites (and their qualifying features), SSSI risk zones, priority habitats and granted European Protected Species Licences were identified on the Multi-Agency Geographic Information for the Countryside (MAGIC) website⁶⁴.

⁶² Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA105 Air Quality*. Available at: <https://www.standardsforhighways.co.uk/dmrbl/> (Accessed January 2021)

⁶³ Natural England (2020) *The Ancient Woodland Inventory* [online]. Available at: <https://naturalengland-defra.opendata.arcgis.com/datasets/ancient-woodland-england> (Accessed January 2021)

⁶⁴ Defra (2020) *Multi-Agency Geographic Information for the Countryside (MAGIC)* [online]. Available at: <https://magic.defra.gov.uk/magicmap.aspx> (Accessed January 2021)

- The MAGIC website was also used to identify ecologically important features within respective zones of influence (ZOI), such as hedgerows and ponds, as well as habitats potentially suitable for supporting protected species including reptiles, bats and dormice.
- A review of local planning developments, including water vole surveys conducted in 2015 in relation to the Nexus 25 complex.
- A review of the Joint Nature Conservation Committee (JNCC) to identify statutory or non-statutory designated sites where birds are a feature of interest.
- A review of historic maps to identify hedgerows which form historic field patterns.
- A Phase 1 habitat survey was undertaken in 2016 of the route options, including the area covered by the modified pink route.
- Results of various detailed species and habitat surveys conducted by Mott MacDonald Sweco Joint Venture between 2016 and 2020.

Designated sites and habitats

- 9.3.2 There are no confirmed or potential SPA, SAC, or Ramsar sites located within the 2km study area (Figure 9.1 and Table 9-1). However, Somerset Levels and Moors SPA & Ramsar is located approximately 3.5km from the proposed scheme and is connected downstream by a series of watercourses. Four SACs are also designated for bats within the 30km study area, including Hestercombe House SAC, Exmoor and Quantock Oakwoods SAC, Beer and Quarry Caves SAC, and Bracket's Coppice SAC. Qualifying features of each site and distances from the proposed scheme are provided in Table 9-1.
- 9.3.3 The Severn Estuary SAC and Ramsar site is located beyond the 2km study area, however it extends to the tributaries of the Severn, which include the River Tone approximately 7km downstream of the Junction 25 of the M5, and is, therefore, considered hydrologically linked to the proposed scheme.
- 9.3.4 There are two SSSIs within 2km of the proposed scheme, Thurlbear Woods and Quarrylands SSSI is located 1.5km (at its closest point) south west of the proposed scheme and Barrington Hill Meadows SSSI located 1.7km to the south, which is also designated as a NNR. Qualifying features of each SSSI site within 2km of the proposed scheme are provided in Table 9-2.
- 9.3.5 A further 15 sites designated as SSSIs are located over 2km from the proposed scheme, but fall within 200m of the ARN, see Figure 9.1.
- 9.3.6 These SSSIs are:
- Quants;
 - Prior's Park & Adcombe Wood;
 - Deadman, Ruttersleigh;
 - Hurcott Lane Cutting;
 - Wet Moor;
 - West Moor;
 - Fivehead Woods and Meadows;
 - Curry and Hay Meadows;
 - North Moor;
 - Southlake Moor;
 - Kings Sedgemoor;

- Aller and Beer Woods; and
- Aller Hill.

- 9.3.7 These SSSIs are designated for the presence of grassland, woodland, peatland or heathland which support many notable, and in some cases rare, species of flora and fauna, some of which may be sensitive to NO_x and nitrogen deposition.
- 9.3.8 Three LNRs are located within 2km of the proposed scheme (see Table 9-2 and Figure 9.1). Qualifying features of each LNR site within 2km of the proposed scheme are provided in Table 9-2.
- 9.3.9 There are 27 LWSs within 1km of the proposed scheme (see Table 9-3 and Figure 9.1). The closest of these is Road Verges West of Hatch Beauchamp, which is located within the footprint of the proposed scheme. Bickenhall Wood, Saltfield Copse, River Rag, Jordans Park, Every's Copse and Ashill Wood are all adjacent to the proposed scheme.
- 9.3.10 Additional statutory and non-statutory designated sites, including LNRs and LWS, are likely to be located within 200m of the ARN. A comprehensive list of these will be identified, and potential impacts upon them assessed, within the PEIR and ES in line with DMRB LA105.

Table 9-1 Ramsar and European sites within the study area

Site and designation	Qualifying features	Approximate distance and direction from proposed scheme
Somerset Levels and Moors SPA and Ramsar	<p>This site is designated for being the largest area of lowland wet grassland and associated wetland habitats remaining in Britain, formed by the floodplains of the rivers Axe, Brue, Parret, Tone and their respective tributaries. The SPA encompasses a total of 12 SSSIs. Flooding affects extensive areas during the winter, which provides conditions for overwintering waterfowl that form the primary designation features under both SPA and Ramsar criteria as described below.</p> <p>SPA qualifying features:</p> <p>Nationally important numbers of Annex 1 Bewick's swan <i>Cygnus columbianus bewickii</i> and golden plover <i>Pluvialis apricaria</i>;</p> <p>Regularly supporting over 20,000 wintering waterfowl; and</p> <p>Supports internationally important numbers of migratory Eurasian teal <i>Anas crecca</i> and northern lapwing <i>Vanellus vanellus</i>.</p> <p>Ramsar qualifying criteria:</p> <p>Supports 17 species of British Red Data Book invertebrates;</p> <p>Assemblages of wintering birds of international importance; and</p> <p>Species/populations of birds occurring at levels of international importance, with qualifying species including:</p> <p>Bewick's swan;</p> <p>Eurasian teal; and</p> <p>Northern lapwing.</p> <p>In addition to these qualifying features, the site is also notable for nationally important wintering numbers of gadwall <i>Anas strepera</i>, widgeon <i>Anas penelope</i> and shoveler <i>Anas clypeata</i>, with further Annex 1 species marsh harrier <i>Circus aeruginosus</i>, bittern <i>Botaurus stellaris</i>, merlin <i>Falco columbarius</i>, peregrine <i>Falco peregrinus</i>, hen harrier <i>Circus cyaneus</i> and short-eared owl <i>Asio flammeus</i> present in breeding or wintering capacity.</p>	3.5km east ARN passes through site
Hestercombe House SAC	The primary reason for designation is the presence of lesser horseshoe bats <i>Rhinolophus hipposideros</i> .	3.9km north west
Severn Estuary SAC and Ramsar	<p>The site is characterised by the presence of tidal rivers, estuaries, mud flats, sand flats, lagoons, salt marshes, salt pasture and salt steppes. The primary designation features under both SAC and Ramsar criteria as described below.</p> <p>SAC qualifying features:</p>	7km north

	<p>the presence of estuaries, mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows.</p> <p>the site supports sea lamprey <i>Petromyzon marinus</i>, river lamprey <i>Lampetra fluviatilis</i> and twaite shad <i>Alosa fallax</i></p> <p>Regularly supporting over 20,000 wintering waterfowl; and</p> <p>Supports internationally important numbers of migratory Eurasian teal and northern lapwing <i>Vanellus vanellus</i>.</p> <p>Ramsar qualifying criteria:</p> <p>Estuaries</p> <p>Assemblage of migratory first species (including sea lamprey, river lamprey, twaite shad, allis shad <i>Alosa alosa</i>, salmon <i>Salmo salar</i>, sea trout <i>Salmo trutta</i>, eel <i>Anguilla anguilla</i>)</p> <p>Internationally important assemblage of waterfowl (including Bewick's swan, European white-fronted goose <i>Anser albifrons</i>, dunlin <i>Calidris alpina</i>, redshank <i>Tringa totanus</i>, shelduck <i>Tadorna tadorna</i> and gadwall).</p> <p>In addition to the primary reason for designation the site also supports sandbanks which are slightly covered by sea water all the time and reefs, which are qualifying features of the SAC.</p>	
Exmoor and Quantock Oakwoods SAC	The primary reasons for designation are the presence of 'Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles in conjunction with heath' and its maternity colonies of barbastelle bat <i>Barbastella barbastellus</i> . The qualifying features include Alluvial forests with alder <i>Alnus glutinosa</i> and ash <i>Fraxinus excelsior</i> and the presence of Bechstein's bats and otters <i>Lutra lutra</i> .	16.7km north west
Bracket's Coppice SAC	The primary reason for designation is the presence of Bechstein's bat <i>Myotis bechsteinii</i> . The qualifying features include habitats such as <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils.	18.4km south east
Beer and Quarry Caves SAC	The primary reason for designation is the presence of a hibernation roost for Bechstein's bats. Greater horseshoe bat <i>Rhinolophus ferrumequinum</i> and lesser horseshoe bat are present as qualifying features but are not a primary reason for site selection.	28.5km south

Table 9-2 Statutory designated sites within the study area

Site and designation	Qualifying features	Approximate distance and direction from proposed scheme
Bickenhall Orchard LNR	The habitats within this LNR have the potential to support rare flora, mammals, birds and invertebrates.	550m south west
South Taunton Streams LNR	This reserve supports a wide range flora and fauna including water vole <i>Arvicola amphibius</i> , otters, kingfisher <i>Alcedo atthis</i> , sand martin <i>Riparia riparia</i> and bats including pipistrelle, lesser horseshoe and noctule.	690m west of the link road to Junction 25 on the M5
Children's Wood / Riverside Park LNR	The reserve is an important habitat and movement corridor for a host of animals with otter and a number of bats being recorded. A large number of bird species occur including kingfisher, dipper, grey wagtail, mute swan, grey heron and reed warbler. Butterflies include small and large skipper, marbled white, small heath and small copper. Also good for dragonflies and damselflies.	900m north
Thurlbear Woods and Quarrylands SSSI	This site is of special interest due to species-rich woodland, formerly managed in a traditional coppice-with-standards system and situated on soils derived from rhaetic shales and limestones. The recorded history of the site is of Medieval origin - embankments and the presence of several plants normally confined to primary woods, which all suggest that Thurlbear Wood is of considerable antiquity.	1.5km (at its closest point)
Barrington Hill Meadows SSSI and NNR	The primary reason for designation of this site is the presence of Bechstein's bat. The qualifying feature includes habitats such as <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils.	1.7km south

Table 9-3 Non-statutory designated sites within the study area

LWS	Interest/designated feature																		Approx. distance and direction from the proposed scheme		
	H2 – Woodland (including ancient)	H3 - Grassland	H6 – Freshwater habitats	H10 - Mosaic sites	S1 – Vascular plants	S3 - Mammals	S7 - Invertebrates	5H1 – Woodland (including ancient)	5H2 - Grassland	5H3 - Heathland	5H4 – Freshwater habitats	5H8 – Mosaic sites	5H9 – Artificial habitats	5S1 – Vascular plants	5S2 – Non-vascular plants	5S3 - Mammals	5S4 - Birds	5S6 - Amphibians		5S8 - Invertebrates	5S9 – Notable species from 2+ groups
Road Verges West of Hatch Beauchamp	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	Within the footprint
Bickenhall Wood	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	0m
Saltfield Copse	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0m
River Rag	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	0m
Jordans Park	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	0m
Every's Copse	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Adjacent to a new access road
Ashill Wood	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	Adjacent to a new access road
Stoke Wood	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60m south
Huish Woods	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	220m south
River Isle	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	255m south
Huish Copse East	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	348m south
River Tone and Tributaries	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	470m west
Thorn Clump	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	480m
Forest Orchard	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	528m south
Oldway Bridge Field and Spring	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	529m south

LWS	Interest/designated feature																			Approx. distance and direction from the proposed scheme	
	H2 – Woodland (including ancient)	H3 - Grassland	H6 – Freshwater habitats	H10 - Mosaic sites	S1 – Vascular plants	S3 - Mammals	S7 - Invertebrates	5H1 – Woodland (including ancient)	5H2 - Grassland	5H3 - Heathland	5H4 – Freshwater habitats	5H8 – Mosaic sites	5H9 – Artificial habitats	5S1 – Vascular plants	5S2 – Non-vascular plants	5S3 - Mammals	5S4 - Birds	5S6 - Amphibians	5S8 - Invertebrates		5S9 – Notable species from 2+ groups
Hatch Green Fields	-	-	-	-	-	-	-	-	X	-	-	-	X	X	-	-	-	-	-	-	600m north
Line Wood	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	691m north east
Knowl Wood	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	760m south
Scutty Benches Copse	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	795m north east
Hatch Court Park	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	800m north
Bens Copse	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800m north
Southtown Farm	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	X	820m south
Close Park	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	870m south
Near Myrtle Farm	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	930m south
Curry Mallet Drove	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	950m south
Donyatt Railway Cutting	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	970m north
Blackbrook Pavilion	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	1km south west

9.3.11 There are seven Ancient Woodland Inventory (AWI) sites located within the 1km study area (Figure 9.2). These include both ancient semi-natural woodland and ancient replanted woodland habitat types. Several of these sites are also LWSs.

9.3.12 The AWI sites located within 1km of the proposed scheme are:

- Bickenhall Wood, listed as ancient replanted woodland, immediately adjacent to the south of the online section of the proposed scheme;
- Huish Coppice, listed as ancient & semi-natural woodland approximately 215m south west of the online section of the proposed scheme;

- Ashill Wood/Everyys Coppice, listed as containing sections of ancient & semi-natural woodland and ancient replanted woodland, approximately 320m north of the online section of the proposed scheme;
- Line Wood, listed as ancient & semi-natural woodland, approximately 600m east of the online section of the proposed scheme;
- Stoke Wood listed as ancient & semi-natural woodland, approximately 710m south of the offline section of the proposed scheme;
- Knowl Wood listed as ancient & semi-natural woodland, approximately 800m south of the offline section of the proposed scheme; and
- An unnamed site listed as ancient replanted woodland, approximately 870m north of the online section of the proposed scheme.

9.3.13 Additional sensitive habitats, including ancient woodlands and veteran trees, are likely to be located within 200m of the ARN. A comprehensive list of these will be identified, and potential impacts upon them assessed, within the PEIR and ES in line with DMRB LA105.

9.3.14 The desk-based study identified a variety of priority habitats within the study area of the proposed scheme. Presence of the following priority habitats was confirmed during the Phase 1 survey undertaken in 2016:

- Hedgerows;
- lowland mixed deciduous woodland;
- coastal and floodplain grazing marsh;
- hedgerows;
- traditional orchards;
- ponds;
- rivers & streams; and
- wood-pasture and parkland.

Other habitats

9.3.15 The 2016 Phase 1 habitat survey found the survey area to be a predominantly agricultural landscape, with most land given over to cultivation of winter wheat *Triticum* sp., grazing or set aside. Other land uses within the surveyed area were localised, comprising pastureland, forestry plantations, residential, industrial (sewage treatment, horticultural nursery), a disused railway line and two small apple orchards.

9.3.16 Grassland habitats identified were predominantly either improved grassland or species-poor semi-improved grassland. These grasslands were generally associated with livestock grazed land or arable set aside, with other, more localised, areas including a polo ground and solar farm. Amenity grassland was associated with residential properties and road verges, characterised by a regularly mown short sward. Of greater ecological interest was a small area of MG5 grassland qualifying as Lowland Meadow, within the construction footprint of the proposed scheme south of Capland and small isolated areas of marshy grassland, the majority of which were located east of the A358 at the southern extent of the study area.

9.3.17 There were numerous small rivers and streams within the surveyed area, many of which are bisected by the proposed scheme. Named watercourses include the River Ding, Fivehead River, Venner's Water, Black Stream, Black Brook, and Cad Brook. These streams are varied in characteristics, but several have riparian

corridors lined by scattered mature trees, scrub and patches of broadleaved semi-natural woodland. Numerous bodies of standing water, mostly ponds or wet ditches, were also identified.

- 9.3.18 Woodland stands were spread along the length of the proposed scheme, including several larger blocks of ancient and semi-natural woodland which are also listed as LWSs, such as Stoke Wood and Bickenhall Wood. Several other well-established woodland blocks were identified, though without designation, as well as numerous linear belts of broadleaved woodland and wooded riparian corridors. Several areas of plantation woodland were also identified, including broadleaved, conifer and mixed plantation. Stands of scrub were limited in extent across the survey area, generally found in association with other habitat types.
- 9.3.19 Field boundaries, lanes and tracks supported an extensive and complex network of ditches and hedgerows across arable areas. A small number of hedgerows had been recently planted, but the majority were old landscape features.

Protected and notable species

- 9.3.20 The desk study undertaken in 2016 identified records for a range of protected or notable species within 2km of the proposed scheme. These included badger *Meles meles*, bats, birds (including Schedule 1 species such as barn owl *Tyto alba*, hobby *Falco subbuteo*, kingfisher and red kite *Milvus milvus*), dormice, reptiles (grass snake *Natrix helvetica*, slow worm *Anguis fragilis* and adder *Vipera berus*), otter and water vole.
- 9.3.21 SERC also provided records for a range of other notable species, including Species of Principal Importance (SoPI)⁶⁵ within the study area, including brown hairstreak *Thecla betulae*, grizzled skipper *Pyrgus malvae* and Duke of Burgundy *Hamearis lucina*.
- 9.3.22 The EA ecology & fish data explorer provided records of protected and notable fish species, including bullhead *Cottus gobio* and European eel *Anguilla anguilla* within the 3km study area.
- 9.3.23 The Phase 1 habitat survey identified a range of habitat features that would be suitable for the following protected and notable species or groups of species: amphibians including great crested newt (GCN) *Triturus cristatus*, badger, bats, breeding & wintering birds, dormice, fish, freshwater invertebrates including white-clawed crayfish *Austropotamobius pallipes*, otter, water vole, common reptiles, terrestrial invertebrates including brown hairstreak and SoPI such as hedgehogs *Erinaceus europaeus* and brown hare *Lepus europaeus*. The presence of all of these species/groups, with the exception of white-clawed crayfish, have been confirmed by field surveys undertaken since 2016.
- 9.3.24 Bluebell *Hyacinthoides non-scripta* has been identified, during woodland National Vegetation Classification (NVC) surveys, at locations along the route of the proposed scheme. No other protected or notable vascular plants were identified during the Phase 1 survey or the woodland and grassland NVC surveys, though these habitats are features of ecological import in themselves. Several LWS within the study area are designated for supporting notable vascular plant species (see Table 9-3).

⁶⁵ A Species of Principle Importance as listed on Section 41 of the NERC Act 2006.

- 9.3.25 Field surveys undertaken from 2017 to 2020 recorded the presence of a number of protected and notable species including badgers and badger setts, 15 species of bats and bat roosts, breeding birds including barn owls and barn owl nesting sites, dormice, GCN, otter, notable fish including brown trout *Salmo trutta* and bullhead, reptiles including slow worm and grass snake, and water voles.
- 9.3.26 Appendix C provides details of the survey methodology used for surveying each species group. Where published survey guidance has been updated since 2017, the updated guidance has been used to undertake field work in 2019/2020 or will be used to inform surveys to be undertaken during 2021.

Invasive species

- 9.3.27 The desk study did not identify any invasive non-native plant species (INNS) within the study area.
- 9.3.28 Giant hogweed *Heracleum mantegazzianum* is the only INNS confirmed within the study area, to date, being identified during field surveys, at two locations; one within the offline section to the west of Henlade, and the other to the immediate north of the online section at Kenny.

Future baseline

- 9.3.29 It would be expected that as the current landuse is predominantly arable and the quality of the agricultural land is poor to very good (see Chapter 10), it would continue to be managed in this way in a steady state in the future. Increasing development and housing in the area is likely to put more pressure on the remaining natural habitats which may affect the local population and distribution of species. Any short-term effects from climate change would be unlikely to significantly alter the land use, and therefore the habitats, prior to construction of the proposed scheme. Longer term impacts from climate change could alter the species composition and types of habitats in and around the site, and therefore types and diversity of fauna. Habitats that will be created as part of mitigation proposals will take consideration of climate change scenarios, and other factors such as the prevalence of ash die-back disease, when selecting species compositions for landscape planting.

Value of receptors

- 9.3.30 The value of each receptor was determined based on a geographical scale, following the 'resource importance' approach described in DMRB LA 108 – Biodiversity⁶⁶. The list of receptors and the respective importance provided in Table 9-4 should be treated as provisional and may change based on the outcome of further detailed surveys, assessments and consultation during development of the proposed scheme.
- 9.3.31 Invasive non-native animal and plant species do not have an intrinsic value and are considered of negligible value in this assessment of value/importance.

⁶⁶ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA108 Biodiversity*. Available at: <https://www.standardsforhighways.co.uk/dmrbl/> (Accessed January 2021)

Table 9-4 Value of receptors in the study area for biodiversity

Value/ sensitivity	Examples within the study area	Justification
Designated sites and habitats		
International or European	Hestercombe House SAC, Bracket's Coppice SAC, Exmoor and Quantock Oakwoods SAC, Beer and Quarry Caves SAC, Severn Estuary SAC and Ramsar, and Somerset Levels, Moors SPA and Ramsar.	Sites have been selected as internationally important through expert consensus according to European criteria.
UK or National	AWI site, veteran trees.	Irreplaceable habitat. Have been selected as nationally important through expert consensus according to national criteria.
	Barrington Hill Meadows SSSI and NNR, Thurlbear Woods and Quarrylands SSSI, Ruttersleigh SSSI, Deadman SSSI, Quants SAC and SSSI, Maiden Down SSSI, Curry and Hays Moor SSSI, Kings Sedgemoor SSSI, Aller Hill SSSI.	Sites have been selected as of national importance for formal conservation designation through criteria of particular scientific interest.
Regional	No features present within the study area at this level of importance.	N/a.
County	South Taunton Streams LNR, Children's Wood / Riverside Park LNR, Bickenhall Orchard LNR and numerous LWS within 1km.	Have been selected for county designation by consensus according to county wildlife site criteria.
Local	Priority habitat: hedgerows; lowland mixed deciduous woodland; coastal and floodplain grazing marsh; traditional orchards; ditches; ponds; rivers; streams; and parkland.	Generally, not particularly high-quality examples of their types. Not designated at county level or above. However, they still provide important habitat, foraging and habitat corridors for wildlife at the site level.
Species		
International or European	Internationally important assemblages of species form the designating features for Internationally and European designated sites as detailed in Table 9-1.	Sites have been selected as internationally important through expert consensus according to European criteria.
UK or National	Bechstein's bat population associated with Huish and Bickenhall woods.	Important colony of rare bat species in the UK and Europe at the edge of national distribution.
	White-clawed crayfish.	Due to their known rarity in the UK and declining populations.
Regional	Dormouse.	Large amount of suitable habitat in county where species relatively common, constituting a regional stronghold.
	Barbastelle population associated with Huish and Bickenhall woods.	Important population of rare bat species in the UK and Europe.
County	Breeding bird assemblage, including Schedule 1 species barn owl, Cetti's warbler <i>Cettia cetti</i> and kingfisher, twelve S41 species, 12 Red List and 11 Amber List species.	Significant declining population trends of farmland assemblages.

Value/ sensitivity	Examples within the study area	Justification
	Barn owl	Trend of significant declining population .
	Bat species assemblages.	Known rarity or lack of information on the population numbers of some bat species.
	Great crested newt, otter and water vole.	Widespread distribution in the county, but restricted habitat use.
	Brown hairstreak	Scattered distribution across southern England, good population on nearby Blackdown Hills.
Local	Badger, reptiles, freshwater fish, SoPI (including hedgehog, brown hare and terrestrial invertebrate assemblage). Any additional species listed as Priority species on Section 41 of the NERC Act 2006 with potential presence in the study area.	Widespread and relatively abundant in this region. The populations within the study area are likely to make a very limited contribution to the species' conservation status.

9.4 Potential impacts

9.4.1 The potential impacts that may arise from the proposed scheme, and the ZOI within which receptors might experience effects, are listed in Table 9-5.

9.4.2 Table 9-5 shows the typical pathways to an effect and the ZOI over which the effect is felt (based on best practice guidance where available) and the ecological features identified in the baseline that are present within a ZOI.

Impact pathways - construction

9.4.3 The proposed scheme would require the temporary and permanent loss of terrestrial and aquatic habitats, including priority habitats, and habitats likely to be used by, or to support, protected and notable species. Habitat fragmentation would potentially result from the severance of linear habitat features such as hedgerows, lines of trees, woodland edge and riparian corridors. This could potentially affect protected or notable species that rely upon such habitats for sheltering, foraging, commuting or dispersal. The impact associated with severance of habitats will be greatest within the offline section of the proposed scheme, where there are existing networks of connected habitat that will be bisected by the proposed scheme, however the online section will also be subject to severance as a result of the loss of the habitat belts that run alongside the existing A358.

9.4.4 During the construction phase, the following activities could potentially result in mortality and injury of species receptors: site clearance, earthworks, works affecting watercourses, and other temporary works e.g. entrapment in excavations. Significant effects could arise if protected or notable species are present within the footprint of the proposed scheme, especially if they are not able to avoid works, or are attracted to disturbed land to forage e.g. badgers.

9.4.5 Initial ground clearance works associated with the construction phase, particularly the offline section of the scheme, have the potential to attract foraging birds including gull and corvid species. Birds often gather to forage during ground

clearance including during arable field management such as ploughing, sowing and harvesting activities as insects are disturbed and exposed during the movement of the soil. There is the potential for larger flocks of birds to represent a bird strike risk to planes using the nearby RNAS Merryfield airbase; however, given the arable dominated landscape within and adjacent to the proposed scheme, this risk is considered to be low.

- 9.4.6 Disturbance to important receptors could result from changes in noise, light, vibration or visual stimuli. During construction, disturbance could arise from the following activities: fencing, earthworks, compound set up, construction and reinstatement.
- 9.4.7 Air quality changes could occur through releases of dust and changes in local pollutant concentrations caused by emissions from construction plant and machinery, earthworks, and delivery of materials, with resulting effects on sensitive habitats. Chapter 6 provides additional detail on air quality. Modelling assessment is required to assess the impact of nitrogen oxide (NO_x) deposition on sensitive habitats. This is described in Chapter 6.
- 9.4.8 There is potential for hydrological change where the new alignment passes through cutting to cause significant effects during construction where works would directly or indirectly affect watercourses. Hydrological changes are detailed in Chapter 14, road drainage and the water environment, and include changes to both water quality and quantity within nearby watercourses. Changes in hydrology, fluvial geomorphology and hydrogeology are important to terrestrial and freshwater ecology due to the following factors:
- water quantity has an important role in structuring the flora and fauna communities in watercourses, ponds and wetlands;
 - sediment and other pollutant releases have the potential to adversely affect sensitive ecological receptors; and
 - ecological receptors can be sensitive to alterations of runoff regimes changing the quality of surface and groundwater.
- 9.4.9 Any introduction or spread of INNS would potentially cause significant adverse effects to sensitive habitats. This is because of the dominance that these species can have over native species. During the construction works, topsoil and subsoil potentially containing plant INNS would be disturbed. Such soil or seed and 'propagules' could be spread during construction activities, including excavation and machinery movements. Works within water can also introduce and spread animal INNS.

Impact pathways – operation

- 9.4.10 The offline sections of the proposed scheme would fragment habitats south of the existing A358 between the connection with the M5 at Junction 25 and connection with the online section. The proposed scheme would also fragment habitats to the north of the existing A358 between Hatch Beauchamp and Ashill through loss of habitats associated with the widening of the online section. Given the predominantly arable landscape, the severance of existing wildlife corridors along the proposed scheme (such as watercourses, field margins, hedgerows and tree lines) could have significant effects on species in the area as the new highway could act as a barrier across the landscape.

- 9.4.11 Severance leads to isolation both within and between populations and from specific resources separated spatially and temporally. The effects of this include reduced foraging range and success, increased competition, genetic isolation and inbreeding, which can lead to local extinctions.
- 9.4.12 The operation of a widened online section, and new offline stretch, of road could increase the risk of vehicle related mortality for some faunal species. Animals would be required to cross a wider section of road along the online section of the proposed scheme, resulting in greater potential for collision with vehicles and injury or mortality. The offline section of the scheme will introduce a new hazard source into a section of the landscape, with the introduction of a wide and high-speed road into a rural area, again increasing the potential for vehicle related injury or mortality. The risk of direct mortality through operation of the proposed scheme is permanent, unlike the vehicle collision risk posed by the construction phase.
- 9.4.13 Sources of disturbance in the operational phase also relate to road noise and lighting. Noise has the potential to impact upon local populations of breeding and wintering birds, potentially reducing the suitability of habitat close to the road and therefore reducing the availability of suitable habitat in the vicinity of the proposed scheme. Many mammal species are also susceptible to disturbance through the introduction of noise and vibration, particularly where this impacts upon their resting sites. Such noise and vibration disturbance may cause animals to abandon their resting sites. The sensitivity of resting sites to disturbance may vary depending on the time of year .e.g. bat maternity roosts may have greater sensitivity to disturbance than summer day roosts. It is also acknowledged that there will be a greater impact to animals adjacent to the offline section of the proposed scheme, where they will not be as habituated to vehicular related noise and vibration as those animals utilising habitats along the online section where there is an existing level of noise and vibration from vehicular movement.
- 9.4.14 Impacts from operational road lighting are most likely to affect bat species along the proposed scheme (although it could also affect birds, invertebrates and nocturnal mammals, such as dormice, badger, otter and hedgehog). The effects of road lighting are complex but include roost disturbance and abandonment; severance (for light-shy species such as brown long-eared bat); loss of foraging habitats for light-shy species due to light-spill; a decline in airborne invertebrate prey available to light-shy species (as insects are attracted to lights); and increased traffic collisions for bat species such as pipistrelle that will actively forage on insects attracted to lighting. Habitats where the impact of lighting can be particularly severe include along river corridors, woodland edges and hedgerows.
- 9.4.15 Highways balancing ponds, or ecological mitigation ponds, associated with the proposed scheme have the potential to attract waterfowl, which may represent a bird strike risk to planes using the nearby RNAS Merryfield airbase.
- 9.4.16 The key receptors that may be sensitive to changes in vehicle emissions are the designated sites noted for their floristic importance, sensitive priority habitats and ancient woodland habitats, and any species that depend on these. Elevated NO_x concentration is generally considered to be the main threat to vegetation from vehicle emissions, but ammonia emissions from catalytic converters may also represent a source of nitrogen deposition in habitats within proximity to roads.

9.4.17 Operational effects to watercourses are possible in relation to surface water road drainage and unexpected, accidental, pollution events. Impacts affecting watercourses may have a wide ZOI, particularly on sensitive receptors downstream of the proposed scheme. The Water Framework Directive (WFD) assessment undertaken as part of this study will determine the effects of the proposed scheme on ecological quality, identifying any potential impacts that could cause deterioration in the assigned status of a water body or prevent a water body from meeting its WFD objectives. WFD assessment is covered in Chapter 14, road drainage and the water environment

Table 9-5 Summary of impact, zones of influence and relevant ecological receptors

Impact	Zone of influence and rationale	Receptor potentially sensitive to the impact
Construction phase		
Habitat loss, fragmentation or modification	Habitat loss would be restricted to areas cleared to make way for highways construction (including borrow pits) and will form both temporary and permanent loss. This includes temporary compounds or temporary access roads. Temporary/permanent loss and fragmentation of watercourses may occur with installation/modifications to culverts and bridge crossings.	<ul style="list-style-type: none"> • Road Verges West of Hatch Beauchamp LWS; • Priority habitats; • Veteran trees; and • Habitats supporting protected or notable species including bats, badger, breeding and wintering birds (inc barn owl), dormouse, great crested newt, otter, reptiles, water vole and priority species (brown hare, brown hairstreak, hedgehog etc.).
Mortality and injury of species	Physical interaction between species and project infrastructure, machinery or activities would be limited to areas within the footprint of the proposed scheme and areas immediately outside the scheme footprint due to construction traffic approaching or leaving the site. Potential for construction to attract flocks of birds which may be at risk of bird strike with planes using RNAS Merryfield.	<ul style="list-style-type: none"> • Protected or notable species including bats, badger, breeding and wintering birds, dormouse, great crested newt, otter, reptiles, water vole and priority species (brown hare, hedgehog etc.).
Species disturbance (from changes to noise, vibration, visual and light stimuli)	The area subject to noise disturbance varies based on the activity being undertaken and the sensitivity of the individual receptor. All potentially sensitive receptors within the area likely to be exposed to noise level changes will be considered. Consideration will be given to the effects of visual disturbance for all potentially sensitive receptors. The zone of influence for visual disturbance is extremely difficult to quantify and varies with each receptor and type of stimuli. This assessment will be informed using professional judgement in consultation with statutory advisors; however, the baseline study area fully encompasses all likely zones of influence.	<ul style="list-style-type: none"> • SPAs and Ramsar sites designated for breeding birds; and • Protected and notable species including bats (within roosts only [noise] and and/or in foraging/commuting areas [light]), badger (within setts only), breeding and wintering birds (inc barn owl), dormouse, otter, water vole and priority species.

Impact	Zone of influence and rationale	Receptor potentially sensitive to the impact
Air quality changes (resulting in habitat loss/modification)	The effect of air emissions including dust from construction traffic and plant are considered within 200m.	<ul style="list-style-type: none"> • SSSIs; • LNRs; • LWSs; • AWI sites and other ancient woodland habitats; and • Priority habitats.
Hydrological changes to surface and groundwater (resulting in mortality/injury of species and/or habitat loss/modification and/or impacts to prey species)	All sensitive receptors with hydrological connections to an affected waterbody.	<ul style="list-style-type: none"> • SPAs and Ramsar sites with hydrological connectivity; • LNRs; • LWSs; • AWI sites and other ancient woodland habitats; • Priority habitats; and • Protected and notable species including fish, freshwater invertebrates including white-clawed crayfish, fresh water macrophytes, great crested newt, otter and water vole.
Introduction and spread of INNS (resulting in habitat loss/modification or spread of detrimental fauna)	Effects associated with INNS would only likely be experienced within the immediate vicinity of areas where machinery movements, soil stripping, storage and habitat reinstatement would be undertaken. However, there is potential for wider effects to occur where works would be within and in the vicinity of flowing watercourses.	<ul style="list-style-type: none"> • LNRs; • LWSs; • AWI sites and other ancient woodland habitats; and • Priority habitats.

Impact	Zone of influence and rationale	Receptor potentially sensitive to the impact
Operational phase		
Habitat fragmentation	In offline areas, retained habitats either side of the works would be fragmented. In online areas, habitats running parallel to the network will be lost and fragmented through the expansion of the road to dual carriageway.	<ul style="list-style-type: none"> Protected and notable species including bats, badger, breeding and wintering birds (including barn owl), dormouse, great crested newt, reptiles, otter, water vole and priority species (amphibians, brown hare, hedgehog etc.).
Mortality and injury of species	Traffic collisions within active highway. Risk of bird strike with planes using RNAS Merryfield as a result of changes in habitats i.e. introduction of balancing ponds holding standing water.	<ul style="list-style-type: none"> Bats; badger; breeding birds (including barn owl); great crested newt; otter; water vole and priority species (amphibians, brown hare, hedgehog etc.).
Species disturbance (from changes to noise and light stimuli)	The area subject to operational road noise and lighting disturbance is dependent on the sensitivity of the individual receptor.	<ul style="list-style-type: none"> SPAs and Ramsar sites designated for breeding or wintering birds; and Protected and notable species including bats (within roosts only [noise] and/or in foraging/commuting areas [light]), badger (within setts only), breeding and wintering birds (including barn owl), fish, otter, water vole and priority species.
Air quality changes (resulting in habitat loss/modification)	The effect of air pollution from operational traffic are considered within 200m of the Affected Road Network	<ul style="list-style-type: none"> SPAs, SACs SSSI LWSs; AWI sites and other ancient woodland habitats; and Priority habitats.
Hydrological changes (resulting in mortality/injury of species and/or habitat loss/modification)	All sensitive receptors with hydrological connection to an affected waterbody.	<ul style="list-style-type: none"> SPAs and Ramsar sites with hydrological connectivity; LNRs; LWSs; AWI sites and other ancient woodland habitats;

Impact	Zone of influence and rationale	Receptor potentially sensitive to the impact
		<ul style="list-style-type: none">• Priority habitats; and• Protected and notable species including great crested newt, otter and water vole.

Impact pathways – receptors

- 9.4.18 The proposed scheme has the potential to impact upon bats associated with Hestercombe House, Beer and Quarry Caves and Exmoor and Quantock Oakwoods SACs resulting from loss of roosting sites, loss of habitat connectivity/severance of commuting routes and risk of injury or death to individual bats during construction and operation. However, the proposed scheme is outside the core sustenance zone (CSZ) for Bechstein's bats, for which Bracket's Coppice SAC is designated, it is considered unlikely there will be any direct or indirect impact to bats associated with this SAC.
- 9.4.19 There is a potential hydrological impact pathway to the Somerset Levels and Moors SPA and Ramsar, and the Severn Estuary SAC and Ramsar, particularly given the downstream connectivity from the proposed scheme. The SPA, SAC and Ramsar are sensitive to any reduction in water quality and the potential impact of water pollution poses a significant threat to species and habitats for which the SPA, SAC and Ramsar are designated for.
- 9.4.20 Therefore, excluding Bracket's Coppice SAC, all SPA, SAC and Ramsar sites identified within the ZOI are currently scoped into the assessment (in a HRA).
- 9.4.21 Given the distance and limited connectivity, no direct or indirect impact pathways are anticipated for habitats or species associate with Thurlbear Woods and Quarrylands and Barrington Hill Meadow SSSIs (over 1km south) and Bickenhall Orchard and Children's Wood/Riverside Park LNRs (over 300m south).
- 9.4.22 There is a potential hydrological impact pathway to South Taunton Streams LNR with downstream connectivity from the proposed scheme during construction and operation. Additionally, the remaining 15 SSSIs within 200m have potential impact pathways from air quality changes resulting in habitat loss/modification during operation of the proposed scheme. Therefore, these SSSIs and LNR are therefore scoped into the assessment.
- 9.4.23 Direct habitat loss will occur at Road Verges West of Hatch Beauchamp LWS and Jordans Park LWS during construction. Saltfield Copse, River Rag, Bickenhall Woods, Ashill Wood LWS are located adjacent to the proposed scheme, with Every's Copse additionally located within 200m , all of which may be impacted through air quality changes during both construction and operation, or pollution incidents during construction. River Isle LWS is located within 250m of the proposed scheme and may also be impacted by air quality changes. All remaining LWSs are beyond 300m and are not considered to have impact pathways during either construction or operation. LWSs within 200m of the ARN will also undergo an assessment for potential air quality impacts. As such, significant impacts are possible and are scoped in for further assessment.
- 9.4.24 Bluebell has been identified at a series of locations within the study area. No other protected or notable vascular plant species have been identified to date within the study area. However, given that many of the LWS's (including those which may be impacted by the proposed scheme) support notable vascular plant communities there is the potential for such species to be impacted by the proposed scheme. This receptor is therefore scoped in for further assessment.
- 9.4.25 Impact pathways of relevance have been identified for badger, which are widespread within the survey area, with a large number of main setts and associated social groups at the western extent of the proposed scheme. There is

potential for impacts to the setts and foraging habitat of this species, and a risk of increased mortality during operation of the proposed scheme. This receptor is therefore scoped in for further assessment.

- 9.4.26 Bat roosts and commuting and foraging habitats across the proposed scheme extent are likely to be lost and/or fragmented during construction (both online and offline sections), be affected by disturbance during construction and operation, and are potentially at risk of increased mortality during operation. Due to the diversity of bat species present, including nationally rare species, the effectiveness of any embedded mitigation within the design would have to be assessed. Therefore, bats are scoped in for further assessment.
- 9.4.27 There is the potential for significant effects on populations of breeding birds (including Schedule 1 species such as barn owl). Potential impacts include loss of nesting, foraging and commuting habitat, disturbance during construction and operation and increased mortality during operation of the proposed scheme. Therefore, breeding birds are scoped in for further assessment.
- 9.4.28 There is the potential for significant effects on wintering birds (including species which form part of designation criteria for Somerset Levels & Moors SPA & Ramsar). Potential impacts include loss of foraging and commuting habitat, and disturbance during construction and operation. Therefore, wintering birds are scoped in for further assessment.
- 9.4.29 Impact pathways of relevance have been identified for dormouse, which are widespread throughout suitable habitats within the survey area. There is potential for loss and severance of sheltering and foraging habitat during construction, disturbance during construction and a risk of increased mortality during both construction and operation of the proposed scheme. This receptor is, therefore, scoped in for further assessment.
- 9.4.30 Impact pathways of relevance to freshwater fauna (including fish, macroinvertebrates and white-clawed crayfish), otter and water vole have been identified in relation to habitat loss and fragmentation, both directly and from potential hydrological change of habitats, as well as noise and vibration in the construction phase. While previous surveys has indicated the likely absence of white-clawed crayfish and macroinvertebrate assemblages, and watercourses crossed by the scheme were found to be generally of low-moderate conservation value, further surveys are required and therefore white-clawed crayfish and macroinvertebrates are also scoped in for further assessment. Otter and water vole are additionally scoped in for the operational phase due to potential traffic collision and habitat severance impacts.
- 9.4.31 GCN breeding ponds have been identified within the survey area and impact pathways relating to habitat loss/fragmentation, mortality and injury of individuals, and hydrological change of habitats have been identified. The District Level Licencing (DLL) approach to mitigation, led by Natural England, may be implemented on the proposed scheme to avoid significant effects on GCN. However, it is proposed to scope GCN into the assessment to demonstrate that there would be no significant effects on this species.
- 9.4.32 Slow-worm and grass snake are widespread throughout suitable habitats within the survey area, especially along the verges of the existing road network. Therefore, impact pathways exist from suitable habitat loss and/or fragmentation during construction, and a risk of increased mortality during construction and

operation. Due to the presence of multiple good or exceptional populations of slow worm, the effectiveness of embedded mitigation would be required to be assessed to avoid significant impact. Therefore, reptiles are scoped in for further assessment.

- 9.4.33 There is potential for terrestrial invertebrates, including brown hairstreak, to be impacted by the proposed scheme through habitat loss/fragmentation. Previous survey effort indicates that terrestrial invertebrate assemblages associated with habitats are common and widespread, but further effort is required to ensure habitats and their associated invertebrate assemblage have not significantly altered. Therefore, terrestrial invertebrates are scoped into the assessment.
- 9.4.34 The desk-study and field surveys confirmed presence or likely presence of a number SoPI such as brown hare, hedgehog and several species of invertebrate. These notable species will be present within the landscape at various densities depending on their specific habitat requirements and the quality of the habitat present. However, the majority of habitats recorded within the footprint of the proposed scheme are abundant within the local landscape and priority species would also benefit from the mitigation strategies which would be implemented for the protected and notable species scoped in for further assessment. However, until the designs of this mitigation are developed, priority species are scoped into the assessment.
- 9.4.35 Given the negligible value assigned to INNS and their limited presence across the proposed scheme, invasive species are scoped out of further assessment. However, changes in the presence and distribution of INNS will be assessed as part of further work, ensuring they will be considered in relation to legislative compliance.
- 9.4.36 Species scoped in for further assessment at this stage may be scoped out in future if the value assigned to them is reduced (or removed completely if likely absence is confirmed) following additional surveys and data collection. Receptors will only be scoped out following consultation and agreement with statutory bodies.

9.5 Design, mitigation and enhancement measures

- 9.5.1 A route selection process was undertaken for the proposed scheme, during which amendments were made to the route alignment in an effort to avoid important ecological receptors such as ancient woodlands. Further efforts will be made to avoid impacts to important ecological receptors, such as hedgerows, watercourses and treelines, through on-going refinement of the design where possible.
- 9.5.2 Mitigation measures will be embedded into the proposed scheme through design iterations as well as best practice measures (mitigation which will be included as a result of standard good practice and due to legislative requirements). Such measures are likely to include:
- landscape design to include habitats that replace those lost; these will be designed and managed to maximise their biodiversity value and ensure their target condition exceeds that of the habitats lost i.e. Biodiversity Net Gain;
 - the design of linear habitats such as hedgerows and lines of trees should aim to increase connectivity along the scheme, linking with retained woodland and hedgerows where possible;

- appropriate design of river realignments will be undertaken with input from a qualified ecologist and geomorphologist to maximise environmental benefits and biodiversity net gain;
- appropriate timing of vegetation clearance works to avoid sensitive periods for ecological receptors (i.e. avoiding breeding bird season) and clearance under supervision of an Ecological Clerk of Works (ECoW) with licencing in place as appropriate;
- establishment of suitable protection buffers around important ecological receptors during construction to avoid impacts, which would, for example, include 15m wide buffers around ancient woodland;
- general protection and control measures to be detailed in an Environmental Management Plan (EMP)), risk assessments and method statements during the construction phase, to include measures to minimise the impact of dust on adjacent habitats and maintain water quality;
- measures to control noise and light pollution as a result of construction and operation of the proposed scheme; and
- implementation of an Invasive Species Management Plan for plant and animal species in the terrestrial and aquatic environment.

9.5.3 Additional measures will be required to reduce or mitigate the effects on biodiversity as a result of the construction and operation of the proposed scheme. Such measures may include;

- improving the permeability of the proposed scheme for wildlife by providing new routes, or improving existing routes, for movement of species across the new road e.g. by including features such as hop-over vegetation, underpasses/tunnels, mammal ledges and dormouse bridges;
- retention of woodland/hedgerows identified for placement of bat and bird boxes;
- vegetation clearance and structure demolition method statements in accordance with legislative and licencing conditions, if required (protected species licences from Natural England will potentially be required for bats, badger, dormouse, otter and water vole);
- measures such as species translocation may be required where impact avoidance is not possible;
- provision of replacement shelter features such as artificial badger setts and otter holts where impact avoidance to such features is not possible;
- design of gully pots within the drainage scheme to avoid trapping amphibians.

9.5.4 The proposed scheme, as part of the wider Highways England Delivery Plan, would aim to achieve no net loss of biodiversity (with an aspiration to provide a net gain), in line with the requirements of the NPPF and NPSNN.

9.5.5 A Protected Species Compliance Report will be provided with the assessment to document the mitigation that would be put in place to comply with legal requirements for protected species that may be impacted but that would not be significantly affected in EIA terms.

9.6 Description of the likely significant effects

9.6.1 Approximately half of the proposed scheme is offline with the creation of new highway, and widening of the remaining online section, both primarily in arable and improved grassland habitats of limited biodiversity importance. However, the

proposed scheme will also result in the partial loss of Jordans Park LWS, where veteran trees may be impacted. Veteran trees are considered to be an irreplaceable habitat, if impacted by the construction of the proposed scheme, this would result in a significant residual effect.

- 9.6.2 With the implementation of design and mitigation measures and adherence to legal compliance it is highly unlikely that the proposed scheme would result in any additional residual significant effects on ecological receptors.

9.7 Assessment methodology

Biodiversity

- 9.7.1 It is anticipated that due to the potential for significant effects on biodiversity receptors, a detailed assessment is required to identify the necessary mitigation to avoid any significant effects. The biodiversity assessment will be undertaken in accordance with DMRB guidance methodology, specifically LA 104 Environmental Assessment and Monitoring⁶⁷ and LA 108 Biodiversity⁶⁶ which meets the NPSNN policy requirements set out in section 9.1. The assessment will be based on the information collated from desk-based resources detailed in section 9.3 and the ongoing field surveys, detailed in Appendix C. An initial assessment of the value and sensitivity of each identified biodiversity receptor is provided in Table 9-4 within section 9.3 and follows the DMRB criteria for determining value (in terms of geographical importance).
- 9.7.2 The magnitude of impact on each biodiversity receptor will be assessed in accordance with the criteria presented in Table 9-6.

Table 9-6 Magnitude of impact and typical descriptions (from DMRB LA 108)

Magnitude of impact (change)		Typical description
Major	Adverse	<ul style="list-style-type: none"> Permanent/irreversible damage to a biodiversity resource; and the extent, magnitude, frequency and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
	Beneficial	<ul style="list-style-type: none"> Permanent/addition of, improvement to, or restoration of a biodiversity resource; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource
Moderate	Adverse	<ul style="list-style-type: none"> Temporary/reversible damage to a biodiversity resource; and the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
	Beneficial	<ul style="list-style-type: none"> Temporary addition of, improvement to, or restoration of a biodiversity resource; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Minor	Adverse	<ul style="list-style-type: none"> Permanent/irreversible damage to a biodiversity resource; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.

⁶⁷ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. *LA104 Environmental Assessment and Monitoring*. Available at: <https://www.standardsforhighways.co.uk/dmrbl/> (Accessed January 2021)

	Beneficial	<ul style="list-style-type: none"> Permanent addition of, improvement to, or restoration of a biodiversity resource; and the extent, magnitude, frequency, and/or timing of an impact positively does not affect the integrity or key characteristics of the resource.
Negligible	Adverse	<ul style="list-style-type: none"> Temporary/reversible damage to a biodiversity resource; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
	Beneficial	<ul style="list-style-type: none"> Temporary addition of, improvement to, or restoration of a biodiversity resource; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
No change		No observable impact, either positive or negative.

9.7.3 Effects will be evaluated by combining the assessment of both the value/sensitivity of a biodiversity receptor, with the magnitude of impact. This allows the prediction of significance of effect as shown in Table 9-7.

Table 9-7 Significance matrix – Biodiversity (from DMRB LA 108)

Resource value (importance)		Level of impact				
		No change	Negligible	Minor	Moderate	Major
International or European importance	Neutral	Slight	Slight or moderate	Large or very large	Very large	
UK or National importance	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large	
Regional importance	Neutral	Neutral or slight	Slight	Moderate	Moderate or large	
County importance	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate	
Local importance	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight	

9.7.4 The impact assessment work to be undertaken for the proposed scheme and reported in the Environmental Statement will be proportionate and focus on potential significant adverse effects within the ZOI.

9.7.5 The requirements of protected and controlled species legislation will be detailed in a separate report to allow the Environmental Statement chapter to focus on potential significant effects, in terms of EIA, only. It is anticipated that protected species licences are likely to be required for bats, badger, dormouse, otter and water vole. This will be determined on completion of surveys during 2021. Draft licences will be prepared and agreed with Natural England for these species/groups alongside the EIA. Full submission of licences to Natural England would be required following the DCO being granted.

9.7.6 Assessment of the potential air quality impacts on sensitive designated sites and habitats within 200m of the ARN will be undertaken in accordance with DMRB LA 105⁶². For those sites outside of the habitat survey areas defined in Appendix C, baseline information included with the citations for these sites should be sufficient to assess potential air quality impacts on the sensitive habitats. If the air quality

modelling identifies additional potential effects that warrant further survey, site visits may be undertaken to confirm the stated habitat types and extents are correct, but this is unlikely to be required given the nature of the sites present.

Habitat Regulations Assessment (HRA)

- 9.7.7 HRA is a recognised step-by-step process to determine the likely significant effects and (where appropriate) assess adverse impacts on the integrity of European designated sites. Where likely significant effects are identified, the assessment examines alternative solutions and provides justification for imperative reasons of over-riding public interest (IROPI).
- 9.7.8 The HRA Stage 1 (Screening) identifies the likely significant effects of a project upon the integrity of a European designated site, either alone or in combination with other plans and projects and considers whether the effects are likely to be significant.
- 9.7.9 An initial/draft Stage 1 assessment has been undertaken for PCF Stage 2 (A358 Taunton to Southfields Dualling Stage 2 Habitat Regulations Assessment⁶⁸), which remains in accordance with new guidance in DMRB LA 115⁶¹, to determine whether the proposed scheme would have any likely significant effects on the European sites listed in Table 9-1. The assessment requires further survey data in order to provide full confidence in the significance of effects, particularly relating to bat species. However, early assessment indicates that significant effects cannot be ruled out for European sites scoped in for assessment at this stage, (except Bracket's Coppice SAC), when considered alone or in combination with other plans and projects. A HRA will be undertaken during PCF Stage 3 which will incorporate all available and contemporary survey data.

9.8 Assessment assumptions and limitations

- 9.8.1 Where possible, nationally recognised standard survey methodologies will be used to reduce limitations for ecological evaluation and impact assessment.
- 9.8.2 Specific limitations relevant to each survey, such as land access constraints, will be detailed in the relevant survey result factual reports. Assuming that further progress is made in gaining land access through 2021, the survey specific constraints are unlikely to represent a limitation that would compromise the ecological impact assessment, especially when taking account of the proposed scheme's embedded mitigation in design and best practice measures.

⁶⁸ Mott MacDonald Sweco Joint Venture (2019) 'A358 Taunton to Southfields Dualling Stage 2 Habitat Regulations Assessment'. Mott MacDonald Joint Venture HE551508-MMSJV-EBD-000-RP-LB-0006.

10 Geology and soils

10.1 NPSNN requirements

10.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

10.1.2 Key policies from the NPSNN relevant to this discipline include:

- Paragraph 5.22 of the NPSNN states where the project is subject to EIA the applicant should consider likely significant effects on internationally, nationally and locally designated sites of ...geological conservation importance'.
- Paragraph 5.23 of the NPSNN states the 'applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests'.
- Paragraph 5.25 of the NPSNN states 'as a general principle, and subject to the specific policies below, development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives'.
- Paragraph 5.168 states that for developments on previously developed land 'applicants should ensure that they have considered the risk posed by land contamination and how it is proposed to address this'. The policy recommends use of Environment Agency guidance Model Procedures for Management of Land Contamination (CLR11) to assess the risk from contamination, however CLR11 has now been withdrawn and replaced by online guidance Land Contamination: Risk Management (LC:RM) published October 2020.
- Paragraph 5.168 also states that where significant development of agricultural land is necessary 'applicants should seek to use areas of poorer quality land in preference to that of a higher quality'. 'Applicants should take into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification)'. 'Applicants should also identify any effects, and seek to minimise impacts, on soil quality, taking into account any mitigation measures proposed'.
- Paragraph 5.179 of the NPSNN states 'applicants can minimise the direct effects of the project on existing uses of the proposed site or proposed uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction'.

10.1.3 The policies relevant to this chapter as outlined above have been addressed in the proposed scoping for the impact assessment.

10.1.4 This chapter assesses the potential effects which may occur during the construction and operational phases of the proposed scheme on the baseline geology and soil environment, and includes:

- effects on bedrock geology and superficial deposits, including geological designations and sensitive / valuable non-designated features;
- quantity and quality of agricultural land that would be affected, both temporarily and permanently;
- effects on soil resources; and

- effects from contamination on human health, surface water and groundwater.

10.1.5 Only effects from land contamination are considered for soil, surface water and groundwater. Chapter 14 Road Drainage and the Water Environment contains detail of potential effects of the proposed scheme on surface and groundwaters.

10.2 Study Area

10.2.1 The Design Manual for Roads and Bridges (DMRB), LA 109 Geology and Soils does not set a defined study area but states that it should be 'identified on a project by project basis' taking account of the following:

- construction footprint including compounds and temporary land take;
- potential and actual land contamination inside and outside the construction footprint which could affect receptors; and
- location of off site sensitive receptors that can be affected by the project.

10.2.2 The study area has therefore been based on professional judgement, taking the above prescriptions into consideration and also the physical conditions of the site and surrounding area. The following define the study area, with buffers measured from the centre line:

- the limits of the land to be used either temporarily or permanently for the construction and operation of the proposed scheme for soils and agricultural land;
- 250m for past pollution incidents; and
- 500m for landfills/waste management sites (historical and current).

10.2.3 The extent of these zones has been developed using professional judgement on the basis that contamination migration beyond this distance is likely to be minimal or could be mitigated.

10.2.4 The following sections describe the baseline geology and soil conditions and identify receptors and potential impacts within the study area as defined above.

10.3 Baseline Conditions

Baseline Sources

10.3.1 Baseline data have been abstracted from the following sources:

- Stage 2 Preliminary Sources Study Report⁶⁹ (PSSR), this report was based on the following main primary sources:
 - previous reports available from the Highways Agency Geotechnical Data Management Systems (HAGDMS) website;
 - a review of previous ground investigations (GI);
 - Landmark Envirocheck Reports obtained between 2016 and 2018;
 - British Geological Survey. Mineral Resource Information in Support of National, Regional and Local Planning: Somerset (comprising Somerset,

⁶⁹ Mott MacDonald Sweco Joint Venture (2019) 'A358 Taunton to Southfields Dualling Stage 2 Preliminary Sources Study Report'. Mott MacDonald Joint Venture HE551508-MMSJV-HGT-000-RP-CE-0001.

North Somerset, Bath and North East Somerset, the City of Bristol and Part of Exmoor National Park), Commissioned Report CR/04/214N⁷⁰.

- MAGIC website⁷¹; and
- findings of a site walkover completed between April and May 2017.
- Stage 2 Environmental Scoping Report⁷² (ESR);
- Stage 2 Environmental Assessment Report⁷³ (EAR);
- Stage 2 Preliminary Sources Study Addendum⁷⁴ (PSSR);
- Stage 2 Environmental Assessment Report Addendum⁷⁵ (EAR);
- Ministry of Agriculture, Fisheries and Food (MAFF) (1995), Taunton Deane Local Plan (MAFF ref. ALCB00895);
- Cranfield University -The National Soil Map of England and Wales 1:250,000 scale⁷⁶;
- Soil Survey of England and Wales (1984), Soils and Their Use in South West England, Harpenden;
- MAGIC interactive mapping⁷⁷;
- Natural England's Regional Agricultural Land Classification (ALC) Maps; and
- The Environmental Constraints Plan.

Baseline Information

Geology

10.3.2 The superficial geology, where present beneath the route, comprises Quaternary age deposits of Head (gravel, sand and clay), Colluvium (Diamicton) and Valley Head or Alluvium (clay, silt and sand overlying gravel). An interdigitated succession of alluvium and colluvium is prevalent in the floodplain of the River Isle (at the eastern end of the proposed scheme).

10.3.3 The study area is underlain by the following bedrock geology:

- Mercia Mudstone, comprising Mudstone and Halite-stone at the M25 junction to Haydon.
- Branscombe Formation, consisting of reddish brown, weakly calcareous mudstones approximately 180m thick of the Mercia Mudstone Group to south of Henlade.
- Blue Lias Formation underlies the route from just north of Griffin Lane to Folly Drove, comprising interbedded grey mudstones and limestones, with a thickness of 45m.
- From Folly Drove to Southfields the route is underlain by Charmouth Mudstone comprising dark grey laminated shales and dark, pale and bluish grey Mudstone, approximately 95m thick, which dips to the south east.

⁷⁰ British Geological Survey (2005) *Mineral Resource Information in Support of National, Regional and Local Planning: Somerset (comprising Somerset, North Somerset, Bath and North East Somerset, the City of Bristol and Part of Exmoor National Park)*. Commissioned Report CR/04/214N. Available at: <http://nora.nerc.ac.uk/id/eprint/509793/1/CR04214N.pdf> (Accessed January 2021)

⁷¹ <https://magic.defra.gov.uk/>

⁷² Mott MacDonald Sweco Joint Venture (2019) 'A358 Taunton to Southfields Dualling Stage 2 Environmental Scoping Report'. Mott MacDonald Joint Venture HE551508-MMSJV-EGN-000-RP-LP-0006.

⁷³ Mott MacDonald Sweco Joint Venture (2019) 'A358 Taunton to Southfields Dualling Stage 2 Environmental Assessment Report'. Mott MacDonald Joint Venture HE551508-MMSJV-EGN-000-RP-LP-0001.

⁷⁴ Mott MacDonald Sweco Joint Venture (2019) 'A358 Taunton to Southfields Dualling Stage 2 Preliminary Sources Study Addendum'. Mott MacDonald Joint Venture HE551508-MMSJV-HGT-0000-RP-CE-0006.

⁷⁵ Mott MacDonald Sweco Joint Venture (2019) 'A358 Taunton to Southfields Dualling Stage 2 Environmental Assessment Report Addendum'. Mott MacDonald Joint Venture HE551508-MMSJV-EGN-000-RP-LP-0030.

⁷⁶ Cranfield University (2001) *The National Soil Map of England and Wales 1:250,000 scale*. Cranfield University: National Soil Resources Institute

⁷⁷ <https://magic.defra.gov.uk/MagicMap.aspx>

- At Ashill the Belemnite Marl Member is recorded either side of the current A358 beneath the proposed link roads, comprising dark grey interbedded calcareous Mudstones with abundant belemnites, 25m thick and dipping to the south east.
- 10.3.4 The route is crossed by two normal faults; north of Griffin Lane trending north west to south east and north of Horton Cross Farm, trending north east to south west.
- 10.3.5 Areas of made ground, worked ground and infilled ground are not identified beneath the route, however these are anticipated within the study area associated with historical land uses, such as; a dismantled railway which intersects the existing A358 and proposed route at West Hatch Lane junction.
- 10.3.6 Further detail of the geology and existing borehole records can be found within the PSSRs. Additional ground investigation will be completed to confirm the geochemical, geological and hydrogeological conditions within the study area not covered by previous investigations.
- 10.3.7 No landslips are recorded on the route, although two are recorded within 300m; Stoke Wood Landslip to the south and Island Copse landslip to the north. The potential for slope instability associated with Colluvium and Valley Head deposits and the underlying mudstone is noted, see the PSSR for further detail.
- 10.3.8 A local geological site (LGS) is recorded, south east of Hatch Beauchamp approximately 950m east of the route, identified as the Hatch Beauchamp Cutting designation noted as 'Exposure of Rhaetic clays and limestone in former railway cutting near Hatch Fault'. According to the Stage 2 reports, no other designated geological sites of local, regional, national or international importance have been identified along the route or within the study area.

Soils

- 10.3.9 The study area is predominately agricultural land. The economic resource of a soil is based on its ability to support agricultural uses, and this is quantified by its Agricultural Land Classification (ALC) grade. The post-1988 ALC (England) identifies five grades, with Grade 3 is subdivided. The grading is dependent on the extent to which physical or chemical characteristics of the soil impose long-term limitations on the agricultural use of the land, and are described as follows:
- Grade 1 (excellent quality);
 - Grade 2 (very good quality);
 - Subgrade 3a (good quality);
 - Subgrade 3b (moderate quality);
 - Grade 4 (poor quality); and
 - Grade 5 (very poor quality).
- 10.3.10 Best Most Versatile (BMV) agricultural land is defined as Grades 1, 2 and Subgrade 3a of the ALC system. BMV land is the most flexible land in terms of the range of crops that can be grown, gives the highest yield, produces the most consistent yield, and requires fewer inputs.
- 10.3.11 Provisional ALC data for the study area show the area to be dominated by undifferentiated Grade 3 soils, with two small areas of Grade 4 at the southern portion of the A358 and land associated with Venner's Water further north, see Figure 10.1 in Volume 2 of this report.

- 10.3.12 Post-1988 ALC data are only available for small areas at the northern and southern extents of the study area. In the north, between the M5 junction 25 to Henlade, the land is predominantly in Subgrade 3b with smaller areas of Grade 2 and Subgrade 3a land, see Figure 10.1 in Volume 2 of this report.
- 10.3.13 In the south, there is an area of Grade 2 which could be affected by works associated with the existing A303 roundabout at Ilminster, see Figure 10.1 in Volume 2 of this report.
- 10.3.14 For the remainder of the route, regional ALC mapping shows that the majority of the land within the study area is Grade 2 (very good quality) and Grade 3 (good to moderate). Where undifferentiated Grade 3 land is mapped by the provisional ALC data, it is assumed that BMV land in Grade 2 and Subgrade 3a is likely to be present.

Mining, quarrying and mineral resources

- 10.3.15 British Geological Society (BGS) Mineral Resource Information has been referenced in the Stage 2 Scoping Report and EAR, no recorded mineral sites have been identified in close proximity to the route, although the Blue Lias Formation (limestone) is recorded as a resource which intersects the route.
- 10.3.16 Superficial deposits are not identified as a mineral resource in the BGS onshore mineral resources database, however, there is evidence for historical quarrying in the area, see following paragraphs. Further detail and assessment is presented in Chapter 1 Material assets and Waste

Historical mineral extraction sites (potentially infilled)

- 10.3.17 Two areas of historical quarrying have been identified within the study area based on historical mapping:
- a quarry is indicated on-route near Home Farm; and
 - a gravel pit just north of the proposed Jordan's Bridleway
- 10.3.18 The presence or composition of any backfilled material is unknown.

Landfills

- 10.3.19 Six records of historical landfills have been identified within 500m of the study area, and two are noted to intersect the proposed scheme. These are:
- Thornfalcon Refuse Tip at West Hatch Land Junction off-slip embankment of the east bound carriageway which accepted commercial and household wastes, located in a former railway cutting; and
 - Ashill Bypass Site A Landfill at the crest of cutting, the facility accepted inert waste.
- 10.3.20 Detail of other landfills within the study area are presented in Appendix D
- 10.3.21 Several of the landfill sites are former historical features including old gravel pits and railway cuttings, e.g. at West Hatch Lane. Some former landfills are not in evidence on the historical Ordnance Survey (OS) maps reviewed. Further detail on these features is available in the PSSR.

Potential sources of contamination

10.3.22 The study area is a predominately rural setting however a number of potentially contaminative land uses have been identified including; historical landfills, sewage works, commercial activities and fuel storage sites and evidence of made ground of unknown quality. The following are considered ‘Significant Sites’ based on criteria within HA 73/95 (now withdrawn):

- former Thornfalcon Refuse Tip/Thornfalcon Tip as it intersects the proposed slip embankment;
- former inert Ashill Bypass Site A Landfill is located directly on the route corridor;
- Off line bulk fuel storage/fuel stations; former Ashill petrol filling station (PFS) (Stewley Cross) and Shell Services, Horton Cross;
- unknown made ground at former Great Western Railway (GWR) cutting on line at West Hatch Lane; and
- commercial industrial site; Foresters Garden Buildings north west of West Hatch Lane, manufacturers of timber products.

10.3.23 Other sites associated with potential contamination risk within the study area include:

- other landfills in the study area i.e. near Dairy Farm, Land east of Bow Bridge and Saw Mills;
- former Butlers Fuel Depot, Kenny Lane, Ashill;
- Texaco service station at Mattock’s Tree Hill;
- Hatch Green Garage and PFS at Hatch Green;
- depot at Greenway Lane
- farmyards (potential contamination sources include fuel tanks and slurry pits);
- sewage works north of the proposed scheme at Ashill and a second southwest at Horton Cross;
- other commercial sites include a builders’ yard at Hatch Beauchamp and used motorhome dealer at Mattock’s Tree Hill; and
- presence of made ground associated with existing road construction and the immediate environment of the route corridor, infilled disused quarries and former gravel pits.

10.3.24 An unexploded ordnance (UXO) pre-desk study assessment completed by Zetica has identified the site to be at low UXO hazard level. The Stage 2 report indicated that no further UXO investigation is required⁷⁸.

10.3.25 Potential sources of land contamination noted above are shown on Figure 10.2, and listed in Appendix D.

Surface water and groundwater

10.3.26 There is the potential that contaminants from land contamination and landfills may impact on groundwater and surface water. Information on surface water and groundwater receptors are covered in chapter 14, road drainage and the water environment.

⁷⁸ CIRIA Report C681 (2009) “Unexploded Ordnance (UXO): a guide for the construction industry”. CIRIA

10.3.27 Surface water and groundwater will be monitored, as part of the ground investigation works, to enable assessment of the potential impact of the proposed scheme on groundwater and surface water.

Future Baseline

Geology

10.3.28 No significant change anticipated.

Surface water and Groundwater

10.3.29 Any future land use changes, for example a new bulk fuel storage premises i.e. petrol filling station developed in the study area, would potentially impact baseline soil condition, groundwater and surface water quality in the area. Existing ground conditions would generally improve (particularly groundwater and surface water quality) in areas where existing / historical land contamination sources identified along the route are remediated.

10.3.30 It is noted that a new business park is to be developed at the M25 junction which could introduce new potential sources of contamination (called Nexus 25).

10.3.31 The owners of the former Butler's fuel depot have applied for permission to redevelop the land for a residential use which would potentially require remediation of soil and /or groundwater contamination and also introduce new sensitive receptors. The application has been granted permission in principle..

10.3.32 An application to redevelop the former post office adjacent the former Ashill petrol fuel station for 10 residential units, is currently under consideration, this would also introduce new sensitive receptors and potentially require remediation of soil/groundwater contamination.

10.3.33 Planning for a mixed use residential and commercial development at B3168 Station Road Ilminster south of the Southfields roundabout, on the former Horlicks factory are underway and these, if granted, could introduce new sensitive receptors and potential sources of contamination dependent on the activities located on the commercial development.

Soils

10.3.34 No significant changes to baseline are anticipated.

Value of receptors

10.3.35 An overview of the criteria used to determine the value (sensitivity) of geology and soil receptors is provided in Table 10-1, this is based on the criteria set out in Table 3.11 of DMRB LA 109, and provided in Table 10-1 below. The value / sensitivity of surface water and groundwater receptors have been determined based on the criteria set out in DMRB LA 113 (see Chapter 14).

Table 10-1 Value (sensitivity) of receptors in the study area for geology and soils

Value/ sensitivity	Aspect	Description	Examples within the study area
Very High	Geology	International designated sites of geological value (e.g. UNESCO World Heritage Sites).	None identified within the study area.

Value/ sensitivity	Aspect	Description	Examples within the study area
	Agricultural land and soil	ALC Grades 1 and 2. Soils directly supporting an EU designated site (e.g. Special Area of Conservation or Special Protection Area).	Detailed post 1988 data shows areas of land in ALC Grade 2 in the study area.
	Human health	Very sensitive land use such as residential, allotments, schools	Residential properties scattered along the route and settlements including; Henlade, Ruishton, Thornfalcon, Haydon, West Hatch, Hatch Beauchamp and Ashill with other residential properties. Also Somerset Progressive School adjacent the route at West Hatch, Ashill Primary School.
	Groundwater	Principal aquifer, providing a regionally important resource and/or supporting a site protected under EC and UK legislation. Groundwater that locally supports a groundwater dependent terrestrial ecosystem (GWDTE). Inner source protection zone (SPZ1).	No source protection zones within the vicinity of the route and study area. No Principal aquifer within the study area. Ecosystem1
	Surface water	Watercourse having a Water Framework Directive (WFD) classification shown in a River Basin Management Plan 1 (RBMP) and a $Q95 \geq 1.0 \text{m}^3/\text{s}$. Species or site protected/designated under EC or UK legislation e.g. site of special scientific interest (SSSI), special protection area (SPA).	River Tone, Main River WFD watercourse
High	Geology	Rare and of national importance with little potential for replacement (e.g. geological SSSI). Geology meeting national designation citation criteria which is not designated as such.	None.
	Agricultural land and soil	ALC Subgrade 3a Soils directly supporting a UK designated site (e.g. SSSI).	Detailed post-1988 data shows land in ALC Subgrade 3a in the study area. Undifferentiated grade 3 land is mapped for much of the study area.
	Human health	High sensitivity land use such as public open space.	Ashill Playground
	Groundwater quality	Principal or Secondary A aquifer providing locally important resource or supporting a river ecosystem.	Superficial Colluvium and Head deposits and solid geology of the Blue Lias

Value/ sensitivity	Aspect	Description	Examples within the study area
		Groundwater supports a GWDTE. Unlicensed private water supply. SPZ2	Formation are Secondary A aquifers. 2No. private water supplies used for drinking water and food preparation identified at Ashe farm caravan and camping site.
	Surface water quality	Watercourse having a WFD classification shown in RBMP with a Q95<1.0m3/s. Species protected under EC or UK legislation.	River Ding, ordinary watercourse, WFD watercourse
Medium	Geology	Regionally Important Geological Sites with limited potential for replacement (e.g. RIGS). Geology meeting regional designation citation criteria which is not designated as such.	None identified in the study area.
	Agricultural land and Soil	ALC Subgrade 3b Soils supporting non-statutory designated sites (e.g. LNR).	Detailed post-1988 data shows large area of land in ALC Subgrade 3b at the northern end of the proposed scheme at the M5 Junction 25. Undifferentiated Grade 3 soils are mapped for much of the study area.
	Human health	Medium sensitivity land use such as commercial or industrial.	Users of commercial properties and industrial areas located throughout the study area, eg: depot, PFS, farm workers.
	Groundwater quality	Secondary B aquifer / aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3	Secondary B aquifers in Mercia Mudstone Group and Branscombe Formation Licensed abstractions used for commercial purposes identified in the study area at Taunton Racecourse.
	Surface water quality	Watercourse not having a WFD classification shown in RBMP and a Q95>0.001m3/s.	None identified, all watercourses likely to be assigned at least high value.
Low	Geology	Geology of local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarries / mining sites).	Local Geological Site, 950m east. Historical mineral extraction sites.
	Agricultural land and Soil	ALC Grades 4 and 5. Soils supporting non-designated notable or priority habitats.	Some local areas of Grade 4 and 5 land could be present in the provisionally mapped undifferentiated Grade 3.
	Human health	Low sensitivity land use such as highways and rail.	Local road network.

Value/ sensitivity	Aspect	Description	Examples within the study area
	Groundwater quality	Undifferentiated strata /unproductive strata.	Alluvium. Charmouth Mudstone Formation including the Belemnite Member at the eastern end of the route
	Surface water quality	Watercourse not having a WFD classification shown in RBMP and a $Q95 \leq 0.001 \text{m}^3/\text{s}$.	Surface water features e.g. ponds and lakes.
Negligible	Geology	No geological exposures, little / no local interest.	None within the study area.
	Agricultural land and Soil	Previously developed land formerly in 'hard uses' with little potential return to agriculture.	A number of areas within the study area have been previously developed.
	Human health	Undeveloped surplus land / no sensitive land use proposed.	Undeveloped field.
	Groundwater quality	Not included in Table 3.70 of LA 113	Not applicable.
	Surface water quality	Not included in Table 3.70 of LA 113	Not applicable.
Notes:			
¹ Please refer to Chapter 9 Biodiversity for identification of sensitive ecosystems			

10.4 Potential Impacts

10.4.1 The methodology used to determine potential impacts is in accordance with DMRB LA 109. A combination of the sensitivity of the receptor (Table 10-1) under consideration and the magnitude of the impact (DMRB LA109, Table 3.12 and Table E/2.1), in relation to the receptor has been used to determine the significance of effects, in accordance with the matrix in Table 5-2 in Chapter 5 which is consistent with the matrix in DMRB LA 104.

Construction

Geology

10.4.2 Only one geological site of local importance has been identified within the region and there are unlikely to be contamination linkages to this feature created by construction of the proposed scheme. The distance from the proposed scheme also means there are unlikely to be any direct effects upon geological feature and it is therefore scoped out of the assessment.

Soil

10.4.3 Soils would potentially be affected during construction by way of:

- damage to soils during stripping, handling and storage, through mechanisms such as compaction and smearing or temporary loss of agricultural land during construction period e.g. location of construction compound, haul routes, storage areas; and
- permanent removal of soils or permanent sealing of agricultural land.

- 10.4.4 For the purposes of this screening report it is assumed that agricultural land within the proposed scheme footprint and construction envelope will be of very good to moderate quality, in Grades 2 and 3b.
- 10.4.5 The area of agricultural land likely to be sealed and therefore lost by development or otherwise required by the proposed scheme will be greater than 20ha (DMRB LA109, Table 3.12). This physical removal or permanent sealing of agricultural land has a Major magnitude of impact, resulting in likely Large to Very Large adverse effect during construction.
- 10.4.6 Embedded mitigation measures such as stripping of topsoil for use elsewhere in the proposed scheme would reduce the extent of permanent sealing and or loss of topsoil. A Soils Management Plan (SMP) will be prepared in accordance with Defra's Code of Construction Practice for the Sustainable Use of Soils on Construction Sites and BS3882:2015 guidance, which sets out best practice management measures. The adoption of appropriate mitigation for soil handling and restoration, will ensure the majority of disturbed soils would be able to continue their various ecosystem functions once construction was complete.
- 10.4.7 However, some soils removed from areas of land within Flood Zone 3 will lose their flood alleviation function. As such, the proposed scheme could potentially result in a moderate magnitude of impact for some of the soils in relation to degradation but resulting in overall likely slight adverse effects for the soil receptors during construction.
- 10.4.8 Soils are scoped in for the construction phase of the project.

Human Health

- 10.4.9 Made ground, infill materials, and natural soils underlying the proposed scheme may have been potentially contaminated by historical and current land use activities identified including historical landfill sites, infilled mineral extraction pits, fuel storage, PFS, industrial areas and farmyards. Disturbance of potentially contaminated soils may cause an increase in leaching and mobilising of contaminants, along new or existing surface or sub-surface pollution pathways. These could create new pathways to receptors.
- 10.4.10 Ground gases /vapours may be associated with the existing historical landfills at Thornfalcon/nr Dairy Farm which could migrate to a small number of commercial/residential properties in close proximity to the proposed scheme. The current scheme design suggests there would be limited interaction with the landfills, however this may have to be reassessed once final design is adopted. Vapours could also be associated with former fuel sites where there is residual contamination which could also migrate to adjacent properties.
- 10.4.11 Ground investigation soil chemical data was not available at the time of writing, therefore, screening of the soil chemical analysis data against soil guideline values for human health risk assessment has not been undertaken. However, the impact on human health from exposure to contaminants exposed during the construction phase is considered likely to be minor to moderate based on information available from the PSSR. There is a short-term human health risk of exposure to potentially harmful contaminants at the landfill sites, infilled railway cutting, and other commercial sites such as bulk fuel storage sites, PFS and timber product site.

Groundwater and surface water

- 10.4.12 Disturbance of potentially contaminated soils from landfills or localised residual contamination from former or existing fuel sites, or the timber plant or diffuse pollutants from agricultural land along the proposed scheme could be caused due to earthworks and/ or use of piled foundations for structures. This may cause an increase in leaching of contaminants in soils and mobilising of contaminants along new or existing surface or sub-surface pollution pathways. This may lead to the quality of surface waters and groundwater aquifers being impacted through runoff, infiltration and vertical and horizontal movement of contaminated groundwater and leachate. In the absence of site-specific ground investigation data and baseline groundwater monitoring data, the predicted significance of effects on Controlled Waters is likely to be moderate, prior to mitigation.
- 10.4.13 Risks during construction are typically mitigated by applying good working practice set out in an Environmental Management Plan (EMP) or Health and Safety Plan and can help to reduce likelihood of pollution incidents occurring. Assuming appropriate good working practices are undertaken during construction, the predicted significance of effects is likely to be low. Groundwater and surface water likely to be affected by contaminated land has been scoped in for the construction phase.

Operation

Geology

- 10.4.14 No additional impacts are predicted on geology during the operational phase. Operational effects on geology are therefore scoped out of further assessment.

Soils

- 10.4.15 No additional impacts are predicted on soils or agricultural land during the operational phase. The permanent loss of agricultural land occurring during construction would continue into operation but is not considered as an additional impact. Temporary impact arising during construction on soil quality in relation to degradation during handling may extend into operation but should not be persistent assuming that the best practice mitigation measures in section 10.5 are applied and use of a soil restoration plan. Operational impacts on soils and agricultural land are therefore scoped out of further assessment.

Human health

- 10.4.16 The proposed scheme will be predominately comprise hardstanding and contamination which was identified as having the potential to cause significant effect to human health would likely be removed during construction. This would reduce the potential for contact with contaminated soil/waste during the operational phase. The impact to future site users would be reduced to negligible on human health.
- 10.4.17 Similarly, it is considered likely that appropriate site-specific risk assessments and method statements would be produced to control any likely future exposure to maintenance workers. However, human health for maintenance workers and occupants of residential properties has been scoped in where the alignment interacts with, or properties are near, landfill sites or fuel storage sites due to the

possibility of them being affected by ground gas/vapours during the operational phase.

Groundwater and surface water

- 10.4.18 During the operational stage, potential contaminated land linkages would have been addressed by the construction of the road therefore no additional impacts are predicted in relation to water receptors. Operational impacts on surface water and groundwater from land contamination are therefore scoped out of further assessment.
- 10.4.19 During operation there is the potential for leakage of various chemicals and fuels from vehicle using the road which could impact controlled waters due to surface run-off from the road. The potential impacts on water receptors are addressed in Chapter 14.

10.5 Design, Mitigation and Enhancement Measures

- 10.5.1 The following mitigation measures would be put in place for the receptors that have been identified as being potentially impacted by the proposed scheme or would potentially impact the scheme. Mitigation measures would include both embedded mitigation and additional mitigation measures.
- 10.5.2 Embedded mitigation would include design measures which may include the use of:
- consolidated development footprints to reduce the loss of agricultural land;
 - stripping of topsoil as a minimum from the footprints of all permanent development (hardstanding and materials placement), followed by sustainable reuse within the proposed scheme or elsewhere, wherever practicable;
 - to promote sustainable reuse of excavated made ground and natural soils either within the scheme or at a receiver or hub site, a Materials Management Plan (MMP) will be prepared in advance of construction works in accordance with CL:AIRE Definition of Waste Code of Practice (2011) (v.2), see Chapter 11 Material assets and waste;
 - waste hierarchy principles to be used at every stage of the project, as appropriate to identify opportunities for reuse of soils within the proposed scheme;
 - development and implementation of a soil resource plan prior to construction start of works, consistent with Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2009);
 - production of a SMP;
 - ground investigation (GI) - to be completed (mid 2021);
 - risk assessments and method statements to be completed as part of the construction process and for future maintenance activities.
 - An EMP to be prepared for the EIA and DCO submission; and
 - The EMP to be further developed by the appointed contractor prior to the start of construction works.
- 10.5.3 Additional mitigation measures may also be developed to address specific identified impacts. At this stage, the requirement for specific mitigation measures in respect of soils and geology could include, for example:
- remedial works where risk from land contamination to human health, controlled waters is assessed as high or moderate eg: associated with landfill

sites (or sites identified following the ground investigation which may identify areas of existing contamination); and

- control measures to mitigate potential effects from gas migration, dust / vapour generation.

10.5.4 The requirement for remedial works is usually informed by ground investigations and detailed risk assessment. Remedial options and associated costs would be likely be more complex and costly if the route is aligned through the existing landfill boundaries. The design should avoid these areas, if possible, to reduce costs, although remediation of these legacy sites would be of environmental benefit.

10.6 Description of the likely significant effects

10.6.1 A lack of site-specific ground investigation and ground gas/ groundwater monitoring means that it is not feasible to identify likely significant or residual effects in respect to geology and soils at this stage. However, the incorporation of the mitigation measures outlined in Section 10.5, would mean the residual effects are unlikely to be significant, with the exception of the loss of agricultural land.

10.7 Assessment Methodology

10.7.1 The assessment of the potential effects on the geology and soil characteristics, including land contamination, will consider the following legislation, regulations, planning policies and guidance:

- Environmental Protection Act 1990, Part IIA;
- Environmental Permitting (England and Wales) Regulations 2016;
- Water Framework Directive (Council Directive 2000/60/EC); implemented in England by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- Wildlife and Countryside Act 1981, as amended;
- National Planning Policy Framework (NPPF);
- National Policy Statement for National Networks (NPSNN);
- DMRB LA 104 – Environmental Assessment and Monitoring;
- DMRB LA 109 – Geology and Soils⁷⁹; and
- DMRB LA 113 – Road drainage and the Water Environment.

10.7.2 The criteria that will be used to assess the value (sensitivity) of receptors and magnitude if impacts are based upon those in DMRB LA 109.

10.7.3 The sensitivity of the soils and geology receptor as outline in Table 10-1 is combined with the magnitude of impacts and the matrix in Table 5-2 is applied which is consistent with the matrix in DMRB LA 104. This is in accordance with DMRB LA 109 to assist professional judgement when determining the significance of effects.

10.7.4 Desk studies will be completed for the key sites identified as potentially contaminated. It is proposed that information gained from an intrusive site investigation and period of environmental monitoring will be used in the

⁷⁹ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA 109 Geology and Soils*. Available at: <https://www.standardsforhighways.co.uk/prod/attachments/adca4c7d-4037-4907-b633-76eaed30b9c0?inline=true> (Accessed January 2021)

assessment for geology and soils. Data will be gathered on the chemical quality of soil and groundwater which will be used to inform further stages of assessment.

- 10.7.5 A land contamination risk assessment will be undertaken in accordance with the online guidance Land Contamination Risk Management (LC:RM). A Conceptual Site Model (CSM) (based on LC:RM) will be developed as part of the initial desk-based assessment of the scheme. The CSM will identify and assess contaminant linkages using the source-pathway-receptor model. Development of the CSM forms the main part of preliminary risk assessment and the model is subsequently refined or revised as more information becomes available (for example ground investigation data).
- 10.7.6 Data gathered from the GI and environmental monitoring will be assessed and the CSM and preliminary risk assessment presented in the desk study will be updated. Potential risks to human health will be assessed by screening soil contaminant concentrations against relevant soil screening criteria (e.g. category 4 screening levels) recommended in DMRB LA 109 for assessment of risk to human health from land contamination. Similarly, potential risks to controlled waters will be assessed by screening monitoring data against relevant guideline screening values. Where exceedances of screening levels are established, further risk assessment and/or additional mitigation works will be recommended and incorporated into the design.
- 10.7.7 Additional technical consultation with various statutory and non-statutory bodies and external sources will be undertaken to obtain the latest information on baseline conditions, particularly landfills, private water supplies (PWS) and licensed water abstractions.
- 10.7.8 Monitoring of watercourses likely to be impacted by the proposed scheme (see chapter 14 for details of watercourses) may be undertaken prior to the start of construction works. This will be detailed in the Environmental Statement and EMP. The purpose of the monitoring would be to provide data under differing flow conditions which would be used to assess the impact, if any, of the proposed scheme development on surface water quality during and post construction works.
- 10.7.9 An ALC survey will be undertaken to inform further stages of assessment, in accordance with the Revised Criteria for Grading the Quality of Agricultural Land (MAFF, 1988). Consultation with Natural England will be undertaken to verify the survey methodology and survey results. The detailed soil and ALC survey will examine and record the characteristics (depth of horizon, texture, colour, stone content etc) of soil profiles using a hand-held auger at a density of one auger observation per hectare within the site boundaries. Soil pits will also be dug to examine and record subsoil structure and rooting depth for each main soil type identified. Topsoil and subsoil samples will be taken for laboratory determination of particle-size analysis to confirm hand-texturing in the field surveys, pH, organic matter content and major nutrients.
- 10.7.10 The proposed assessment methodology is compliant with the NPSNN policy for geology and soils outlined in section 10.1.
- 10.7.11 In accordance with LA109, where significant residual effects have been identified, the EMP shall include remediation monitoring requirements, to be agreed with the relevant authorities.

10.8 Assessment Assumptions and Limitations

- 10.8.1 The proposed assessment methodology will largely be dependent on information obtained from third party sources the quality of which has not been independently verified. Some additional information may be available from the proposed ground investigation and monitoring programmes.
- 10.8.2 The following limitations have been encountered:
- Only provisional ALC data are available for the majority of the study area. An ALC survey will be undertaken to inform further stages of assessment.
 - Ground investigation is being scoped at the time of writing. In the absence of ground investigation data, potential impacts to current land users, groundwater and surface water from land contamination cannot be fully assessed at this stage.
 - The ground investigation is programmed to be completed and data made available in time to inform the assessment. However, if some of the GI data are unavailable at the time of drafting the Environmental Statement (due to unforeseen circumstances), a qualitative land contamination risk assessment will be completed.
 - It is proposed to undertake additional technical consultation with various statutory and non-statutory bodies and external sources to obtain the latest information on baseline conditions. However, the information held by these sources may in some cases be limited and may be delayed. Where there is a lack of third-party data, professional judgement will be used in interpreting available desk study information.

11 Material assets and waste

11.1 NPSNN requirements

11.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

11.1.2 Key policies from the NPSNN relevant to this discipline includes:

- Paragraphs 4.28 to 4.29 of the NPSNN state that applicants should include design as an integral consideration from the outset of a proposal; and inter alia produce sustainable infrastructure efficient in the use of natural resources.
- Paragraph 5.169 of the NPSNN states that applicants should safeguard any mineral resources on the proposed site as far as possible.
- Paragraph 5.182 of the NPSNN states that where a proposed development has an impact on a Mineral Safeguarding Area, the SoS should ensure that the applicant has put forward appropriate mitigation measures to safeguard mineral resources.
- Paragraph 5.42 of the NPSNN states the applicant should set out the arrangements that are proposed for managing any waste produced. The arrangements described should include information on the proposed waste recovery and disposal system for all waste generated by the development. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome.

11.2 Study area

11.2.1 This scoping assessment has been prepared in accordance with Highways England Design Manual for Roads and Bridges (DMRB) LA 110 Material Assets and Waste⁸⁰ guidance. DMRB LA 110 provides the requirements for assessment, reporting and management of environmental effects associated with the consumption / use of material assets, and the disposal recovery of waste from the delivery of motorway and all-purpose trunk road projects.

11.2.2 The scoping assessment for material assets and waste considers the following:

- The consumption of materials and products which includes materials from primary, secondary, recycled, sustainable, and renewable sources, and the use of excavated and other arisings that fall within the scope of waste exemption criteria; and
- The production and disposal of waste on the proposed scheme.

11.2.3 In accordance with DMRB LA 110, the assessment of material assets and waste is based on two geographically different study areas to consider the use of

⁸⁰ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA 110 Material Assets and Waste*. Available at: <https://www.standardsforhighways.co.uk/prod/attachments/6a19a7d4-2596-490d-b17b-4c9e570339e9?inline=true> (Accessed January 2021)

primary, secondary and recycled construction materials; and secondly the generation and management of waste:

- The first study area is based on the construction footprint / project boundary (Proposed Scheme area) including compounds and temporary land take as this comprises the area where construction materials will be consumed, and wastes would be generated; and
- The second study area considers the area from which construction materials will be required to construct the proposed scheme and the waste infrastructure that is likely to be suitable to accept arisings and/or waste generated by the proposed scheme. For the purposes of this assessment this second study area will focus on the county of Somerset where the proposed scheme is located although consideration has also been included for the wider South West region (Cornwall, Devon, Dorset, Gloucestershire, Somerset and Wiltshire).

11.2.4 The study has been extended to include the wider South West region based on the potentially large surplus of material currently identified for the project and the anticipated waste capacity available within Somerset.

11.2.5 As indicated within DMRB LA 110, professional judgement has been used to provide consideration on a balance of the proximity principle and value for money principle for establishing the second study area.

11.3 Baseline conditions

Baseline sources

11.3.1 Desk based assessment has been undertaken for the two study areas to consider the current and likely future baseline conditions for material assets and waste during the anticipated construction period (assumed to be 2025 to 2028).

11.3.2 Baseline data has been collected at county (Somerset) level and regional (South West of England) level which includes data on the availability of:

- primary, secondary and recycled aggregates;
- presence of mineral safeguarding areas and/or peat resources; and
- information on licensed waste management capacity, including remaining landfill void space and waste transfer, waste treatment, metal recycling and waste incineration facilities.

11.3.3 The baseline assessment has been prepared with reference to the latest minerals and waste planning information published by the South West Aggregates Working Party (SWAWP), Somerset County Council (SCC) as the Minerals and Waste Planning Authority, and the Environment Agency (EA).

Baseline information

Material Resources

11.3.4 In addition to site won materials such as sand, gravel and clays, the main materials used in road construction will be aggregates such as sand, gravel and crushed rock which will usually comprise mainly primary aggregates although other aggregates can be used subject to them meeting specification. These will principally be sources from off-site.

11.3.5 The British Geological Survey (BGS) Mineral Planning Factsheet for Construction Aggregates⁸¹ indicate that aggregates are normally defined as being hard, granular materials which are suitable for use either on their own or with the addition of cement, lime or a bituminous binder in construction, the following definitions are provided for aggregates, as is given in Table 11-1:

Table 11-1 BGS descriptions for construction aggregates

Aggregate	Description
Primary	Aggregates produced from naturally occurring mineral deposits, extracted for use as aggregates and used for the first time.
Secondary	Aggregates obtained as a by-product of other quarrying and mining operations
Recycled	These arise from various sources including demolition or construction of buildings and structures, or from civil engineering works. Other forms of recycled aggregates are asphalt planings from resurfacing roads and railway track ballast.

Material Resources – Operation of Existing Highways Network

11.3.6 The operation and maintenance of the existing A358 road consumes both unbound aggregates (used as sub-base and drainage applications) and bound aggregates (used in ready mixed concrete and asphalt).

11.3.7 At the time of writing, no figures have been obtained regarding the baseline quantities of operation and maintenance materials used within the proposed scheme area. This information will be obtained where available for use as the baseline for the Environmental Statement (ES).

Material Resources – Primary Aggregates

11.3.8 Materials required for the construction of the proposed scheme will include both aggregates (e.g. sand and gravel and crushed rock) and aggregate containing materials (e.g. asphalt and concrete products). Some of these materials would originate off site, purchased as primary construction products, but it is likely that some would arise onsite, particularly from the use of excavated soils, crushed concrete or recycled asphalt planings, or recycled materials brought in from off site, possibly from other projects or industries. However, some materials could also be encountered which may be more difficult to re-use in the proposed scheme such as tar bound road planings.

11.3.9 The National Planning Policy Framework (NPPF) requires Mineral Planning Authorities (MPAs) to maintain a landbank of at least 7 years for supplies of sand and gravel and ten years for supplies of crushed rock.

11.3.10 Table 11-2 below provides a summary of aggregate sales and reserves in Somerset from the SCC Local Aggregate Assessment (LAA) (second revision 2017) for 2006-2015⁸².

⁸¹ The British Geological Survey (2019) *Mineral Planning Factsheet for Construction Aggregates* [online]. Available at: https://www2.bgs.ac.uk/mineralsuk/download/planning_factsheets/mpf_aggregates.pdf (Accessed January 2021)

⁸² Somerset County Council (2017) *Local Aggregate Assessment for 2006-2015*. Somerset County Council

Table 11-2 Aggregate sales and reserves in Somerset 2015

Mineral	2015 Sales (tonnes)	Reserves at end of 2015 (tonnes)	Landbank (years)
Sand & Gravel	-	7 million	12.5
Crushed Rock	12.55 million	380 million	28.4
Marine Aggregates	55,000	-	-
Secondary Aggregates	19,501	-	-
Recycled Aggregates	65,130	-	-

11.3.11 The LAA indicates Somerset is the largest producer of crushed rock in the south of England but that sand and gravel resources are limited and these materials have not been extracted during the past 10 years. Sand and gravel resource at 'Whiteball', extracting from the Budleigh Salterton Pebble Beds formation, straddles the Somerset-Devon border and supplies aggregates into both counties.

11.3.12 The LAA indicates that Mineral Planning Authorities for Somerset, Devon and Cornwall have signed an MoU that provides a mechanism for sharing data and maintaining a joint sand and gravel landbank (with a significant contribution from Devon).

11.3.13 The Devon Local Aggregate Assessment for 2009-2018⁸³ provides the following data for sand and gravel reserves in Devon (Table 11-3).

Table 11-3 Aggregate reserves in Devon for 2018 and 2027

Mineral	Reserves at end of 2018 (tonnes)	Landbank at end of 2018 (years)	Reserves at end of 2027 (tonnes)	Landbank at end of 2027 (years)
Sand & Gravel	4.885 million	9.7	0.853 million	1.6

11.3.14 The SCC LAA indicates that marine-dredged sand and gravel originating from the Bristol Channel is landed at Dunball Wharf in Somerset which is run by a single operator with approximately 55,000 tonnes of marine-dredged sand and gravel landed in 2015. The total area dredged in 2015 was noted as being <5% of the licensed area and the LAA indicates that if landings and tide allows there is potential to dredge and land more material. The Somerset Minerals Plan Development Plan Document up to 2030⁸⁴ (Adopted 2015) indicates annual quantities landed at the Wharf equate to roughly 5-10% of Somerset's sand and gravel consumption.

11.3.15 The Somerset Minerals Plan Development Plan Document up to 2030 (Adopted 2015) indicates there are a number of aggregate sites in Somerset that are considered to be dormant. Dormant sites were defined as a mineral site where no mineral development has taken place to any substantial extent in, on, or under the site at any time in the period 22 February 1982 and 06 June 1995. Dormant sites have extant planning permission but do not have agreed modern working

⁸³ Devon County Council (2020) *8th Devon Local Aggregate Assessment 2009-2018*. Available at: <https://www.devon.gov.uk/planning/planning-policies/minerals-and-waste-policy/local-aggregate-assessment> (Accessed January 2021)

⁸⁴ Somerset County Council (2030) *The Somerset Minerals Plan: Development Plan*. Available at: <https://www.somerset.gov.uk/waste-planning-and-land/somerset-minerals-plan/> (Accessed January 2021)

conditions. Dormant sites are listed at Barnclose, Cloford, Cookwood, Emborough, Highcroft, Tadhil, Tor Hill, West Quantoxhead and Westdown.

11.3.16 At the time the Minerals Plan was prepared it was considered unlikely that any of these sites would be worked again during the Plan Period. However, it was noted that evidence suggests that Westdown and Cloford may be proposed for working at a future date (outside the Plan Period).

Materials resources - recycled and secondary aggregates

11.3.17 The Somerset Minerals Plan Development Plan Document up to 2030 (Adopted 2015) indicates there are a number of permitted recycling aggregate facilities in Somerset located in former quarries or waste transfer stations. In addition, active quarries also generate recycled aggregates, and inert waste is often treated on-site (for example as part of major new development schemes) via mobile crushers.

11.3.18 Estimates within the Mineral Plan indicate that the potential capacity of existing facilities for recycled and secondary aggregates in Somerset is over 160,000 tonnes per year. However, the Minerals Plan considers this figure to be an underestimate and that it does not fully represent the potential supply of secondary and recycled aggregate.

11.3.19 The Minerals Plan notes that the Mineral Planning Authority will support the supply of recycled and secondary aggregates including (but not limited to) high quality recycled aggregates and the development of aggregate recycling facilities in appropriate locations.

Mineral safeguarding areas and peat resources

11.3.20 The NPPF requires that planning policies should:

- Provide for the extraction of mineral resources of local and national importance, but not identify new sites or extensions to existing sites for peat extraction (Paragraph 204,a).
- Safeguard mineral resources by defining Mineral Safeguarding Areas (MSA); and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided, whilst not creating a presumption that the resources defined will be worked (Paragraph 204,c).
- Set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place (Paragraph 204,d).
- Safeguard existing, planned and potential sites for: the bulk transport, handling and processing of minerals; the manufacture of concrete and concrete products; and the handling, processing and distribution of substitute, recycled and secondary aggregate material (Paragraph 204,e).

11.3.21 NPPF also indicates that Local Planning Authorities should not normally permit other development proposals in Mineral Safeguarding Areas if it might constrain potential future use for mineral working (paragraph 206).

11.3.22 The SCC Minerals Plan (adopted 2015) Development Plan Document up to 2030 indicates the three main mineral types worked in Somerset are aggregates (crushed rock with minimal amounts of sand and gravel), building stone (various types) and peat.

- 11.3.23 MSAs have been designated in Somerset for mineral deposits comprising sand and gravel (aggregates) and various types of bedrock for use as aggregates and building stone along with surface coal. Peat is not listed within the list of mineral deposits.
- 11.3.24 Mineral Consultation Areas (MCA) relate to areas where the District and Borough councils are required to consult the Mineral Planning Authority over non-minerals development. All of the MSAs in the county will be covered by an MCA.
- 11.3.25 The SCC Minerals Plan does not show any Mineral Safeguarding Areas within the proposed scheme area. The nearest is for building stone to the east of Stoke St Mary, approximately 400m to the west / south west of the proposed scheme. The SCC Mineral and Waste Development Framework – Minerals Topic Paper 6 for Mineral Safeguarding Areas indicates that this MSA is designated for Blue Lias bedrock.
- 11.3.26 There are no peat resources located within the proposed scheme area.

Waste generation and management

- 11.3.27 Environment Agency Waste Management 2019⁸⁵ data for the South West indicates that 1,573,000 tonnes of waste was received / handled in Somerset in 2019, with 20,390,000 tonnes in the South West region. A summary of the Environment Agency data for 2019 from waste returns has been provided in Table 11-4.

Table 11-4 Waste breakdown by disposal route for Somerset and the South West in 2019

Type	Somerset (tonnes)	South West (tonnes)
Landfill	484,000	3,211,000
Transfer	300,000	3,824,000
Treatment	583,000	8,334,000
Metal Recovery / Recycling	90,000	1,551,000
Incineration (throughput)	0	1,030,000
Use of Waste	0	112,000
Land Disposal	110,000	2,276,000
Storage	6,100	52,000
Total	1,573,000	20,390,000

Environment Agency Waste Data Interrogator does not indicate there was any incineration or capacity for incineration within Somerset in 2019

- 11.3.28 In addition, the Environment Agency Waste Data Interrogator for 2019 indicates that a further 261,000 tonnes of material was processed in Somerset via a mobile plant license with the majority (250,000 tonnes) for land-spreading.
- 11.3.29 Environment Agency records relating to landfill inputs in Somerset for 2019 provided by the Environment Agency Waste Management Information 2019 have

⁸⁵ Environment Agency (2020) 2019 Waste Data Interrogator [online]. Available at: <https://data.gov.uk/dataset/d409b2ba-796c-4436-82c7-eb1831a9ef25/2019-waste-data-interrogator> (Accessed January 2021)

been summarised in Table 11-5. The data does not indicate there was any hazardous waste landfill capacity within Somerset in 2019.

Table 11-5 Landfill inputs for Somerset and the South West in 2019

Landfill Type	Somerset (tonnes)	South West (tonnes)
Hazardous Merchant	-	51,000
Hazardous Restricted	-	-
Non Hazardous with Stable Non-Reactive Hazardous Waste (SNRHW) cell	224,000	396,000
Non Hazardous	187,000	1,541,000
Non Hazardous (Restricted)	-	-
Inert	73,000	1,223,000
Total	484,000	3,211,000

11.3.30 Table 11-6 summarises hazardous waste as the total quantity and the quantity relating to just construction and demolition (C&D) waste including asbestos in Somerset from the Environment Agency Waste Management Information 2019.

Table 11-6 C&D hazardous waste production for Somerset and the South West in 2019

Hazardous Waste	Somerset (tonnes)	South West (tonnes)
Managed (Total)	38,510	457,213
Deposited (Total)	15,187	384,672
Managed – C&D inc. asbestos	20,364	131,337
Deposited – C&D inc. asbestos	10,288	102,525

'Total' relates to the combined quantities in the Environment Agency Waste Management Information 2019 for European Waste Catalogue (EWC) (also referred to as List of Waste) chapters 01 to 20
C&D relates to the quantities provided for EWC chapter 17 'Construction and Demolition Wastes including Excavated Soil from Contaminated Sites'

11.3.31 Annual capacity data is published by the Environment Agency for landfill and incineration facilities at the regional and sub-regional level along with a national level. However, capacity data is not published for waste transfer, treatment or metal recycling sites.

11.3.32 Landfill capacity in Somerset and South West Region for 2019 provided by the Environment Agency Waste Management Information 2019 has been summarised in Table 11-7.

Table 11-7 Landfill capacity for Somerset and the South West Region in 2019

Landfill Type	Somerset (m ³)	South West (m ³)
Hazardous Merchant	-	1,352,000
Hazardous Restricted	-	-
Non Hazardous with SNRHW cell	1,105,000	3,564,000
Non Hazardous	912,000	8,628,000
Non Hazardous Restricted	-	-
Inert	-	11,494,000

Total	2,017,000	25,038,000
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11.3.33 The Waste Management Information 2019 shows that hazardous waste (merchant) capacity in the South West Region is all located in Gloucestershire and Wiltshire.

11.3.34 Data from SCC on the capacity of their waste management facilities and remaining capacity of landfill is outlined in their most recent Minerals and Waste Annual Monitoring Report (2015-2016)⁸⁶ which is based on data obtained from 2011. This information is provided in Table 11-8 below.

Table 11-8 Waste management capacity for Somerset in 2011

Type	Capacity (tonnes per annum)	Capacity (m ³)
Recycling	1,213,603	
Other Recovery	45,000	
Non-hazardous landfill		5,146,000 *
Inert landfill		900,000

* Indicated in the SCC Annual Monitoring Report at 3,155,391 m³ in December 2015

11.3.35 The SCC Minerals and Waste Annual Monitoring Report (2015-2016) indicated that non-hazardous capacity relates to three landfill sites; Walpole (near Bridgewater), Dimmer (near Castle Cary) and Whiscombe (near Somerton). The Somerset Waste Core Strategy⁸⁷ (adopted 2013) indicates there is sufficient capacity to meet Somerset's requirements for non-hazardous landfilling until at least 2028 but this was based on data from 2010.

11.3.36 However, the Minerals and Waste Annual Monitoring Report (2015-2016) identified that the capacity of inert landfill disposal in Somerset (identified in Table 11-8 above) from two operational inert landfills according to data from the Environment Agency in December 2013 was now extremely limited and is likely to be used up within the next few years at the current disposal rates.

11.3.37 Environment Agency (2020) Waste Management 2019 data provided in Table 11-7 above indicates there is no remaining inert waste capacity in Somerset and only 2,017,000 m³ of non-hazardous waste capacity (including non-hazardous sites with stable non-reactive hazardous waste (SNRHW) capacity). However, there was 11,494,000 m³ of inert waste capacity within the overall South West region in 2019.

11.3.38 The Environment Agency Waste Data Interrogator for 2019 indicates there were 3 no. permitted non-hazardous landfills in Somerset and 26 no. in the South West.

Waste generation - existing highways network

11.3.39 The annual operation and maintenance of the existing A358 is anticipated to generate a wide range of wastes including asphalt, vegetation, road sweepings, gully arisings, and litter.

⁸⁶ Somerset County Council (2016) Minerals and Waste Annual Monitoring Report 2015-2016. Somerset County Council

⁸⁷ Somerset County Council (2013) The Somerset Waste Core Strategy. Available at: <https://www.somerset.gov.uk/waste-planning-and-land/somerset-waste-core-strategy/> (Accessed January 2021)

11.3.40 No precise figures have been obtained regarding the baseline quantities of operational and maintenance waste generated. This information will be sourced for use as the baseline in the ES where available.

Material recycling targets

11.3.41 The SCC Waste Core Strategy (adopted 2013) Development Plan Document up to 2028 provides recycling targets for C&D waste of 76% for 2020 and 79% for 2028.

11.3.42 Defra UK Statistics on Waste⁸⁸ reports the recovery rate from non-hazardous C&D waste was just over 92% in England in 2016.

Future baseline - aggregates

11.3.43 For the purpose of this assessment, it has been assumed that the primary aggregate landbanks, marine aggregate reserves and the supply market for secondary and recycled aggregate would be largely the same during the construction period (2024 to 2028) as for the baseline.

11.3.44 It is also assumed that the size and location of minerals infrastructure and designations within the study area remains unchanged from the baseline.

Future baseline – waste

11.3.45 The following table provides a summary of the trends in landfilling capacity within Somerset and the South West region from 2004 when the existing landfill classifications were introduced; inert, non-hazardous, non-hazardous landfill sites with a SNRHW cell and merchant hazardous landfill sites. This excludes restricted user non-hazardous and hazardous restricted landfill sites as these are only permitted to only accept waste from the operators of these sites although the Environment Agency Waste Management 2019 data does not indicate there have been any restricted user landfills in Somerset since before 2005 and in the South West region since 2013.

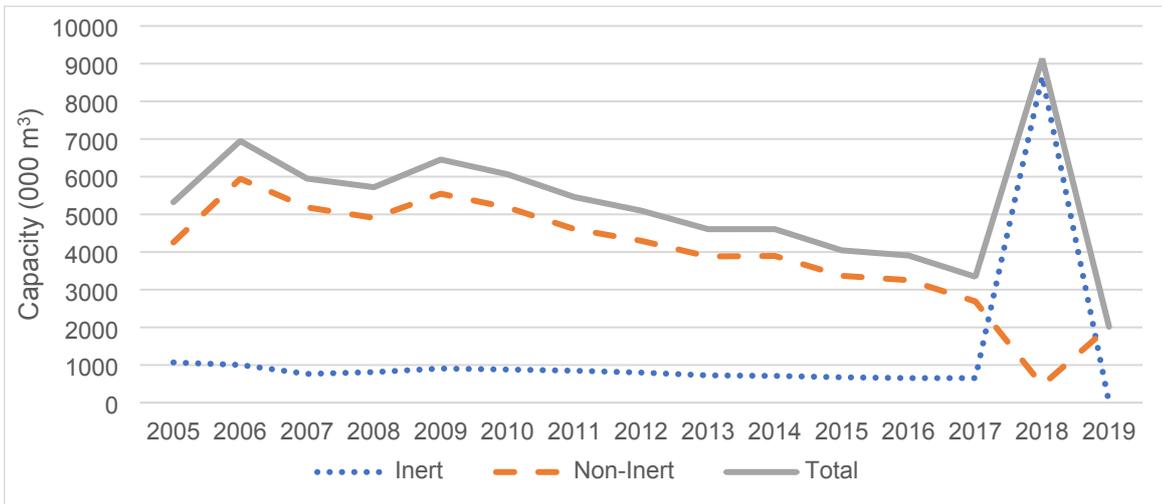
Table 11-9 Landfill capacity for Somerset and the South West 2005-2019

Year	Site Type	Somerset (000 m ³)	South West Region (000 m ³)
2005	Inert	1,069	5,958
	Non-Inert	4,254	46,816
		5,323	52,774
2006	Inert	1,003	6,815
	Non-Inert	5,946	50,737
		6,949	57,552
2007	Inert	765	5,970
	Non-Inert	5,184	46,993
		5,949	52,964
2008	Inert	813	5,418

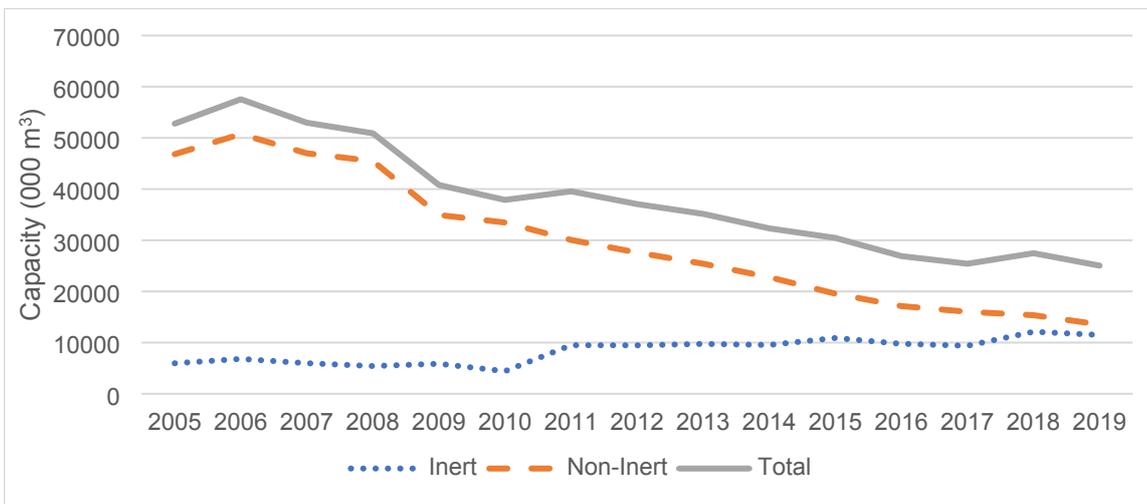
⁸⁸ Department for Environment, Food and Rural Affairs (2020) *UK Statistics on Waste*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918270/UK_Statistics_on_Waste_statistical_notice_March_2020_accessible_FINAL_updated_size_12.pdf (Accessed January 2021)

Year	Site Type	Somerset (000 m ³)	South West Region (000 m ³)
	Non-Inert	4,908	45,478
		5,721	50,896
2009	Inert	908	5,860
	Non-Inert	5,547	34,933
		6,454	40,793
2010	Inert	881	4,415
	Non-Inert	5,183	33,466
		6,063	37,881
2011	Inert	850	9,494
	Non-Inert	4,609	30,058
		5,459	39,552
2012	Inert	800	9,468
	Non-Inert	4,298	27,595
		5,098	37,063
2013	Inert	726	9,737
	Non-Inert	3,882	25,411
		4,607	35,147
2014	Inert	712	9,538
	Non-Inert	3,896	22,781
		4,607	32,318
2015	Inert	675	10,897
	Non-Inert	3,369	19,556
		4,045	30,453
2016	Inert	654	9,763
	Non-Inert	3,254	17,135
		3,908	26,898
2017	Inert	654	9,386
	Non-Inert	2,689	16,024
		3,344	25,410
2018	Inert	8,667	12,117
	Non-Inert	463	15,351
		9,130	27,468
2019	Inert	-	11,494
	Non-Inert	2,017	13,544
		2,017	25,038

11.3.46 Graphics 11-1 and 11-2 summarise the data on landfill capacity provided in Table 11-9.



Graphic 11-1 Landfill Capacity in Somerset 2005-2019



Graphic 11-2 Landfill Capacity in the South West 2005-2019

- 11.3.47 Although the data does not include any additional capacity that may be introduced in the future, it shows there is an overall reducing trend in total landfill capacity within Somerset and the South West region.
- 11.3.48 There was no inert waste capacity in Somerset in 2019 and prior to this there was an overall decreasing trend except for a large increase in inert waste capacity in 2018 although it is possible this could be an error in the data as it is significantly higher than previous years. Within the wider South West region there has been an overall increasing trend in inert waste capacity since 2011.
- 11.3.49 For non-inert wastes, there has been an overall decreasing in Somerset trend in capacity since 2006 and also within the wider South West region. In Somerset, this capacity relates to non-hazardous waste as there is no hazardous waste landfill capacity.
- 11.3.50 Notwithstanding this, it is anticipated that much of the waste arising from construction of the proposed scheme would be re-used, recycled or recovered in accordance with legislative, policy and cost drivers.

11.4 Potential impacts

Construction

- 11.4.1 Construction of the proposed scheme will require the use of materials such as aggregates from primary, secondary and recycled sources, along with manufactured construction products which can include road surfacing, retaining walls, pre-cast elements for the construction of structures such as bridges, gantries and signage, barriers, lighting and fencing. However, some of the material could be generated on-site, for example excavated soils or recycling of concrete for use as aggregate from existing structures.
- 11.4.2 Construction is expected to result in potentially significant volumes of surplus materials and waste, leading to potential impacts on the available waste management infrastructure (in particular through the permanent use of landfill void space). Waste will predominantly arise from excavations and demolition of existing structures, and also from materials brought to site that may be damaged, off cuts and / or surplus.
- 11.4.3 However, the proposed scheme area will not affect any MSAs.

Operation

- 11.4.4 Operation of the proposed scheme will result in smaller impacts on material assets and waste to those described above for the construction phase. The design process will seek to minimise the consumption of materials and the generation and disposal of waste throughout the lifecycle of the proposed scheme.
- 11.4.5 DMRB LA 110 requires that environmental assessment for material assets and waste should only report on the first year of operational activities (opening year) in addition to the construction phase.
- 11.4.6 It is not anticipated that any significant maintenance activities should occur during the first year of operational activity and, therefore, no significant material asset use or waste generation should arise.
- 11.4.7 Therefore, it is proposed that operational impacts be scoped out of the assessment on the basis that no likely significant effects would occur.
- 11.4.8 It is assumed that the assessment of any environmental effects relating to material assets and waste during any large scale future maintenance, renewal, or improvement works, would be undertaken by Highways England's South West Asset Delivery Contractor(s) (or equivalent) in accordance with the requirements of LA 110 (or future updates).

11.5 Design, mitigation and enhancement measures

- 11.5.1 Measures will be implemented to minimise the impacts associated with both the consumption of material assets and the generation and management of waste during construction. The proposed scheme would apply the waste hierarchy of prevention, preparing for re-use, recycling, other recovery and disposal to minimise disposal and maximise re-use and recycling.
- 11.5.2 The design of the proposed scheme has not been sufficiently developed at this stage to allow mitigation measures to be defined in detail. Therefore, this section

identifies best practice mitigation measures considering relevant legislation, policy and best practice. This will be developed and refined further during subsequent assessment.

Design

11.5.3 Design measures would include, but are not limited to, applying the five key principles for Designing out Waste as outlined by WRAP A Design Team Guide for Civil Engineering which has been summarised below:

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

11.5.4 A Materials Management Plan will be prepared as part of implementing the CL:AIRE The Definition of Waste: Development Industry Code of Practice for the re-use of geotechnically and chemically site won materials. The proposals for material re-use will be agreed with Environment Agency and Local Authority.

Mitigation

11.5.5 Whilst much of the mitigation would be undertaken as part of the design stage, further mitigation measures as part of the construction stage would include, but not be limited to, the following:

- Ensuring that waste is handled, stored, managed and re-used, recycled or recovered as close as possible to the point of origin during the construction of the proposed scheme provided there are no unacceptable adverse impacts on people, the environment or local amenities. Locally permitted transfer, re-use, recycling, other recovery and disposal sites would be used during construction, where available, to minimise the attendant environmental impact and cost of waste transport and support the economic well-being of the local communities;
- Minimising potential effects from the storage and processing of material assets and waste, ensuring that construction site compounds and on-site storage, stockpiling and processing areas are designed to minimise impacts to designated sites and sensitive environmental receptors during construction;

- Minimising storage of materials and careful storage and handling to minimise damage and, therefore, waste production;
- Implementation of a Site Waste Management Plan (SWMP) to evidence how the design and construction of the proposed scheme has adopted the waste hierarchy of prevention, reuse, recycling, other recovery and disposal, and to ensure that C&D waste is subjected to material recovery in support of legislative and policy targets (LA 110 indicates at least 70% (by weight) of C&D waste shall be subjected to material recovery in accordance with the Waste Directive, and the SCC Waste Core Strategy provides recycling targets for C&D waste of 76% for 2020 rising to 79% in 2028); and
- Complying with 'Duty of Care' requirements for waste during construction to ensure that any surplus / waste materials are stored, transported, treated and disposed of without endangering human health or harming the environment. Ensuring that waste carrier registrations; environmental permits, mobile plant permit / deployments and / or waste exemptions for the storage, sorting, treatment, use, disposal and / or transportation of waste during construction.

11.5.6 The Contractor will prepare a Construction Environmental Management Plan (EMP) detail mitigation measures to be adhered to on-site to reduce the impacts from material use and waste generation during the site preparation, demolition, earthworks and construction phases.

Enhancement

11.5.7 No specific enhancement measures have been identified at this stage, although these will be explored during the design and construction of the proposed scheme as an integral part of developing the SWMP. Example enhancement opportunities for material assets and waste could include, but not be limited to:

- using surplus recycled or recovered materials in community projects, e.g. utilising recycled mulch from tree felling on adjacent community facilities; and
- recycling suitable material from construction of noise and landscape bunding outside of the highway boundary where need has previously been identified (where land availability allows).

11.6 Description of the likely significant effects

11.6.1 Given the scale of the proposed scheme the potential exists for significant effects relating to material assets and waste to occur from the use of natural resources and the use of landfill capacity, as well as deviation from the relevant targets for material recovery.

11.6.2 DMRB LA 110 provides five questions for the scoping assessment to address to gain an understanding of the need to undertake further assessment for material assets and waste. Where the response to one or more of these questions is 'yes', then further assessment should be undertaken.

11.6.3 The responses to the scoping assessment questions for the proposed scheme are provided in Table 11-10 which are based on the use of professional judgement for the current design information.

Table 11-10 LA 110 Scoping questions and responses

Scoping questions	Response	Scoped in / out
1. Is the project likely to recover / reuse little on site material thereby requiring materials to be imported to site?	Uncertain at this stage	Scoped in
2. Is the project likely to use little / no recycled / secondary materials thereby requiring the majority of materials used on the project to comprise primary materials?	Uncertain at this stage	Scoped in
3. The project is likely to sterilise (substantially constrain / prevent existing and potential future use of) mineral sites or peat resources?	No	Scoped out
4. Would the project generate large quantities of waste relative to regional landfill capacity?	Yes (potentially)	Scoped in
5. Will the project have an effect on the ability of waste infrastructure within the region to continue to accommodate waste from other sources?	Yes (potentially)	Scoped in

11.7 Assessment methodology

- 11.7.1 An assessment of material assets and waste will be undertaken, with professional judgement applied to the DMRB LA 110 simplified assessment framework provided in Table 11-11 and Table 11-12 below.
- 11.7.2 The information requirements on material assets and waste identified in section 11.8 will be considered as part of the environmental assessment.
- 11.7.3 Consultation will be undertaken with the Local Authority and Environment Agency. Close liaison will also be undertaken with the design team along with ongoing meetings to track and demonstrate reductions in material assets and waste.
- 11.7.4 Published resource efficiency statistics, benchmarks and key performance indicators will also be used to populate data gaps that may exist in relation to assessing the effects of constructing the proposed scheme, which are likely to include:
- WRAP, Net Waste Tool;
 - WRAP, Construction Procurement Guidance: Delivering Higher Recycled Content in Construction Projects;
 - Glenigan et al., UK Industry Performance Report 2018 – Based on the UK Construction Industry Key Performance Indicators;
 - Environment Agency Waste Data Interrogator; and
 - Defra UK Statistics on Waste.
- 11.7.5 The data sources outlined above would be required in order to populate the following data gaps which may exist for the assessment during construction:
- information on indicative levels of recycled content in imported aggregate and aggregate containing construction materials;
 - the amount of waste that could be recovered and diverted from landfill within the two study areas; and
 - quantities of waste arising from construction requiring disposal to landfill.

Simplified criteria

11.7.6 DMRB LA 110 sets out how effects associated with the material assets and waste aspect should be assessed through the use of a 'simplified assessment framework'. The assessment of effects on material assets and waste will be based on the significance categories given in Table 11-11.

Table 11-11 LA 110 Significance categories descriptions

Significance category	Description
Very large	<p><u>Material assets</u> no criteria: use criteria for large categories.</p> <p><u>Waste</u> 1% reduction or alteration in national capacity of landfill, as a result of accommodating waste from a project; or construction of new (permanent) waste infrastructure is required to accommodate waste from a project.</p>
Large	<p><u>Material assets</u> project achieves <70% overall material recovery / recycling (by weight) of non-hazardous Construction and Demolition Waste to substitute use of primary materials; and aggregates required to be imported to site comprise <1% re-used / recycled content; or project sterilises ≥1 mineral safeguarding site and/or peat resource¹.</p> <p><u>Waste</u> >1% reduction in the regional capacity of landfill as a result of accommodating waste from a project; or >50% of project waste for disposal outside of the region.</p>
Moderate	<p><u>Material assets:</u> project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous construction and Demolition Waste to substitute use of primary materials; or aggregates required to be imported to site comprise re-used/recycled content below the relevant regional percentage target.</p> <p><u>Waste:</u> >1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project; or 1-50% of project waste for disposal outside of the region.</p>
Slight	<p><u>Material assets:</u> project achieves 70-99% overall material recovery / recycling (by weight) of non-hazardous Construction and Demolition Waste to substitute use of primary materials; and aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional percentage target.</p> <p><u>Waste:</u> ≤1% reduction or alteration in the regional capacity of landfill; or waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region.</p>

Significance category	Description
Neural	<p><u>Material assets:</u> project achieves >99% overall material recovery / recycling (by weight) of non-hazardous Construction Demolition Waste to substitute use of primary materials; or aggregates required to be imported to site comprise >99% re-used / recycled content.</p> <p><u>Waste:</u> no reduction or alteration in the capacity of waste infrastructure within the region.</p>
<p>¹ Sterilisation is defined in DMRB LA 110 as to “substantially constrain / prevent existing and potential future use and extraction of materials”.</p>	

11.7.7 The significance of effects on material assets and waste will be reported in accordance with the significance criteria in Table 11-12.

Table 11-12 LA 110 Significance criteria

Significance	Description
Significant (one or more criteria met)	<p><u>Material assets</u></p> <ul style="list-style-type: none"> • category description met for moderate or large effect. <p><u>Waste</u></p> <ul style="list-style-type: none"> • category description met for moderate, large or very large effect.
Not significant	<p><u>Material assets</u></p> <ul style="list-style-type: none"> • category description met for neutral or slight effect. <p><u>Waste</u></p> <ul style="list-style-type: none"> • category description met for neutral or slight effect.

11.7.8 The descriptors of effect provided in Table 11-11 will be used to assess the likely environmental effects of constructing the proposed scheme on material assets and waste. Professional judgement will be used to determine which significant effect categories the proposed scheme is likely to fall within for material assets and waste.

11.8 Assessment assumptions and limitations

11.8.1 The information provided within this chapter is considered to provide an appropriate level based on the scoping assessment methodology outlined in DMRB LA 110.

11.8.2 Limited information is available at this stage on material requirements and waste quantities relating to construction of the proposed scheme, although this is not uncommon at the scoping stage. DMRB LA 110 indicates where projects are in an early stage of development, assumptions and limitations on data gaps should be reported

11.8.3 Where the need for further assessment has been identified, DMRB LA 110 indicates the following would need to be obtained for material assets:

- types and quantities of materials required to construct the proposed scheme;
- information on materials that contain secondary / recycled content;
- information on any known sustainability credentials for materials to be consumed;

- the type and volume of materials that would be recovered from off-site sources for use on the proposed scheme;
- the cut and fill balance; and
- details of on-site storage and stockpiling arrangements, and any supporting logistical details.

11.8.4 For waste, DMRB LA 110 indicates the assessment would need to identify the following:

- amount of waste (by weight) that will be recovered and diverted from landfill either on site or off site (i.e. for use on other projects);
- types and quantities of waste arising from the project (demolition, excavation arisings and remediation) requiring disposal to landfill;
- details of on-site storage and segregation arrangements for waste and any supporting logistical arrangements; and
- potential for generation of hazardous waste (type and quantity).

11.8.5 This scoping assessment for material assets and waste receptors is based on a review of the baseline information available at the time of assessment. Whilst the baseline data sources used in this assessment have been obtained from the most recently available information, it is still possible that conditions could have changed since their publication and it is not possible to confirm the accuracy of the data. Furthermore, changes to the permitted minerals and waste management capacity during the construction of the proposed scheme will also be difficult to determine.

11.8.6 Material assets and waste have the potential to results in a wide range of environmental effects. Where materials are used and waste is generated, along with how materials are managed, can result in effects such as visual impacts, dust, noise, vehicle emissions, soil and water contamination. Consideration of these effects and any mitigation measures do not form part of the material assets and waste assessment and will be considered as part of the other relevant chapters in this scoping report.

12 Noise and vibration

12.1 NPSNN requirements

12.1.1 The National Policy Statement National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

12.1.2 Key policies from the NPSNN relevant to this discipline includes:

- Paragraph 5.191 of the NPSNN states that operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. The prediction of road traffic noise should be based on the method described in Calculation of Road Traffic Noise (CRTN)⁸⁹. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.
- Paragraph 5.193 states that developments must be undertaken in accordance with statutory requirements for noise. Due regard must have been given to the relevant sections of the Noise Policy Statement for England, National Planning Policy Framework and the Government's associated planning guidance on noise.
- Paragraph 5.194 states that the project should demonstrate good design through optimisation of scheme layout to minimise noise emissions and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission. The project should also consider the need for the mitigation of impacts elsewhere on the road and rail networks that have been identified as arising from the development, according to Government policy.
- Paragraph 5.195 states that the SoS should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:
 - avoid significant adverse impacts on health and quality of life from noise as a result of the new development;
 - mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and
 - contribute to improvements to health and quality of life through the effective management and control of noise, where possible.
- Paragraph 5.200 states that applicants should consider opportunities to address the noise issues associated with the Important Areas as identified through the noise action planning process.

⁸⁹ Department of Transport and Welsh Office, "Calculation of Road Traffic Noise", 1988.

12.2 Study area

- 12.2.1 This section presents the guidance set out in the Design Manual for Roads and Bridges (DMRB) document LA 111⁹⁰, which shall be used to define the study area for the construction noise, construction vibration and operational noise assessments. DMRB LA 111 states that the study area can be defined to include all noise or vibration sensitive receptors that are potentially affected by construction noise, construction vibration or operational noise and to also include noise or vibration sensitive receptors in areas where there is a reasonable stakeholder expectation that a noise assessment will be undertaken.
- 12.2.2 For individual projects, variations in the study area can be defined and professional judgement will be exercised in deciding the extent of any variations made. As an example of this, the study area might be extended to give consideration of the potential impact on particular communities which may have concerns due to the scheme. Therefore, the study area will be defined using guidance within DMRB LA 111 alongside professional judgement and any consultation feedback from local authorities.
- 12.2.3 The assessment will be carried out by identifying residential and non-residential receptors sensitive to noise and vibration due to the scheme within the study area. These noise sensitive receptors (NSRs) would include but not be limited to, dwellings, hospitals, healthcare facilities, education facilities, community facilities, public rights of way and cultural heritage assets.

Construction noise

- 12.2.4 The study area for assessing construction noise will be defined by the following principles, as described in DMRB LA 111:
- A study area of 300m from the closest construction activities is described as normally sufficient to encompass NSRs potentially affected by construction noise.
 - A diversion route study area is required where the project is likely to require full carriageway closures overnight (23:00-07:00 hours). Diversion route study areas are 25m from the kerb line of all designated diversion routes.
 - A construction traffic study area shall be defined to include a 50m width from the kerb line of public roads with the potential for an increase in basic noise level of 1dB(A) or more as a result of the addition of construction traffic to existing traffic levels.
 - The study area will also include NSRs in areas where there is a reasonable stakeholder expectation that a noise assessment will be undertaken.

Construction vibration

- 12.2.5 The study area for assessing construction vibration will be defined by the following principles, as described in DMRB LA 111:
- A study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors.

⁹⁰ Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure Northern Ireland (2020) Design Manual for Roads and Bridges. Sustainability and Environment Appraisal. LA 111, Noise and Vibration, Revision 2. Available at: <https://www.standardsforhighways.co.uk/prod/attachments/cc8cfcf7-c235-4052-8d32-d5398796b364?inline=true> (Accessed January 2021)

- The study area will also include vibration sensitive receptors in areas where there is a reasonable stakeholder expectation that a construction vibration assessment will be undertaken.

Operational noise

12.2.6 The study area for assessing noise from operational road traffic will be defined by the following principles, as described in DMRB LA 111:

- An area 600m from new road links, road links physically changed or road links bypassed by the project.
- An area 50m from any road with the potential to experience a short-term BNL change of more than 1.0 dB.
- The study area will also include NSRs in areas where there is a reasonable stakeholder expectation that a noise assessment will be undertaken.

12.2.7 No study area is considered for operational vibration as it is stated in DMRB LA 111 that operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities so operational vibration will not have the potential to lead to significant adverse effects.

12.3 Baseline conditions

Baseline sources

12.3.1 The following baseline source has been used during the scoping stage:

- England Noise Map Viewer⁹¹

Baseline information

12.3.2 A desk-based review of the area surrounding the proposed scheme has been undertaken and indicates the following regarding the baseline noise conditions:

- The area within close proximity to the scheme is predominantly rural, becoming more urbanised towards Taunton.
- The existing noise climate is generally anticipated to be dominated by road traffic noise from the A358, A303, A378 and M5.
- In the immediate vicinity to the existing A358, it is anticipated that baseline noise is characterised by road traffic noise and, as distance increases from the A358 traffic, noise levels reduce but are likely to remain audible within the majority of the study area.
- Where the proposed scheme deviates from the existing A358 corridor, background noise levels are more likely to be dominated by local sources, such as road traffic noise from local roads and noise associated with both urban and rural activities. However, it is still likely that traffic noise from the existing A358 may still be audible depending on weather conditions.
- Baseline conditions in the vicinity of the M5 are expected to be again dominated by road traffic noise.
- NSRs throughout the study area are predominantly residential dwellings.

⁹¹ <http://extrium.co.uk/noiseviewer.html>

- 12.3.3 The baseline noise conditions across the study area for the construction and operational noise assessments will be determined by modelling the do-minimum noise levels in each assessment year.
- 12.3.4 A baseline noise survey would be undertaken when travel restrictions due to the COVID-19 pandemic are removed and the traffic flows are considered representative of the baseline conditions in the area. The noise survey would be used to provide additional information about the baseline noise environment, particularly from non-road noise sources or local roads not included in the traffic model. Further considerations on the undertaking of this survey can be found in paragraph 12.8.2.
- 12.3.5 The following settlement areas have been identified as anticipated to be within the study area for the proposed scheme: Horton Cross, Broadway, Rapps, Southtown, Ashill, Kenny, Woodstock, Stweley, Hatch Green, Hatch Beauchamp, West Hatch, Meare Green, Henlade, Thornfalcon, Ruishton and Taunton at the northern end of the scheme.
- 12.3.6 Noise Important Areas (NIAs) are based upon strategic noise maps results which have been produced in line with the requirements set out in the noise action plans⁹² and can be viewed with the England Noise Map Viewer detailed in 12.3.1. There are three NIAs along the section of the A358 between the A303 and the A378 junctions (NIAs 3502, 12940 and 3501), all of which are on sections of the route proposed for online widening. There are five NIAs on the section of the A358 proposed to be bypassed by the scheme between the A378 and the M5 junctions (NIAs 3497, 3498, 3499, 34500 and 12939). The NIAs along the route are shown in Table 12-1. The full extents of the study area would be defined once do-minimum and do-something traffic information is available. Subject to the review of traffic information, any additional NIAs identified within the study area would be considered in the assessment for the EIA.

Table 12-1 Noise Important Areas

NIA number	Road	Noise Source Asset Owner	Noise Receiving Authority
3497	A358	Somerset	Taunton
3498	A358	Somerset	Taunton
3499	A358	Somerset	Taunton
3500	A358	Somerset	Taunton
3501	A358	Somerset	Taunton
3502	A358	Somerset	Taunton
12939	A358	Somerset	Taunton
12940	A358	Somerset	Taunton

- 12.3.7 Several of the NIAs along the A358 include individual or small groups of isolated dwellings. NIA 3497 includes a larger number of dwellings and is located in Henlade.
- 12.3.8 From available public online mapping, there does not appear to be any existing noise mitigation in the form of noise barriers along the existing A358. This will be confirmed by site visits and by interrogating data held by Highways England.

⁹² UK Government, "Noise Action Planning Important Areas Round 2 England", 2019.

Similarly, the type and condition of the existing road surface, including whether there is any existing low noise surface, will be confirmed during the EIA.

Future baseline

- 12.3.9 The existing noise levels near the scheme are likely to increase slowly due to road traffic growth over time as a result of local or regional development, especially at either end of the scheme where new developments are planned. This road traffic growth will be accounted for in future do-minimum and do-something traffic data and therefore the noise assessment will inherently include cumulative impacts.
- 12.3.10 Any future committed developments (i.e. those where planning permission has been granted) that would introduce noise sensitive receptors within the study area will be considered in the assessment. This will include individual receptors and larger developments. The cut-off date for including receptors will be the same as that used for all environmental aspects. The potential impact at any large areas of land that may be marked for development but where no permission has been granted will be commented on within the reporting, but these potential receptors would not be included within assessment tables or considered for mitigation or enhancements.

Noise and vibration sensitive receptors

- 12.3.11 Within DMRB LA 111 are examples of receptors that are potentially sensitive to noise and vibration. A summary of these is provided in Table 12-2.
- 12.3.12 With no scale of sensitivity of receptors, it is not possible for the noise and vibration assessment to use the matrix-based approach to determine potentially significant effects. The approach to determining potential significant effects is described in section 12.7.

Table 12-2 Value of receptors in the study area for noise and vibration

Value/ sensitivity	Description	Examples within the study area
Sensitive	Dwellings, hospitals, healthcare facilities, education facilities, community facilities, quiet areas or potential quiet areas as defined by the Environmental Noise Directive, international and national or statutorily designated sites, public rights of way, buildings containing vibration sensitive equipment and cultural heritage assets	Dwellings within, or isolated properties near to: Haydon, Ruishton, Henlade, Thornfalcon, Meare Green, West Hatch, Hatch Beauchamp, Hatch Green, Capland, Woodstock, Stewley, Kenny, Ashill, Rapps and Horton Cross. Horton Cross Nursing Home. Ruishton Church of England Primary School, Somerset Progressive School, Ashill Primary School. Ashill Village Hall, Broadway Village Hall

12.4 Potential impacts

Construction

- 12.4.1 For construction noise and vibration, DMRB LA 111 poses the following considerations to determine the need for further assessment:
- Does construction noise or vibration generated by the project have the potential to adversely affect any noise / vibration sensitive receptors?

- Are there any noise sensitive receptors where there would be a reasonable stakeholder expectation that a construction noise assessment would be undertaken? Or
- Does the scale of the development or type of construction mean that there will be a reasonable stakeholder expectation that a construction vibration assessment would be undertaken at any vibration sensitive receptors?

12.4.2 Considering the scale of the scheme, it is likely that project-related noise and vibration associated with construction of the proposed scheme would have the potential to adversely affect noise or vibration sensitive receptors, on both the online and offline sections of the Proposed Scheme. Moderate to major construction noise related impacts are likely at receptors within distances of around 50m from the construction works, with minor impacts occurring at greater distances. It is also likely that stakeholders, more than 300m from the construction works, in areas such as Hatch Beauchamp, would have an expectation that a construction noise impact assessment would be undertaken for their properties.

12.4.3 Construction vibration impacts may occur at the closest NSRs to works such as piling and compaction activities.

12.4.4 Construction noise and vibration are therefore scoped-in to the assessment.

Operation

12.4.5 DMRB LA 111 provides four situations to consider when determining whether further assessment is required. These are:

- Is the project likely to cause a change in the BNL of 1dB LA10,18hr in the do-minimum opening year (DMOY) compared to the do-something opening year (DSOY)?
- Is the project likely to cause a change in the BNL of 3dB LA10,18hr in the do-something future year (DSFY) compared to the DMOY?
- Does the project involve the construction of new road links within 600m of noise sensitive receptors? Or
- Would there be a reasonable stakeholder expectation that an assessment would be undertaken?

12.4.6 The magnitude of road traffic noise at any receptor is dependent on a range of factors, all of which are accounted for within the road traffic noise prediction methodology:

- traffic related factors: volume, speed and composition of traffic;
- road related factors: surfacing and gradient;
- propagation factors: distance, the presence of structure/buildings and type of ground cover between the road and any receptor; and
- receptor specific factors: angle of view and reflections.

12.4.7 Given the scale of the project and proximity of sensitive receptors to the proposed scheme, it is considered likely that some sensitive receptors would experience adverse impacts. It is estimated that operation of the project is likely to cause changes in some of factors listed above which is anticipated to result in changes to the BNL of more than 1dB LA10,18hr in the DMOY compared to the DSOY, and more than 3dB LA10,18hr in the DSFY compared to the DMOY. The scheme

includes offline sections where new road links would be constructed within 600m of NSRs.

12.4.8 It is therefore considered that operational noise should be scoped in for further assessment.

12.4.9 DMRB LA 111 states that operational vibration should be scoped out of the assessment methodology as a maintained road surface will be free of irregularities so operational vibration will not have the potential to lead to significant adverse effects. It is considered that there is nothing within the initial design of the scheme that would change this assumption. Therefore, operational vibration is scoped-out of the assessment.

12.5 Design, mitigation and enhancement measures

Construction

12.5.1 Mitigation measures for noise and vibration include measures embedded into a project design to reduce the overall environmental impact (e.g. new road alignment) and measures used solely to mitigate noise (e.g. noise barriers, restrictions on plant or activities during the construction phase, quieter road surfaces).

12.5.2 Prior to construction, the Construction Environmental Management Plan (EMP) would be prepared and implemented. The EMP would include the relevant construction noise criteria and any proposed monitoring during construction. It would also contain details of best practice measures (BPM) associated with mitigating potential noise and vibration impacts. Examples of typical BPM would include:

- The appointed contractor will be responsible for notifying the local residents of particularly noisy or vibratory work prior to commencement of those works. Effective communication should be established, keeping residents informed of the type and timing of works involved.
- Provision of contact details for a site representative that affected residents may contact in the event that disturbance due to noise or vibration from the construction works occurs.
- Ensuring that any complaints are dealt with pro-actively and that subsequent resolutions are communicated to the complainant.
- Site access routes would be in good condition and well maintained with no potholes or other significant surface irregularities.
- Plant machinery would be turned off when not in use.
- all vehicles and mobile plant would be well maintained such that loose body fittings or exhausts do not rattle or vibrate.
- Silenced equipment would be used where possible, in particular silenced power generators and pumps.
- All equipment used would be properly maintained and operated by trained staff.
- Plant and equipment covers/hatches would be properly secured and there would be no loose fixings causing rattling.
- Static noisy plant, including generators, would be located as far away from noise sensitive receptors as feasible and within acoustic enclosures where necessary.

- On-site speed limits would be in place to reduce the effect of construction traffic noise.
- As part of the plant selection process, the contractor should adopt a procedure to ensure the quietest plant and equipment, techniques and working practices available would be selected and used.

Operation

- 12.5.3 Any mitigation measure that has the potential to mitigate or manage operational noise (whether existing or generated by the project) shall be identified and reported within the assessment. When considering noise mitigation measures, the principle of source – path – receptor will be applied. This is a principle where noise mitigation is first considered at source, as this is more than often the most practical and cost-effective solution, and it will also provide a reduction in noise to all the surrounding receptors. Mitigation at source could be provided by either:
- changes to the vertical or horizontal alignment of the road; or
 - low noise road surfacing.
- 12.5.4 DMRB LA 111 also gives speed limits or restrictions on noisy vehicle types as examples of mitigation, however, it is not anticipated that these examples are likely to be practical for the proposed scheme as the scheme is designed to discourage drivers from diverting onto smaller local roads to aid the management of noise levels in surrounding communities.
- 12.5.5 The reduction of noise between the source and receptor is considered next as, after controlling noise at source, a reduction in the transmission path would benefit the greatest number of receptors. A reduction in noise in the path is most likely to be achieved by placing a solid structure between the source and receptor, such as a purposely built noise fence barrier. Examples of mitigation in the path are:
- purpose built noise fence barriers;
 - bunds or earth embankments; and
 - combination of earth bund with noise fence barrier on top
- 12.5.6 The mitigation of noise at the receptor in the form of sound insulation of buildings is the last resort in terms of noise mitigation. This is because it would only be of benefit to the individual receptor. In addition, providing insulation in terms of improved glazing would be ineffective if the windows of a property are open or if the individuals are outside.
- 12.5.7 The suitability of each potential noise mitigation measure for use within the scheme area will be considered based on the benefit of a measure in terms of elimination of likely significant effects, any engineering constraints, and the potential impact across other environmental factors. In addition, when considering mitigation for residential noise receptors only, a comparison of the monetised noise benefit of a mitigation measure against the cost of the measure over the anticipated design life of the scheme shall be considered.

12.6 Description of the likely significant effects

- 12.6.1 There is the potential for significant adverse construction noise effects, given the very close proximity of some receptors to parts of the proposed scheme.

- 12.6.2 There is the potential for significant adverse construction vibration effects on human receptors in buildings and / or resulting cosmetic damage to buildings from construction induced vibration due to the very close proximity of construction works in some cases.
- 12.6.3 Adverse effects from construction noise and vibration would be minimized through mitigation. For example, it may be possible that alternative plant selections or methods can be used to minimise the risk of human annoyance or cosmetic damage from construction induced vibration.
- 12.6.4 Primarily, the proposed scheme has the potential to cause significant adverse operational noise effects by changes to the horizontal or vertical alignment (including widening) and by traffic changes. As a result of the offline section of the proposed scheme, the main noise source at a receptor may move from the front to the rear of a property, potentially resulting in significant adverse and beneficial effects on different façades. Situations could also exist where increased traffic flows, or average speeds, along the proposed scheme or road links in the wider area, would result in increased noise levels at receptors. Receptors near to the proposed scheme include properties that are already subject to high levels of noise, including some which are currently within NIAs. There are a number of isolated individual or small groups of properties along the proposed scheme where noise mitigation in the form of noise barriers may not be a sustainable solution to reduce impacts. It may not be possible to mitigate some of these potential significant effects where receptors do not qualify for individual property noise insulation.

12.7 Assessment methodology

- 12.7.1 The assessment of impacts from noise and vibration will be undertaken in accordance with DMRB LA 111. By following DMRB LA 111 it is considered that the proposed scheme can be measured against the NPSNN policy requirements.
- 12.7.2 DMRB LA 111 incorporates the noise effect levels that have been introduced to English noise policy by the Noise Policy Statement for England (NPSE)⁹³. These effect levels are defined as:
- LOAEL - Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
 - SOAEL - Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.
- 12.7.3 The NPSE does not assign decibel values to these effect levels as they will vary depending upon the type of assessment being undertaken. However, suggested effect levels for construction and operational noise and vibration are contained within DMRB LA 111 and these will be used for the EIA of the proposed scheme. The LOAEL and SOAEL values for construction noise, vibration and operation are stated in the following DMRB LA 111 tables and tabulated below:
- Table 3.12 – Construction time period – LOAEL and SOAEL;
 - Table 3.31 – Construction vibration LOAELs and SOAELs for all receptors;
- and,

⁹³ Department for Environment, Food and Rural Affairs (2010) Noise Policy Statement for England (NPSE). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf (Accessed January 2021)

- Table 3.49.1 – Operational noise LOAELs and SOAELs for all receptors.

Table 12-3 Construction time period LOAEL and SOAEL (ref. Table 3.12 of DMRB LA 111)

Time period	LOAEL	SOAEL
Day (0700-1900 weekday and 0700-1200 Saturdays)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS5228-1:2009+A1:2014
Night (2300-0700)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS5228-1:2009+A1:2014
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014 Section E3.2 and Table E.1 BS5228-1:2009+A1:2014

Table 12-4 Construction vibration

Time period	LOAEL	SOAEL
All time periods	0.3mm/s PPV	1.0mm/s PPV

Table 12-5 Operational noise LOAELs and SOAELs

Time period	LOAEL	SOAEL
Day (06:00-24:00)	55dB $LA_{10, 18hr}$ façade	68dB $LA_{10, 18hr}$ façade
Night (00:00-06:00)	40 dB $L_{night, outside}$ (Free-field)	55 dB $L_{night, outside}$ (Free-field)

Baseline noise and vibration levels

- 12.7.4 DMRB LA 111 states that “noise monitoring should be used to inform baseline noise modelling results and to provide data for public consultation purposes”. As has been described in section 12.3, there have been no noise measurements undertaken to inform this scoping report. When COVID-19 travel restrictions have been lifted and if traffic volumes are considered representative of typical conditions, a series of noise measurements will be undertaken prior to the EIA at a selection of locations representative of individual or groups of sensitive receptors. Further considerations on the undertaking of this survey can be found in paragraph 12.8.2.
- 12.7.5 No baseline vibration surveys will be undertaken as DMRB LA 111 states “the construction vibration baseline shall be assumed to be zero due to the absence of construction work prior to project commencement”.

Construction noise and vibration approach

- 12.7.6 The assessment of noise from construction will be undertaken in accordance with DMRB LA 111, which in turn references the guidance and calculation

methodology within BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise⁹⁴.

- 12.7.7 Noise predictions for construction will be undertaken using reference noise levels from BS 5228-2:2009+A1:2014 or from manufacturer data to represent the various items of plant that would be used during the different activities associated with the construction of the Preferred Scheme. Factors such as on-time that each item of plant is operating over a working day are also considered within the calculations.
- 12.7.8 As set out in DMRB LA 111, construction noise levels will be calculated at selected noise sensitive receptors, or at varying distances from each activity to represent all receptors in the study area.
- 12.7.9 The impact of construction noise will be established by comparing the predicted noise level arising from construction activities against the LOAEL and the SOAEL as determined from Table 12-3. Table 3.16 of DMRB LA 111 includes a scale of magnitude that will be used to determine the impact. Construction noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact would occur for a duration exceeding (ref: DMRB LA 111 para 3.19):
- 10 or more days or nights in any 15 consecutive days or nights; or
 - a total number of days exceeding 40 in any six consecutive months
- 12.7.10 If significant effects are identified, then specific noise mitigation measures to reduce the noise impact from activities will be considered.
- 12.7.11 The impact from additional construction traffic on the road network and that from diversion routes will be assessed in accordance with the guidance from para 3.15 to 3.19 within DMRB LA 111. This method compares the existing level of traffic against that predicted during construction. Table 3.17 of DMRB LA 111 includes a scale of magnitude that will be used to determine the impact.
- 12.7.12 Predicted noise levels from the construction of the proposed scheme will also be provided to inform the assessment of other aspects (e.g. cultural heritage).
- 12.7.13 The assessment of vibration from construction will, where possible, be undertaken quantitatively based on the guidance within DMRB LA 111, which in turn references the guidance and calculation methodology within BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration.
- 12.7.14 For some construction activities (e.g. piling, compaction) equations are available within BS 5228-2:2009+A1:2014 to calculate the level of vibration at a distance from the construction activity. Certain input parameters are required for these calculations and until construction physically starts some of the information required will be based on professional judgement. Where a construction activity is not covered by the calculation methodology, the level of vibration from the activity will be based on professional judgement or empirical data contained within BS 5228-2:2009+A1:2014

⁹⁴ British Standards Institution (2014) BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise. London: British Standards Institution

- 12.7.15 The level of vibration will be calculated at selected locations which are considered to be representative of all vibration sensitive receptors in the study area. These may be individual sensitive receptors or groups of sensitive receptors.
- 12.7.16 To determine significance of effect from construction vibration, the magnitude of the predicted level is compared against a scale shown in Table 3.33 of DMRB LA 111. Construction vibration shall constitute a significant effect where it is determined that a major or moderate magnitude of impact would occur for a duration exceeding (ref: DMRB LA 111 para 3.34):
- 10 or more days or nights in any 15 consecutive days or nights; or
 - a total number of days exceeding 40 in any six consecutive months
- 12.7.17 If significant effects are identified, then specific vibration mitigation measures to reduce the vibration impact from activities will be considered.

Operational road traffic noise approach

- 12.7.18 The assessment of noise from the operation of the scheme will be undertaken quantitatively based on the guidance within DMRB LA 111. The approach within DMRB LA 111 is to compare the predicted noise level with and without the proposed scheme at sensitive receptors. Noise levels will be calculated using the methodology contained within the Calculation of Road Traffic Noise (CRTN)⁹⁵ as modified by Appendix A of DMRB LA 111.
- 12.7.19 To determine the significance of effect, the predicted change in noise in the short-term (i.e. on opening) will be compared against the scale of magnitude shown in Table 12-6 (ref: DMRB LA 111 Tables 3.54a and 3.54b). Where the magnitude of change in the short-term is negligible, this will be deemed as not giving rise to a likely significant effect.

Table 12-6 Classification of magnitude of noise impacts

Magnitude of impact	Noise change, dB	
	Short term noise change (dB LA _{10, 18h} or L _{night})	Long term noise change (dB LA _{10, 18h} or L _{night})
Major	Greater than or equal to 5.0	Greater than or equal to 10.0
Moderate	3.0 – 4.9	5.0 – 9.9
Minor	1.0 – 2.9	3.0 - 4.9
Negligible	Less than 1.0	Less than 3.0

- 12.7.20 For noise sensitive receptors where the magnitude of change in the short-term is minor, moderate or major, other factors will be considered in determining whether the impact is significant or not. Table 3.60 of DMRB LA 111 sets out the factors to be considered.
- 12.7.21 If significant effects are identified, then mitigation measures described above in section 12.5 will be considered.

⁹⁵ Department of Transport and Welsh Office (1988) *Calculation of Road Traffic Noise*. Available at: <http://programmeofficers.co.uk/Preston/CoreDocuments/LCC389.pdf> (Accessed January 2021)

- 12.7.22 An initial assessment of likely eligibility for noise insulation measures under the Noise Insulation Regulations 1975 (as amended 1988) will be undertaken to identify dwellings that may potentially qualify under the Regulations.
- 12.7.23 The local authorities for which the scheme passes through (i.e. Somerset County Council, Somerset West and Taunton Council, South Somerset District Council) will be consulted with regard to this proposed scope.

Data sources

- 12.7.24 The following data sources will be used to undertake the above assessments:
- baseline noise survey (if undertaken – see paragraph 12.8.2) and site walkover;
 - OS Mastermap, OS Addressbase and data.gov.uk datasets of designated sites;
 - Data.gov.uk LiDAR data of the surrounding area and site surveyed topographical information along the existing route;
 - traffic data from the traffic modelling of the scheme;
 - Highways England Pavement Management System (HAPMS) and Environmental Information System (ENVIS) databases of road surfacing information and existing noise barriers;
 - information from planning applications within the area to inform on committed developments that may not be included within the OS Addressbase dataset;
 - likely construction plant to be used and construction phasing and programme;
 - three-dimensional engineering models of the scheme including any landscape earthworks; and
 - proposed surfacing materials for the scheme.

Consideration against noise policy

- 12.7.25 Consideration of the scheme with respect to national policy on noise will also be undertaken. The EIA will report against the three aims within the NPSNN and describe the actions taken to support delivery of each aim. These three aims, together with the actions required by DMRB LA 111, are shown in Table 12-7.

Table 12-7 NPSNN aims and associated actions

NPSNN aim	Action required during assessment
<p>Aim 1: Avoid significant adverse impacts on health and quality of life from noise as a result of the new development.</p> <p>NOTE: Significant adverse noise effects occur when noise levels are above SOAEL.</p>	<ul style="list-style-type: none"> • For each receptor or group of receptors, set out the mitigation measures used to reduce noise exposure to below SOAEL. • Where project noise levels are not predicted to be below the SOAEL, report the reasons why noise levels could not be reduced below the SOAEL, in terms of Government policy on sustainable development.
<p>Aim 2: Mitigate and minimise other adverse impacts on health and quality of life from noise from the new development.</p> <p>NOTE: Other adverse impacts occur when noise levels are between LOAEL and SOAEL.</p>	<ul style="list-style-type: none"> • Set out measures used to mitigate and minimise other adverse impacts for all receptors or groups of receptors where project noise levels are above LOAEL. • Where project noise levels are not predicted to be below the LOAEL, report the reasons why noise levels could not be reduced below the LOAEL, in terms of Government policy on sustainable development.

NPSNN aim	Action required during assessment
<p>Aim 3: Contribute to improvements to health and quality of life through the effective management and control of noise, where possible.</p> <p>NOTE: Applies to all noise levels.</p>	<ul style="list-style-type: none"> • Set out mitigation measures used to improve the noise environment. • Where it has not been possible to contribute to improvements to health and quality of life through management of project noise levels, report the reasons why it is not possible in terms of Government policy on sustainable development.

12.8 Assessment assumptions and limitations

- 12.8.1 The study area for the EIA cannot be determined until detailed traffic data are received allowing for affected road links to be identified.
- 12.8.2 A series of baseline noise surveys are planned to be undertaken. However, the timing of the surveys is yet to be determined due to the COVID-19 pandemic travel restrictions and potentially atypically low noise levels due to reduced human activity. DMRB LA 111 requires that baseline noise levels are calculated using noise modelling with noise surveys being recommended to validate the results. In some circumstances a noise survey may identify that baseline noise levels are higher than those calculated, as a result of non-road traffic noise sources, local roads, or roads out of the study area, not included in the noise model. Using purely calculated noise levels would therefore be considered to be worst-case in terms of impact assessment and it is not considered that the quality of the assessment would be diminished as a result of not having noise survey data. Should the surveys not be undertaken prior to the EIA submission, then they would be rescheduled to be undertaken prior to construction commencing.
- 12.8.3 The construction noise and vibration calculation methods enable the level of noise and vibration at the receptor during various construction activities to be determined. However, the precision of any such prediction is dependent on assumptions and predictions that have to be made regarding the number and type of plant to be utilised, their location and detailed operating arrangements. Some of this information will be clarified as the scheme design progresses, but other information (such as exactly where the plant operates and for how long and, in the case of vibration predictions, assumptions on ground conditions and the coupling of building foundations to the ground) would be assumed as a reasonable worst-case.
- 12.8.4 The operational noise modelling incorporates many different data sources, as set out in 12.7.24. Therefore, the outcome of the modelling is reliant on the quality of these data. Any limitations of these data sources will be reported in the EIA, along with any associated implications.

13 Population and health

13.1 NPSNN requirements

13.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

13.1.2 Key policies from the NPSNN relevant to this discipline includes:

- Paragraph 3.22 states that severance can be a problem in some locations. Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility.
- Paragraph 5.205 states that applicants should consider reasonable opportunities to support other transport modes in developing infrastructure, and that the applicant should provide evidence that they have used reasonable endeavours to address any existing severance issues that act as a barrier to non-motorised users.
- Paragraph 4.82 of the NPSNN states that the applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate. These impacts may affect people simultaneously, so the applicant, and the SoS (in determining an application for development consent) should consider the cumulative impact on health.
- Paragraph 5.166 states that existing open space, sports and recreational buildings and land should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location. Applicants considering proposals which would involve developing such land should have regard to any local authority's assessment of need for such types of land and buildings.
- Paragraph 5.184 states that public rights of way, National Trails and other rights of access to land (e.g. open access land) are important recreational facilities for walkers, cyclists and equestrians. Applicants are expected to take appropriate mitigation measures to address adverse effects on coastal access, National Trails, other public rights of way and open access land and, where appropriate, to consider what opportunities there may be to improve access. In considering revisions to an existing right of way consideration needs to be given to the use, character, attractiveness and convenience of the right of way.
- Paragraph 5.206 states that for road and rail developments, if a development is subject to EIA and is likely to have significant environmental impacts arising from impacts on transport networks, the applicant's environmental statement should describe those impacts and mitigating commitments.

13.2 Study area

13.2.1 The study areas for the assessment of effects on population and health are set out below and shown in Figure 13.1 in Volume 2 of this report.

Land use and accessibility

13.2.2 The study area for land use and accessibility will be the construction footprint plus a buffer of 500m as set out in DMRB LA 112 Population and Health⁹⁷. Where

required, this will be extended where likely effects (direct or indirect) are identified in the surrounding area, such as the affected road network or where other impacts are identified.

- 13.2.3 A wider context will also be considered to understand the sensitivity of routes within the study area used by walkers, cyclists and horse-riders (WCH) that could potentially be affected by the proposed scheme. For cyclists, recreational walkers and horse riders, consideration will be given to possible origins and destinations of up to 10km from the construction footprint of the proposed scheme, while a distance of up to 2km will be considered for regular walking journeys. The consideration of this wider context is deemed sufficient to provide insight into the likely purpose of journeys that cross the footprint of the proposed scheme since typical regular walking distances are up to 2km, while cycle commutes are typically up to 10km⁹⁶. It is also considered sufficient to capture the context for horse riders and long-distance walkers who would typically travel more than 2km as part of a recreational journey.

Human health

- 13.2.4 The study area for health will be defined based on the extent and characteristics of the project and the communities/wards directly and indirectly affected by the project as defined by the DMRB LA112 Population and human health⁹⁷ Guidance.
- 13.2.5 The study area of the assessment varies dependent upon the different health determinants being assessed and the receptors they have an impact on. For example, air quality receptors will be considered within 200m of the proposed scheme (to align with the air quality assessments), whilst for noise and vibration this is 600m. However, general consideration of health effects covers the population that lives within a 500m buffer from the site boundary. Therefore, data has been obtained for wards which fall within a 500m buffer from the site boundary of the proposed scheme to provide an indication of local health issues (Figure 13.1). This represents the study area for human health.
- 13.2.6 Based on this study area for health, the wards included in the ES are:
- West Monkton – E36005293 ;
 - Taunton Halcon – E36005284;
 - Taunton Blackbrook and Holway – E36005281;
 - Ruishton and Creech – E36005279;
 - North Curry and Stoke St Gregory – E36005277;
 - Neroche, Taunton Deane – E36005276;
 - Neroche, South Somerset – E36005253;
 - Islemoor – E36005248; and
 - Ilminster – E36005247.

⁹⁶ Department for Transport (2017) *Local cycling and walking infrastructure plans, technical guidance for local authorities*. Page 8. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908535/cycling-walking-infrastructure-technical-guidance-document.pdf

⁹⁷ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. *LA112 Population and human health*. Available at: <https://www.standardsforhighways.co.uk/dmr/b/search/1e13d6ac-755e-4d60-9735-f976bf64580a> (Accessed January 2021)

13.3 Baseline conditions

13.3.1 This section provides a preliminary summary of the baseline context for population and human health. The purpose of this summary at the scoping stage is to identify the key baseline issues for population and health that are likely to be influenced by the proposed scheme. These key issues will then be the focus of further baseline study as part of the EIA process and will be described more fully in the Environmental Statement.

Baseline sources - land use and accessibility

13.3.2 Key sources used to inform the understanding of baseline conditions were:

- Ordnance Survey data, in particular the OS AddressBase Plus database;
- Strava Global Heatmap⁹⁸;
- Explore Somerset online map⁹⁹;
- The Long Distance Walkers Association¹⁰⁰;
- National Express Route Map¹⁰¹;
- Sustrans National Cycle Network¹⁰²;
- Taunton Deane Site Allocations and Development Management Plan, December 2016¹⁰³;
- West Somerset Local Plan, November 2016¹⁰⁴; and
- South Somerset Local Plan, March 2015¹⁰⁵.

Baseline sources – human health

13.3.3 A high-level review of publicly available data has been undertaken to provide a preliminary profile of the demographic and health status of the population around the proposed scheme. The data reviewed has included, but not been limited to:

- Public Health England Local Health Profiles¹⁰⁶ ;
- Nomis Labour Market Statistics¹⁰⁷; and
- Office for National Statistics, Census 2011¹⁰⁸.

Baseline information – land use and accessibility

Residential property and housing

13.3.4 The main settlements along the A358 corridor are Ruishton, Haydon, Henlade, Thornfalcon, West Hatch, Hatch Beauchamp, Ashill, Broadway and Horton Cross. The populations of these settlements, based on 2019 ONS mid-year population

⁹⁸ Strava Global Heatmap [online] available at: <https://www.strava.com/heatmap#7.00/-120.90000/38.36000/hot/all> (Accessed 22 January 2021)

⁹⁹ Explore Somerset [online] (Available at: <https://roam.somerset.gov.uk/roam/map#>) (Accessed 22 January 2021)

¹⁰⁰ The Long Distance Walkers Association [online], Available at: <https://www.ldwa.org.uk/> (Accessed 22 January 2021)

¹⁰¹ National Express Route Map [online]. Available at: <https://www.nationalexpress.com/en/destinations/network-map> (Accessed 22 January 2021).

¹⁰² Sustrans National Cycle Network [online] Available at: <https://www.sustrans.org.uk/find-a-route-on-the-national-cycle-network/route-33/> (Accessed 22 January 2021).

¹⁰³ Somerset West and Taunton Council (2016) *Taunton Deane Adopted Site Allocations and Development Management Plan, Policies and Inset Maps* [online]. Available at: <https://www.somersetwestandtaunton.gov.uk/media/1072/sadmp-adopted-2016-maps.pdf>.

¹⁰⁴ Somerset West and Taunton Council (2016) *West Somerset Local Plan to 2032* [online]. Available at: <https://www.somersetwestandtaunton.gov.uk/planning-policy/adopted-local-plans/west-somerset-local-plan-to-2032/> (Accessed January 2021)

¹⁰⁵ South Somerset District Council (2015) *South Somerset Local Plan 2006 -2028* [online]. Available at: <https://www.southsomerset.gov.uk/your-council/your-council-plan-and-strategies/planning-policy/local-plan/> (Accessed January 2021)

¹⁰⁶ Public Health England. Fingertips. Available online at: <https://fingertips.phe.org.uk/>

¹⁰⁷ Nomis Labour Market Statistics [online]. Available at: <https://www.nomisweb.co.uk/reports/lmp/la/contents.aspx> (Accessed January 2021)

¹⁰⁸ Office for National Statistics (2011) *Census 2011* [online]. Available at: <https://www.ons.gov.uk/census/2011census> (Accessed January 2021)

estimates of ward profiles in which they sit, are set out in Table 13-1. The wards are shown on Figure 13.1.

- 13.3.5 Taunton to the west of the study area and Ilminster to the east provide greater services and employment opportunities for the populations within the study area.

Table 13-1 Wards within the study area and usual resident population

Wards	Distance from study area	Population within the ward
E36005293: West Monkton	This ward lies partially within the study area, and is part of Taunton.	4,357
E36005284: Taunton Halcon	This ward is partially within the study area and is part of Taunton.	4,058
E36005281: Taunton Blackbrook and Holway	This ward is partially within the study area and is part of Taunton.	4,058
E36005279: Ruishton and Creech	This ward lies partially within the study area and includes the settlements of Ruishton, Henlade and Thornfalcon.	2,346
E36005276: Neroche, Taunton Deane	This ward lies partially within the study area and includes the settlements of Haydon, West Hatch and Hatch Beauchamp.	1,094
E36005277: North Curry and Stoke St Gregory	The periphery of the ward area lies within the study area, but the settlements in this ward lie outside of it.	1,788
E36005253: Neroche, South Somerset	This ward lies partially within the study area and includes the settlements of Ashill, Broadway and Horton Cross.	1,350
E36005248: Islemoor	The periphery of the ward area lies within the study area, but the settlements in this ward are outside of it.	1,595
E36005247: Ilminster	This ward is partially within the study area and is part of Ilminster.	3,374

- 13.3.6 There are no housing allocations within the study area.

Community land and assets

- 13.3.7 Community land and assets includes land, buildings and infrastructure which provide a service or resource to a community, for example open spaces, village greens, playgrounds, village halls, healthcare and education facilities.
- 13.3.8 No green belt land, registered common land or open access land has been identified within the study area. Bickenhall Wood is an open space that is accessible to the public within the study area.
- 13.3.9 Swingrite Golf Centre and three indoor sports facilities are located within the study area.
- 13.3.10 There are a number of churches within the study area including The Church of Jesus in Taunton, St Mary's Church in Ashill and St Aldhelm and St Eadburgha's Church in Broadway..

- 13.3.11 Schools within the study area include Kiddi Caru Day Nursey in Taunton, Somerset Progressive School in West Hatch and Ashill Primary School.
- 13.3.12 Horton Cross Nursing Home is within the study area which provides care for the elderly.
- 13.3.13 Other community assets such as doctor's surgeries, wedding venues, public houses, post offices, garden centres/plant nurseries and local shops are also located within the settlements in and close to the study area.

Development land and business

- 13.3.14 Commercial businesses are clustered at Taunton, within the more built up area of the study area. Industrial and commercial businesses are clustered at Thornfalcon Works at Henlade and Rose Mills Trading Estate and Southfields Enterprise Park, off Southfields roundabout. Other individual commercial and industrial businesses are located throughout the study area.
- 13.3.15 There are over five hotels or B&Bs within the study area at Ruisthon, Henlade, Thornfalcon and Ilminster, and campsites at Ruishton and Thornfalcon.
- 13.3.16 There are a number of strategic employment site allocations within the study area including Nexus 25 at Taunton and allocations at Southfields Roundabout, Ilminster. These are proposed for B1, B2 and B8 uses. There is also a developing plan for commercial and residential development on the former Horlicks factory at Ilminster; this has yet to be submitted for planning.

Agricultural land holdings

- 13.3.17 Agricultural land holdings are located throughout the study area, most of which are arable cropping. There are some livestock breeders, dairy and commercial plots.

Walkers, cyclists and horse riders

- 13.3.18 Walkers and cyclists can be considered as two types – those who walk or cycle as part of an active travel journey (e.g. as part of a regular commute or to access services); and those who are walking or cycling for recreational purposes. Commuters will typically be more interested in an efficient, convenient route while recreational travellers would be more interested in the enjoyment of the route. Equestrian activity is dominated by recreational horse-riding and therefore horse riders will be assumed to be recreational unless there is clear evidence otherwise.
- 13.3.19 The baseline review has considered WCH routes made up of the public right of ways (PRoW) and other routes which cross or meet the A358 within the study area. The wider context has been checked to make assumptions on the likely reasons for people using the routes.
- 13.3.20 Although pedestrians, cyclists and horse riders are not prohibited from using the A358, the current road is not suitable for this type of use for the majority of the length in the study area, due to traffic volumes and speed.
- 13.3.21 Over 80 PRoW paths have been identified which meet, cross or are near to the A358 within the study area. PRoWs are likely to be used for recreational purposes. PRoW use surveys have not been undertaken at this stage but may be

undertaken at the next stage of EIA, if any identified impacts require further exploration and data.

- 13.3.22 There are limited safe crossing points for walkers, cyclists and horse-riders across the A358. There is an underpass at Griffin Lane which connects West Hatch and Hatch Beauchamp. This underpass is part of the East Deane Way long distance walk, around Taunton on to Sedgemoor. National Cycle Network Route 33 starts in Bristol, crosses Somerset at Taunton and ends at Seaton. A short stretch of the cycle route is through Hatch Beauchamp within the study area, but not along the A358.
- 13.3.23 Evidence from the Strava Global Heatmap suggests that the A358 between Taunton and Southfields roundabout is regularly used by cyclists, particularly between Thornfalcon and Hatch Green. There are few regular running routes along the A358, however routes that cross the A358 at Glebe Cottages Road in Thornfalcon, the underpass at Griffin Lane in West Hatch and at Bickenhall Lane in Hatch Beauchamp are regularly used.
- 13.3.24 There are six bridleways within the study area at Hatch Green, Ashill and Ilminster. K Baker Paddocks riding school at Bickenhall is within 500m of the study area. There is therefore potential for horse riders to be using the bridleways that are near to the A358.

Public transport

- 13.3.25 Public transport has been considered in the scope to provide further context of local accessibility and where walkers and cyclists may need to access public transport hubs as part of a longer journey.
- 13.3.26 The A358 is currently used by a number of local and regional bus services, and national coach services, which provides links between settlements along the corridor. National Express operates regional services between Taunton and Winchester along the A358.
- 13.3.27 Taunton Gateway Park and Ride is located south of the A358, within 500m of the M5 at Taunton. Local bus services operate along or adjacent to the A358 between Taunton and Ilminster. There are existing bus stops located on the A358 between Ruishton and Hatch Beauchamp. The services which currently stop on the A358 are:
- Route 10C – Taunton to Martock. This service stops along the A358 in both directions and is operated by Hatch Green Coaches.
 - Route 30 – Taunton to Axminster. This service stops along the A358 in both directions and is operated by First Buses of Somerset.
 - Route 51 – Taunton to Athelney. This service stops along the A358 in both directions and is operated by Hatch Green Coaches.
 - Route 54 – Taunton to Yeovil via Langport, Somerton. This service stops along the A358 in both directions and is operated by First Buses of Somerset.
 - Route 96C – Taunton to Crewkerne. This service stops along the A358 in both directions and is operated by South West Coaches.
 - Route 901 – Taunton to Isle Brewers. This service stops along the A358 in both directions and is operated by Isle Valley Transport.

13.3.28 There are additional bus stops on local roads within the study area with services to Taunton, Wells, Martock and Ilminster.

Baseline information – human health

13.3.29 The World Health Organization (WHO)¹⁰⁹ constitution defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. This scope of assessment therefore includes consideration of potential impacts of the proposed scheme on physical, mental and social health.

13.3.30 Health is determined by a complex interaction between individual characteristics, lifestyle and the physical, social and economic environment. Most public health experts agree that these ‘social determinants of health’ are more important than formal healthcare for ensuring a healthy population¹¹⁰.

13.3.31 The preliminary health baseline therefore considers data on health indicators such as deprivation, economic activity as well as age, life expectancy, self – reported general health, long term illness or disability, respiratory disease and chronic obstructive pulmonary disease. Data for each ward is presented in tables specific to each health indicator and is summarised in text. Cells within tables which are shaded indicate health values for wards which are significantly worse than the values for England.

13.3.32 Certain health data are not available at ward level and yet are relevant in helping to inform a broad understanding of health which can be influenced by transport schemes therefore, local authority level data is presented in these instances.

13.3.33 It should be noted that the health of individuals within the study area will vary considerably and cannot be inferred from the data presented in the baseline.

Age

13.3.34 The age profile of the relevant areas, according to Office for National Statistics (ONS) mid-year population estimates, for mid – 2017¹¹¹ is shown in Table 13-2. When compared to the age profile of England, the wards included within the study area have a higher percentage of older individuals (65 years of age and older) and a lower percentage of the working age population (16-64 years of age). West Monkton had the highest percentage of individuals aged 0-15 years at 24.8%, whereas Neroche, South Somerset and Neroche, Taunton Deane had the highest percentage of individuals 65 years of age and older at 32.2% and 33.0%, respectively.

Table 13-2 Age profiles for the total resident population (%), ONS for mid-2017

Age profiles for the total resident population (%)				
Wards within the study area	0-15 years of age	16-24 years of age	25-64 years of age	65 years of age and older

¹⁰⁹ World Health Organisation (2021). *Constitution* [online]. Available at: <https://www.who.int/about/who-we-are/constitution#:~:text=Health%20is%20a%20state%20of,belief%2C%20economic%20or%20social%20condition> (Accessed January 2021)

¹¹⁰ The Kings Fund (2021) *Broader determinants of health* [online]. Available at: <https://www.kingsfund.org.uk/projects/time-think-differently/trends-broader-determinants-health> (Accessed January 2021)

¹¹¹ Public Health England (2021). *Fingertips. Local Health Statistics – Age* [online]. Available at: <https://fingertips.phe.org.uk/profile/local-health> (Accessed January 2021)

Age profiles for the total resident population (%)				
West Monkton	24.8	7.7	52.9	15.3
Taunton Halcon	22.5	9.2	53.0	15.3
Taunton and Blackbrook and Holway	18.4	9.4	54.7	17.5
Ruishton and Creech	18.0	6.9	46.0	29.1
Neroche, Taunton Deane	13.5	6.1	47.4	33.0
North Curry and Stoke St Gregory	16.4	7.3	47.2	29.1
Neroche, South Somerset	14.4	6.6	46.8	32.2
Islemoor	17.1	7.6	48.5	26.8
Ilminster	18.1	8.7	46.7	26.5
<i>Average of Wards</i>	18.1	7.7	49.2	25.0
Average England	19.1	10.9	51.9	18.0

Deprivation

- 13.3.35 The English Index of Multiple Deprivation (IMD) 2015^{112,113} measures relative levels of deprivation and is made up of seven 'domains' of deprivation (employment, health and disability, education, skills and training, crime, barriers to housing and services, and living environment). Table 13-3 sets out the average IMD score for each ward within the study area based on aggregated, population-weighted scores of lower support output areas. The scores are used to rank areas according to their level of deprivation, with a larger score indicating a more deprived ward.
- 13.3.36 The study area (average of wards: 17.0) has a lower IMD score when compared to the score of England (21.8), suggesting it is less deprived. The IMD score is lowest in West Monkton (9.9) and Ruishton and Creech (9.9) suggesting that these wards are the least deprived. The IMD score is highest in Taunton Halcon (35.9) suggesting that this ward is the most deprived in the study area.
- 13.3.37 The Income deprivation domain measures the proportion of the population in an area experiencing deprivation relating to low income. The definition of low income includes both those that are out-of-work and those that have low earnings. Table 13-3 sets out the proportion of people experiencing income deprivation in the wards within the study area based on aggregated, population-weighted scores of lower support output areas.
- 13.3.38 The study area (average: 10.7%) has a lower proportion of people experiencing income deprivation when compared to the proportion in England (14.6%), suggesting it is less income deprived. The proportion of people experiencing income deprivation is lowest in Neroche, Taunton Deane (6.2%) and Neroche, South Somerset (6.7%) and highest is in Taunton Halcon (24.5%) suggesting there is some variation in income deprivation across the study area wards.

¹¹² As aggregate data for wards was not available for the 2019 IMD, the 2015 IMD was used.

¹¹³ Public Health England (2015). *Fingertips. Local Health Statistics – Index of Multiple Deprivation* [online]. Available at: <https://fingertips.phe.org.uk/profile/local-health> (Accessed January 2021)

Table 13-3 Index of Multiple Deprivation Score and Income Deprivation Percentage, 2015

Wards within the study area	IMD Score, 2015	Income deprivation %, (IMD 2015)
West Monkton	9.9	7.4
Taunton Halcon	35.6	24.5
Taunton and Blackbrook and Holway	19.9	15.0
Neroche, Taunton Deane	13.8	6.2
North Curry and Stoke St Gregory	15.0	7.3
Ruishton and Creech	10.2	6.9
Ilminster	14.2	11.2
Islemoor	21.8	10.8
Neroche, South Somerset	12.4	6.7
<i>Average of Wards</i>	17.0	10.7
Average England	21.8	14.6

Economic activity, inactivity and unemployment

13.3.39 The 2011 Census data¹¹⁴ shows that the percentage of economically active people (employed, self-employed, unemployed but actively seeking work, and full-time students) in the study area was 80.7% which is higher than the England and Wales level (76.8%) (Table 13-4). Unemployment and economic inactivity (retired, student, looking after home or family, long term sick or disabled, other) in the study area was 3.9% and 19.3%, which is lower than the England and Wales level at 7.6% and 23.2%, respectively (Table 13-4). Taunton Halcon had a highest level of unemployment at 8.2% which is higher than the level for England and Wales (7.6%).

Table 13-4 Economic Activity, Inactivity and Unemployment (%), Census 2011

Wards within the study area	Economically Active	Unemployed	Economically Inactive
West Monkton	83.9	2.0	16.1
Taunton Halcon	77.1	8.2	22.9
Taunton and Blackbrook and Holway	81.2	4.5	18.8
Ruishton and Creech	80.6	3.2	19.4
Neroche, Taunton Deane	81.0	3.2	19.0
North Curry and Stoke St Gregory	81.3	3.5	18.7
Neroche, South Somerset	79.5	2.5	20.5
Islemoor	79.9	3.3	20.1
Ilminster	81.9	4.7	18.1
<i>Average of Wards</i>	80.7	3.9	19.3
Average England and Wales	76.8	7.6	23.2

¹¹⁴ Office for National Statistics (2011). *2011 Census* [online]. Available at: <https://www.ons.gov.uk/census/2011census> (Accessed January 2021)

Health and wellbeing

General health

13.3.40 The 2011 Census¹¹⁵, measured self-perceived general health of residents based on a five-point scale. The results specific to the wards included in the study area are portrayed in Table 13-5. The self-perceived general health of wards included within the study area have less people rating their health as bad or very bad (average: 3.1%) than the percentage in England (5.4%). Most residents within the study area rated their health as good or very good however, this was highest in West Monkton and Neroche, Taunton Deane where 84.8% and 83.4% of residents rated their health as good or very good, respectively. Ruishton and Creech had the highest percentage of individuals rating their health as bad or very bad at 5.2% however, this is not significantly different from England (5.4%).

Table 13-5 Self rated general health (%), Census 2011

Wards within the study area	Very good health	Good health	Fair health	Bad health	Very bad health
West Monkton	54.7	30.1	10.5	0.3	0.0
Taunton Halcon	43.4	36.5	14.3	0.5	0.0
Taunton Blackbrook and Holway	45.6	34.5	13.8	0.5	0.1
Neroche, Taunton Deane	49.6	33.8	12.1	3.7	0.8
North Curry and Stoke St Gregory	49.0	33.7	13.1	3.5	0.8
Ruishton and Creech	45.0	35.4	14.4	3.9	1.3
Ilminster	44.4	36.4	14.8	3.6	0.8
Isle Moor	47.0	34.2	14.7	3.0	1.0
Neroche, South Somerset	45.1	35.8	14.8	3.7	0.6
<i>Average of Wards</i>	47.1	34.5	13.6	2.5	0.6
Average England	47.2	34.2	13.1	4.2	1.2

Life expectancy

13.3.41 Public Health England data shows that the 2013-17 average life expectancy at birth¹¹⁶ is comparable across the wards included within the study area (average: Males – 80.1 years, Females – 84.0 years) and is slightly higher than the average life expectancy at birth for England (Males – 79.5 years, Females – 83.1 years) (Table 13-6). North Curry and Stroke St Gregory had the highest male average life expectancy at birth of all wards included in the study area at 83.3 years whereas Taunton Halcon had the lowest at 76.0 years. The highest female average life expectancy at birth was observed for Ruishton and Creek at 86.7 years whereas Taunton Halcon had the lowest at 80.1 years.

¹¹⁵ Nomis Official Labour Market Statistics (2011) *2011 Census – General Health* [online]. Available at: <https://www.nomisweb.co.uk/query/construct> (Accessed January 2021)

¹¹⁶ Public Health England (2021). *Fingertips – Average Life Expectancy at Birth* [online]. Available at: https://fingertips.phe.org.uk/profile/local-health/data#page/3/gid/1938133185/pat/201/par/E07000246/ati/8/are/E05008916/iid/93283/age/1/sex/2/cid/4/page-options/ovw-do-0_car-do-0 (Accessed January 2021)

Table 13-6 Average life expectancy at birth, Public Health England 2013 - 2017

Life Expectancy at birth, 2013-2017		
Wards within the study area	Males	Females
West Monkton	80.9	82.0
Taunton Halcon	76.0	80.1
Taunton and Blackbrook and Holway	81.5	84.7
Neroche, Taunton Deane	79.1	82.4
North Curry and Stoke St Gregory	83.3	85.7
Ruishton and Creech	81.6	86.7
Ilminster	81.5	86.2
Islemoor	83.1	83.6
Neroche, South Somerset	80.8	85.1
<i>Average of Wards</i>	80.9	84.1
Average all England	79.5	83.1

Long term illness or disability

13.3.42 Data from the 2011 Census shows that the percentage of people who reported having a limiting long-term illness or disability¹¹⁷ in the study area (17.9%) was broadly in line with the percentage in England (17.6%) (Table 13-7). Of all the wards, Ruishton and Creech had the highest proportion of people reporting limiting long-term illness or disability at 20.3% while West Monkton had the lowest at 14.4%.

Table 13-7 Percentage of people who reported having a limiting long-term illness or disability, Census 2011.

Wards within the study area	Percentage (%) of people who reported having a limiting long-term illness or disability
West Monkton	14.4
Taunton Halcon	18.4
Taunton and Blackbrook and Holway	17.9
Neroche, Taunton Deane	18.2
North Curry and Stoke St Gregory	17.1
Ruishton and Creech	20.3
Ilminster	18.2
Islemoor	18.1
Neroche, South Somerset	18.8
<i>Average of Wards</i>	17.9
Average all England	17.6

¹¹⁷ Public Health England (2021). *Fingertips. Local Health – Percentage of people who reported having a limiting long – term illness or disability* [online]. Available at: <https://fingertips.phe.org.uk/profile/local-health> (Accessed January 2021)

Respiratory disease and chronic obstructive pulmonary disease

13.3.43 Public Health England data from 2013-2017 shows that the standard mortality ratio (SMR) for deaths from respiratory diseases (for all ages)¹¹⁸ and standard admission ratio (SAR) for emergency hospital admissions for chronic obstructive pulmonary disease (COPD)¹¹⁹ is higher in wards located closer to the city of Taunton (Table 13-8). The SMR for deaths from respiratory diseases (all ages) was 121.1 per 100 and 100.7 per 100 in Taunton Halcon and Taunton Blackbrook and Holway, respectively. The SAR for emergency hospital admissions for COPD was 121.3 per 100 and 162.7 per 100 for Taunton Halcon and Taunton Blackbrook and Holway, respectively. These two wards had the highest standardised ratio of all wards included within the study area for these indicators.

Table 13-8 Table showing the SMR (per 100 people) for deaths from respiratory diseases (all ages) and SAR (per 100 people) for emergency hospital admissions for COPD, Public Health England 2013 - 2017.

Wards within the study area	Deaths from respiratory diseases, all ages, SMR	Emergency hospital admissions for COPD, SAR
West Monkton	95.3	65.7
Taunton Halcon	121.1	121.3
Taunton and Blackbrook and Holway	100.7	162.7
Neroche, Taunton Deane	90.8	51.3
North Curry and Stoke St Gregory	59.9	61.9
Ruishton and Creech	60.7	61.9
Ilminster	60.8	83.5
Islemoor	90.1	59.2
Neroche, South Somerset	66.0	83.5

Vulnerable groups

13.3.44 The baseline profile suggests that there are numerous vulnerable groups within the study area which are considered to have high relevance to the scheme. The vulnerable groups¹²⁰ include, but are not limited to:

- Age related groups (children, young people and older individuals);
- Income related groups (people on low income);
- Groups who suffer discrimination or other social disadvantage (people with physical or learning disabilities/difficulties); and
- Geographical groups (people living in areas known to exhibit poor economic and/or health indicators).

13.3.45 Table 13-9 identifies which vulnerable groups are considered to have high relevance to the scheme and will therefore be given closer consideration within the assessment.

¹¹⁸ Public Health England (2021). *Fingertips. Local Health – Deaths from respiratory diseases* [online]. Available at: <https://fingertips.phe.org.uk/>

¹¹⁹ Public Health England (2021). *Fingertips. Local Health – Emergency hospital admissions for COPD* [online]. Available at: <https://fingertips.phe.org.uk/> (Accessed January 2021)

¹²⁰ Based on: *Health Impact Assessment: A Practical Guide, Wales Health Impact Assessment Support Unit* [online]. Available at: https://whiasu.publichealthnetwork.cymru/files/1415/0710/5107/HIA_Tool_Kit_V2_WEB.pdf (Accessed January 2021)

Table 13-9 Vulnerable and disadvantaged groups within the study areas and their relevance to the health assessment

Vulnerable and disadvantaged groups	Sensitivity (high/medium/low)	Reason for assigned sensitivity in the context of the scheme
Children and young people	Medium	The % of under 16-year olds in study area (18.1%) is slightly below that of the national average (19.1).
Older people	Medium	The % of over 65-year olds in the study area (25%) is higher than the national average (18%).
People on low income	Low	Income deprivation in the study area is significantly better (10.7%) than the national average (14.6%) (although there are still pockets of deprivation).
Economically inactive	Low	Economic inactivity in the study area (19.3%) is significantly lower than the England and Wales average (23.2%).
Unemployed/workless	Low	Unemployment in the study area (3.9%) is significantly lower than the England and Wales average (7.6%) (although there are still pockets of high unemployment).
People who are unable to work due to ill health.	Medium	Percentage of people who reported having a limiting long-term illness or disability in the study area (17.9%) was broadly in line with the percentage in England (17.6%) (although there are still pockets of ill health).
People living in areas known to exhibit poor economic and/or health indicators	Low	The study area is not within an area that is economically deprived or showing ill health.
People living in isolated/over-populated areas	Medium	The study area is not over-populated but does have some isolated properties along the route.
People unable to access services and facilities	Low	The communities within the study area are not in areas that are likely to have access issues.

Air quality

13.3.46 Full baseline conditions related to air quality are found in Scoping Report Chapter 6 Air quality. There are currently three Air Quality Management Areas (AQMAs) within 200m of the Affected Road Network (ARN) (study area for air quality assessment). These are:

- East Reach AQMA declared by Somerset West and Taunton Council;
- Henlade AQMA declared by Somerset West and Taunton Council; and
- Yeovil AQMA declared by South Somerset District Council.

13.3.47 East Reach AQMA and Henlade AQMA were both declared in 2003 for exceedances of the annual mean NO₂. The East Reach AQMA is located approximately 2 kilometres west of the proposed scheme and the Henlade AQMA is located approximately 300m north of the Scheme.

13.3.48 The Yeovil AQMA was declared in 2002 for exceedances of the annual mean NO₂. It is located approximately 17 kilometres east of the proposed scheme.

13.3.49 Public Health England data for 2018 shows that the fraction of mortality attributable to air pollution in Somerset was 4.2% in 2019 which is lower than the

average fraction for England (5.2%)¹²¹. No data for Somerset West and Taunton was available.

Noise

13.3.50 Full baseline conditions related to noise are found in Scoping Report Chapter 12 Noise and Vibration. Ambient noise environment conditions will be observed using baseline noise surveys when travel restrictions due to the COVID-19 pandemic are removed and the traffic flows are considered representative of the baseline conditions in the area.

13.3.51 There are 8 Noise Important Areas (NIA) along the A358 as listed below:

- NIA Number 3497, Taunton, Somerset;
- NIA Number 3498, Taunton, Somerset;
- NIA Number 3499, Taunton, Somerset;
- NIA Number 3500, Taunton, Somerset;
- NIA Number 3501, Taunton, Somerset;
- NIA Number 3502, Taunton, Somerset;
- NIA Number 12939, Taunton, Somerset; and
- NIA Number 12940, Taunton, Somerset.

13.3.52 Public Health England¹²² data for 2018/19 shows that the rate of complaints (per 1000 population) about noise is 2.1 in South Somerset and 2.2 in Somerset West and Taunton, both of which is lower than the rate in England (6.8).

Road safety

13.3.53 Road safety data was obtained from the Combined Modelling and Appraisal Report (ComMA) published as part of the Stage 2 Project Control Framework (PCF) which is the most recent data available for the proposed scheme at the writing of the Scoping Report. An updated accident analysis based on 2015 to 2019 data will be undertaken shortly and will be reported in the PCF Stage 3 ComMA.

13.3.54 Personal Injury Accident (PIA) data for the 5 -year period available (January 2010 to December 2014) showed that there was a total of 63 accidents on the A358 between M5 junction 25 and the A303 at Southfields roundabout of which one was fatal and 20 were serious.

13.3.55 The A358-accident rate per billion vehicle – kilometres travelled for this period was 110 which compares to a national accident rate of 171, suggesting that the frequency of accidents is lower within this area.

13.3.56 Public Health England¹²³ data for 2016 – 2018 for number of people reported killed or seriously injured (KSI) on roads (per 100,000 population) in South

¹²¹Public Health England (2021) Fingertips. *Local Health – Fraction of mortality attributable to air pollution* [online]. Available at: https://fingertips.phe.org.uk/search/air%20pollution#page/6/gid/1/pat/6/par/E12000009/ati/302/are/E06000022/iid/30101/age/230/sex/4/cid/4/page-options/ovw-do-0_car-do-0 (Accessed January 2021)

¹²² Public Health England (2021). *Fingertips. Wider determinants of health - Rate of complaints about noise* [online]. Available at: https://fingertips.phe.org.uk/search/air%20pollution#page/6/gid/1/pat/6/par/E12000009/ati/302/are/E06000022/iid/30101/age/230/sex/4/cid/4/page-options/ovw-do-0_car-do-0 (Accessed January 2021)

¹²³ Public Health England (2021). *Fingertips. Wider determinants of health - Killed and seriously injured (KSI) casualties on England's roads* [online]. Available at: https://fingertips.phe.org.uk/search/air%20pollution#page/6/gid/1/pat/6/par/E12000009/ati/302/are/E06000022/iid/30101/age/230/sex/4/cid/4/page-options/ovw-do-0_car-do-0 (Accessed January 2021)

Somerset and Somerset West and Taunton was 33.3 and 32.8, respectively, which is lower than the KSI in England on average (42.6).

Future baseline

- 13.3.57 The future baseline will likely be characterised by increased businesses within the study area as employment allocations get built out, including Nexus 25 employment site at Taunton.
- 13.3.58 The COVID-19 pandemic that has affected the UK in 2020 may influence future trends. For example, there may be an increase in people working from home even following the end of the pandemic. Some people may switch from the use of public transport to walking, cycling or using their own cars due to concern about communicable diseases. In addition, people may have an increased preference for outdoor recreation where social distancing is easier than in indoor leisure and recreation venues. The level to which these types of behaviour change may occur will depend on the trajectory of the pandemic and individual responses to their experience of 2020/21 (e.g. heightened anxiety or concern) which is, at this time, uncertain. These changes in behaviour will be picked up during survey work carried out for the EIA, e.g. PRow user surveys).

Value of receptors (land use and accessibility)

- 13.3.59 The estimated value of land use and accessibility receptors is set out in Table 13-10. The value is based on criteria in DMRB LA 112⁹⁷ but has been adapted based on the professional judgement and experience of the assessor to take account of policy objectives in the NPSNN and to enable the practical application for the context of the proposed scheme.

Table 13-10 Value of land use and accessibility receptors in the study area for population and health

Value/sensitivity	Description	Examples within the study area
Very High	Residential settlements within the study area which exceed 5ha or 150 houses.	Residential settlements including Taunton, Ruishton, Henlade, Hatch Beauchamp and Ilminster.
	Community land and assets providing essential services for the daily health and functioning of the community where: There is complete severance between communities and their land/assets There is limited potential for substitution The level of use is frequent (daily) They are frequently used by the majority of the community or by vulnerable groups who could be disproportionately affected by changes in the baseline due to potentially different needs.	Schools including, Ashill Primary School and Somerset Progressive School where all students have Educational Health and Care Plans (EHC) and much teaching takes place outside.
	Large employment sites and allocations within the study area which exceed 5ha.	There is an adopted Local Development Order for the 25ha strategic employment site Nexus 25 at junction 25 of the M5, Taunton. A strategic employment site of 12ha is allocated within the South

Value/sensitivity	Description	Examples within the study area
		Somerset Local Plan at the Southfields roundabout.
	Agricultural land holdings wholly reliant on access between land and key agricultural infrastructure.	Examples to be identified at the next stage of EIA.
	National trails and routes likely to be used regularly by high numbers for community and/or recreation (with limited potential for substitution).	National Cycle Network Route 33.
	Grade separated crossing points of the A358 for walkers, cyclists and/or horse riders which link communities and there are no alternatives without substantial detours.	Griffin Lane underpass.
	At grade crossings points with >16,000 vehicles per day; and or/ routes with no accessibility provision.	Examples to be identified at the next stage of EIA.
High	Residential settlements within the study area that exceed 1-5ha / circa 30-150 houses	Thornfalcon and Ashill.
	Community land and assets supporting the health and functioning of the community where: There is substantial severance between community and land/assets Alternatives are available only by travel to other settlements The level of use is frequent (weekly) They are regularly used by a large majority of the community or by vulnerable groups who could be disproportionality affected by changes in the baseline due to potentially different needs.	No assets identified at this stage.
	Agricultural land holdings dependent on access between land and key agricultural infrastructure.	Examples to be identified at the next stage of EIA.
	Employment sites and allocations circa >1 – 5ha	There are two strategic employment sites allocated within South Somerset Local Plan at Southfields roundabout of 3ha and 5ha.
	Regional trails and routes (e.g. promoted circular walks) located close to communities likely to be used for recreation and to a lesser extent commuting, that record frequent (daily) use and have limited potential for substitution.	East Deane Way long distance route.
	Isolated houses and very small hamlets within the study area that <1ha and/or <30 houses	Small hamlets include Haydon, West Hatch, Meare Green, Stewley, Woodstock, Kenny, Rapps and Horton Cross. Other isolated houses are located across the rural parts of the study area including at Ash Road.

Value/sensitivity	Description	Examples within the study area
Medium	Community land and assets supporting the health and functioning of the community where: Alternatives are available only by travel to adjacent communities/neighbourhoods; and They are regularly used by the community (monthly)	Public houses such as Ivy House Social Club in Henlade. Village halls including Ashill Village Hall. A number of indoor sports facilities supporting specific sports, spread across the study area. Churches including St Mary's Church in Ashill and St Aldhelm and St Eadburgha's Church in Broadway.
	Small employment sites and land allocated for employment circa <1ha	Small employment sites including Thornfalcon Works.
	Small agricultural land holdings requiring access to limited areas of land with potential for relocation.	Examples to be identified at the next stage of EIA.
	Public rights of way and other routes close to communities which are used for recreational purposes (e.g. dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys.	Several public rights of way and other routes close to communities throughout the study area.
Low	Proposed development on unallocated sites providing housing with planning permission/in the planning process.	Examples to be identified at the next stage of EIA.
	Community land and assets where: Alternatives are available at a local level in the wider community; Level of use is infrequent; and Land and assets are being used by a minority in the community	Huish Woods Scout Campsite in West Hatch.
	Proposed development on unallocated sites providing employment with planning permission or are in the planning process.	Examples to be identified at the next stage of EIA.
	Agricultural business not dependent on land access and with potential for relocation.	Examples to be identified at the next stage of EIA.
	Routes which have fallen into disuse through past severance and/or which are scarcely used because they do not offer a meaningful route for either utility or recreational purposes.	Examples to be identified at the next stage of EIA.
Negligible	Community land and assets which are very infrequently used.	Examples to be identified at the next stage of EIA.
	Agricultural land which is infrequently used on a non-commercial basis.	Examples to be identified at the next stage of EIA.

Sensitivity of community (health)

13.3.60 The assessment of human health considers how changes that result from the scheme would affect health determinants during both construction and operation. Based on the information that has been gathered for the community health profile

and baselines described in other chapters of the ES (Document Reference 6.2), a judgement has been made on how sensitive the community would be to changes in health determinants. The health determinants to be scoped into the assessment are identified in Table 13-11 along with the sensitivities of each of the communities to changes in these determinants. This is based on the sensitivity criteria identified in DMRB LA 112.

Table 13-11 Community (ward) sensitivity to changes in health determinants

	Wards within the study area								
	West Monkton – E36005293	Taunton Halcon – E36005284	Taunton Blackbrook and Holway – E36005281	Ruishton and Creech – E36005279	North Curry and Stoke St Gregory – E36005277	Neroche, Taunton Deane – E36005276	Neroche, South Somerset – E36005253	Islemoor – E36005248	Ilminster - E36005247
Access to health, community, recreational and educational facilities	High	High	High	High	High	High	High	High	High
Access to green/open space	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Transport and connectivity	High	High	High	High	High	High	High	High	High
Air quality	High	High	Medium	High	Medium	High	Medium	High	Medium
Ambient noise	High	High	High	High	Medium	High	High	Medium	Medium
Sources and pollution pathways	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Landscape amenity	Medium	High	High	High	Low	Low	Low	Low	High
Road safety	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Employment and economy	Medium	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium

13.4 Potential impacts

Construction: land use and accessibility

Residential property and housing

- 13.4.1 The proposed scheme would lead to permanent loss of land from residential premises where new junctions are proposed at Lower Henlade. Although efforts will be made to limit the impacts on residential dwellings, there would likely be a number of demolitions of buildings to accommodate the footprint of the proposed scheme. As well as impacts on the individuals affected, there would be a potential

impact on wellbeing of local communities where demolition alters the character and social capital of the communities.

- 13.4.2 Construction of the proposed scheme may cause temporary and permanent changes to access for residential dwellings from sections of the existing A358, particularly where the offline bypass is proposed and where new junctions are proposed. Where existing local access onto the A358 is stopped up this could result in severance, and residents may face potential changes to journey times.
- 13.4.3 There may also be a temporary loss of amenity at homes close to areas of construction from factors such as dust, noise and visual intrusion.

Community land and assets

- 13.4.4 There may be potential loss of some land associated with community assets where the offline bypass is proposed at Lower Henlade and where online widening is proposed.
- 13.4.5 Construction of the proposed scheme may cause temporary access issues to community assets from sections of the A358 undergoing online widening or where construction of new grade separated junctions is proposed.
- 13.4.6 There may also be a temporary loss of amenity at community assets close to areas of construction from factors such as dust, noise and visual intrusion.

Development land and business

- 13.4.7 Construction of the proposed scheme may cause temporary access issues to businesses from sections of the A358 undergoing online widening or where the construction of new junctions is proposed.

Agricultural land holdings

- 13.4.8 There may be potential loss of some agricultural land where the offline bypass is proposed through Taunton, Haydon and Lower Henlade and where online widening is proposed at Ashill.
- 13.4.9 The proposed scheme may cause temporary access issues to some agricultural land holdings, particularly where new grade separated junctions are proposed at Ashill.

Walkers, cyclists and horse riders

- 13.4.10 The construction footprint of the proposed scheme may require the temporary or permanent diversion or closure of PRoW throughout the study area. There would also be a likely loss of amenity during construction from factors such as dust, noise and visual intrusion.

Construction: human health

- 13.4.11 During demolition and construction works there is the potential for health determinants to be affected such that the community health is impacted. Each of the relevant health determinants is listed below along with a description of how construction may affect them.

Access to health, community, recreational and educational facilities

- 13.4.12 During construction it is likely that access to health, community, recreational and educational facilities would, although minimised, be disrupted. This could either be through road closures, temporary diversions or increases in journey length. These changes could result in affects to an individual's ability to access these social services which could lead to effects on health and wellbeing in a number of ways, depending on a person's individual circumstances, and especially those reliant on public transport whose routes may be affected.
- 13.4.13 It is unlikely that access to these facilities would be completely lost.

Access to green/open space

- 13.4.14 Access to open space, green space and nature has health benefits, in relation to increasing physical activity¹²⁴, as well as for mental wellbeing^{125, 126}. During construction, access to green space is likely to be impacted where PRow's are affected and open space is sectioned off for construction work. The assessment will need to determine the current usage of the land in order to determine whether there would be any negative impacts as a result of loss of use during construction, and if temporary diversions may be possible.

Transport and connectivity

- 13.4.15 Construction may result in delays to public and private transport journey times which can lead to impacts on mental health from actual or perceived social isolation. Longer journeys can exacerbate this with people potentially avoiding making journeys to avoid the construction disturbance (depending on the severity). Connectivity to Public Rights of Way along the proposed scheme and the existing A358 may also become restricted, limiting opportunities for active travel and recreation.

Air quality

- 13.4.16 Dust and emissions from construction activities (predominantly earthworks) and construction vehicles, has the potential to be harmful to human health, particularly those people with existing respiratory health conditions.

Ambient noise

- 13.4.17 Construction noise, particularly where sleep could be disturbed, represents a potential affect to human health. Noise perception can be subjective. However, noise levels would be quantified through the noise impact assessment and the results used to make an assessment on human health.

Sources and pollution pathways

- 13.4.18 Construction, in particular earthworks, has the potential to result in the release of pollution into the surrounding environment which may be harmful to health. The risk associated with this health impact would be greater in areas of higher

¹²⁴ Scrivens, K. S. (2013). Four interpretations of social capital: an agenda for measurement. Working Paper no. 55. OCDC.

¹²⁵ Gong Y, P. S. (1996). A systematic review of the relationship between objective measurements of the urban environment and psychological distress. *Environment International* , 48-57.

¹²⁶ Lee, A. (2010). The health benefits of urban green space: a review of the evidence. *Journal of Public Health* , 33 (2), 212-222.

contamination risk which will be identified within the geology and soils assessment.

Landscape amenity

- 13.4.19 Research into the effects of the visual and aesthetic environment on well-being is mainly focused on the psychological effects of 'natural' versus 'man-made' or urban views. During construction it is unlikely that there would be any resulting health effects, primarily due to the temporary nature of construction. However, it could be argued that knowledge of the resulting long-term changes to the visual and landscape context as a result of the proposed scheme could override this assumption.

Road safety

- 13.4.20 Construction has the potential to increase risks associated to road safety; construction vehicles, diversions, longer journey times, unfamiliar routes and distractions introduced into the views (e.g. from construction activities). These may result in effects on health should road safety become temporarily worse during construction.

Employment and economy

- 13.4.21 Employment is related to social and psychological well-being; should these be impacted during the construction period (positively or negatively) then it is possible that the most vulnerable within the study area would be affected. The construction of a road would potentially provide employment opportunities within the construction industry, but also may indirectly affect employment within the study area through changes to access or through the indirect spend from construction workers within the community.

Operation: land use and accessibility

Residential property and housing

- 13.4.22 Since land and property loss would occur at the construction stage, this is not considered to be an operational impact even though it would be permanent.
- 13.4.23 The use of the new road could have an impact on access to homes and residential areas during operation. Impacts on access could occur from changes in traffic flows in the wider network (for example if higher flows are induced along particular residential streets), or through improvements to access from the proposed scheme, where a settlement is bypassed. These changes in traffic could also lead to changes in amenity at homes from factors such as dust, noise and visual intrusion.

Community land and assets

- 13.4.24 Potential impacts on community land and assets would be similar to impacts on residential property and arise from changes in accessibility or amenity related to changes in traffic conditions.

Development land and business

- 13.4.25 Potential impacts on employment land and businesses would be similar to impacts on residential property, arising from changes in accessibility related to

changes in traffic conditions. The proposed scheme will be designed to improve traffic flows along the A358 and aims to improve access to some areas of employment, opening up opportunities for further businesses to locate to the area.

Agricultural land holdings

- 13.4.26 There is potential for temporary access issues for some agricultural land holdings, particularly at Ashill. Should agricultural land holdings be severed, there is the potential for impacts on the long-term viability of the local agricultural economy. It is anticipated that a relatively low number of agricultural land holdings would be affected by the proposed scheme.

Walkers, cyclists and horse riders

- 13.4.27 The existing A358 has many local roads and private accesses joining directly with it which may be closed up to improve safety. However, as there are limited underpasses or safe crossing points for WCH, closing local road access may reduce WCH accessibility further.
- 13.4.28 That said, there would be potential beneficial impacts on access for WCH where the proposed scheme could address issues of past severance, poor accessibility and inadequate footway, cycleway and bridleway provision. Improvements in access may help more people access public transport hubs and bus stops. Improvements to provision could improve amenity for active travellers, for example through increasing segregation from fast traffic and HGVs.
- 13.4.29 A number of PRow or other routes are expected to be closed permanently. Where routes are replaced, some diversions proposed are longer and through different areas. This is likely to result in significant effects for WCH.
- 13.4.30 Since the A358 already exists in the baseline environment (meaning there is already traffic noise and highway infrastructure visible), it is assumed there would be no likely significant adverse effects on recreational amenity of PRow during operation. However, this assumption will be reviewed against the findings of the landscape and visual assessment (see Chapter 8, landscape) which will involve greater analysis.

Operation: human health

- 13.4.31 There are a number of potential pathways between operational traffic flows and health outcomes with a number of interactions between several of them. The proposed scheme has the potential to reduce the exposure of the local communities to some of the negative pathways, for example through reducing traffic volumes that pass through some communities, therefore reducing exposure to vehicle emissions. Each of the relevant health determinants is listed below along with a description of how operation of the proposed scheme may affect them.

Access to health, community, recreational and educational facilities

- 13.4.32 The proposed scheme is likely to improve access to health, community, recreational and educational facilities through improved journey times, improved connectivity and the removal of heavy traffic through settlements such that local amenity is improved (i.e. making facilities more pleasant and desirable to visit).

Access to green/open space

- 13.4.33 Permanent severance of green/open space resulting from the proposed scheme could lead to loss of access. This could lead to a reduction in the amount of physical activity people within the local communities participate in and consequential health impacts. The assessment would need to consider the balance between the loss of green space and any potential improvements to access through provision of improved and new PRow.

Transport and connectivity

- 13.4.34 An objective of the proposed scheme is to improve connectivity and journey reliability (durations) therefore connectivity to improving some of the social determinants of health such as access to employment, services and social networks would improve with subsequent benefits to health. Connectivity to and creation of improved PRow may also be improved, therefore benefiting opportunities for active travel and recreation which are known to improve health and well-being.
- 13.4.35 Severance as a result of the proposed scheme passing through areas that were previously connected may also impact on the social networks and support systems previously existing, impacting on health.

Air quality

- 13.4.36 Short and long-term exposure to air pollution is a significant cause of ill health and premature death. Air pollution causes health effects on the respiratory system, including permanent reductions in lung function. It is also linked to asthma, chronic bronchitis, cardiovascular disease, cancer and impaired foetal development. Exposure to air pollution is detrimental to everyone but can have particularly serious effects on those who are more vulnerable to air quality such as the young, old and those with existing respiratory disease. Alignment avoids all but a few settlements, especially along the western end, therefore the proposed scheme has the potential to decrease the size of the population exposed to air pollution; therefore decreasing the risk of the associated health conditions.

Ambient noise

- 13.4.37 Transport is the main source of noise pollution in Europe and road traffic is a major contributor to human exposure to environmental noise. Traffic noise causes impaired communication, and can lead to sleep disturbance, annoyance and increased aggression. There is also evidence that exposure to noise can contribute to heart disease and hypertension; considering the large population exposed to traffic noise, this impact could be significant and is relevant to this assessment. The proposed scheme has the potential to either increase or reduce the population exposed to noise, therefore either increasing or reducing the risk of noise associated health conditions for some people within the local communities. The majority of changes would bring reductions in noise to the local communities.

Sources and pollution pathways

- 13.4.38 Once operational, the proposed scheme is unlikely to increase the risk of pollution from ground sources. However, runoff from road surfaces during extreme weather events (rainfall) may lead to the creation of pollution pathways that could be harmful to human health.

Landscape amenity

- 13.4.39 Research into the effects of the visual and aesthetic environment on well-being is mainly focused on the psychological effects of 'natural' versus 'man-made' or urban views. Once operational, the changes to the local landscape amenity will be permanent and therefore exposure to increased levels of 'man-made' views will be increased. For some people within the population (particularly those who have lived in the area for long periods of time), this may result in adverse impacts on their well-being.

Road safety

- 13.4.40 The proposed scheme aims to improve road safety; the introduction of pedestrian bridges or underpasses has the potential to improve pedestrian safety. In addition, the improved opportunities for active travel would result in the proposed scheme improving population health through increased opportunities for regular physical activity.

Employment and economy

- 13.4.41 Employment and a strong economy is related to social and psychological well-being. The proposed scheme would not directly provide employment opportunities, however, indirectly it provides improved transport networks which people use to connect with employment opportunities, and which can serve as economic catalysts for an area. Health benefits would be most likely to be experienced by those who previously found accessing employment difficult.

13.5 Design, mitigation and enhancement measures

- 13.5.1 The design of the proposed scheme, including construction activities, will seek to limit land-take as far as practicable. This would help to reduce the loss of property and land, and limit disruption to people's livelihoods.
- 13.5.2 Measures to maintain connectivity for agricultural landholders could include provision of wayleaves along proposed maintenance access points. This would help ensure farm businesses could continue to access land either side of the proposed scheme.
- 13.5.3 Clear, regular and sensitive communication between the developer's land agents and affected parties would be maintained to reduce uncertainty and anxiety among the residential, business and agricultural communities.
- 13.5.4 Clear communication over construction activities and phasing would also be important to allow individuals to make necessary plans and better cope with any potential disruption. It would also create opportunities for individual residents to discuss their specific needs which may be possible to accommodate depending on the situation.
- 13.5.5 The use of noise bunds and barriers, and/or low noise surfacing may help to mitigate operational noise in some circumstances. The noise assessment will identify whether these types of measures are required to be incorporated into the final design of the proposed scheme, depending upon the results of the assessment (refer to Chapter 12, noise and vibration).

13.6 Description of the likely significant effects

- 13.6.1 Where the proposed scheme involves construction of new junctions, the likely significant effects would relate to demolition of some properties, including residential property. Standard mitigation and compensation may not fully mitigate the social effects on the residents and communities where property loss is required, and so this is considered a likely significant effect.
- 13.6.2 The permanent and temporary requirements for land could impact the functioning of community facilities or agricultural holdings, even where there is no demolition. This would lead to likely significant effects, including at the Somerset Progressive School, depending on the scale of land required.
- 13.6.3 The inclusion of the proposed bypass may mean that the settlement of Henlade, along the existing A358, would be subject to improved air quality. That said, the beneficial effect in Henlade may be partially offset by a worsening effect in Lower Henlade due to the new road.
- 13.6.4 Other likely significant effects would relate to improved provision for WCH. For example, where existing PRoW are enhanced through improved crossing opportunities, resulting in an improved opportunity for recreation for local communities. Conversely closures or long diversions of routes would result in reduced opportunity for recreation for local communities in other areas.
- 13.6.5 During the construction stage there would be temporary disruption to parts of the PRoW network which could cause frustration and effect recreational opportunities for some local communities. However, with best practice mitigation and diversions, these effects would be minimised and therefore unlikely to be significant.

13.7 Assessment methodology

Land use and accessibility methodology

- 13.7.1 The approach to assessment will be based on guidance set out in DMRB LA 112.
- 13.7.2 The baseline will be developed further to identify and provide more detail on sensitive receptors within the study area. Sensitive receptors relating to each matter will be mapped out to allow for an assessment to be made as to whether and how they could be affected by the proposed scheme. In particular, the location and number of properties at risk of demolition, as well as land-take, will be refined as the proposed scheme design is further developed. Where land is required from community land and assets or businesses, we will engage with operators to better understand impacts on the ability of the resource to function.
- 13.7.3 The assessment will be informed by work being undertaken on the EIA and for the development consent application, including results of air quality and noise assessments, work (including frequency/use data) being undertaken for the Walkers, Cyclists and Horse Riders Assessment and Review (WCHAR) and land referencing activities. Engagement with WCH groups and council PRoW and cycling officers will further inform the understanding of current use and demand for walking, cycling and horse-riding provision.
- 13.7.4 It is not proposed to undertake any bespoke user count surveys of PRoW, community facilities or routes to inform the EIA (although such surveys will be undertaken by the WCHAR process to inform the design requirements). Count

surveys can be misleading as they typically only capture a few days of data which may not be a representative sample of annual use, particularly for PRow. Additionally, lack of use can be an indication of poor access or dangerous traffic conditions which suppress use, particularly for cyclists and pedestrians. However, site visits may be undertaken to particular locations to understand the context in terms of access provision and amenity. Signs of use (e.g. footprints, hoof prints, vegetation beaten down) will be noted.

13.7.5 Data sources to inform the WCH assessment will also include a variety of desk-based sources including:

- local authority local development plans;
- web-based data sources including Office of National Statistics/NOMIS, Sustrans interactive mapping, Strava Heatmap; and
- GIS data that has been developed specifically for the project, drawing on datasets from several sources, including OS Address Base Plus data and reviewing aerial mapping.

13.7.6 The baseline for agricultural land holdings has been informed by OS AddressBase Plus data. Engagement with landowners at the next stage of EIA will further inform the understanding of how agricultural land holdings are managed.

13.7.7 Effects will be assessed for the construction phase and for the first year of operation of the proposed scheme. The assessment will set out the predicted quantities of land use and accessibility resources that will be affected to provide an indication of magnitude. The magnitude and sensitivity of the resources will then be taken into account to assess significance. Some professional judgement will be applied in the interpretation of the guidance in DMRB LA 112, particularly for the sensitivity criteria.

13.7.8 The judgement of likely significant effects on land use and accessibility will have regard for the sensitivity and magnitude criteria adapted from DMRB LA 112, combined with judgement as to whether:

- several receptors are affected to the extent that effects are noticeable at a community level (rather than individual level); and
- the function of land use and accessibility resource, such as factors required to support a population (for examples services, employment, recreation, local economy, community cohesion), are likely to be lost, severely degraded or greatly enhanced.

Human health methodology

13.7.9 The assessment of human health is a multidisciplinary process designed to identify and assess the potential health outcomes (both negative and positive) of a proposed project, plan or programme and to deliver evidence-based recommendations that optimise health gains and reduce or remove potential negative impacts or inequalities.

13.7.10 There is currently no statutory guidance for assessing the wider effects of projects on human health. For the purpose of this assessment the DMRB LA 112 standard will be followed and the definition of health that applied will be the World Health Organisation (WHO) definition, 'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'.

- 13.7.11 The assessment approach will be qualitative except where informed by quantitative findings from the environmental factor assessments within the EIA, including Air quality, Noise and vibration, Material assets and waste and Climate Change.
- 13.7.12 The health baseline will be developed further as relevant for the communities identified as likely to be affected by the proposed scheme. Sources of data will be the same as those included within this Scoping Report, namely public Health England's public health profile website and from Somerset and West Taunton Council's web-based data portal. As identified above, much of the data is available at ward level which allows for a more granular assessment. For other health indicators data is only available at district or larger area levels. All data will be at an aggregated population level of data, rather than individual level.
- 13.7.13 The assessment will identify in more detail the determinants of health that would be affected by the proposed scheme and an exploration of the evidence for associated health outcomes will be made. This will be based on peer reviewed medical research papers and systematic reviews of relevant studies. Evidence will also be drawn from environmental noise and air quality guidance followed in the UK.
- 13.7.14 It is proposed to consult with the local public health teams to understand the main public health concerns for the area and to discuss and agree the evidence base and assessment approach.

13.8 Assessment assumptions and limitations

- 13.8.1 This scoping assessment has been undertaken based on a preliminary understanding of the baseline. Further potential receptors will be identified as part of the ongoing EIA process to close existing data gaps. If 2021 census data or more up to date mid-year estimates are available at the time of undertaking the final EIA these will be used where appropriate.
- 13.8.2 The assessment will not draw conclusions on the viability of any individual businesses, including farm businesses, that may be affected by changes in land or access from the proposed scheme. Such matters would relate to the relevant margins that support the businesses and any impacts on business viability would require direct negotiation between the interested parties and their representatives. Instead the assessment will present effects in relation to whether widespread or localised effects on business and agriculture are anticipated, to provide an indication of economic effects.
- 13.8.3 Strava Heatmap it is likely to represent only a selective group of cyclists and runners who use the app, who are likely to be very keen and more competitive cyclists and runners, and may not reflect the activities of occasional cyclists and runners, family rides with younger children or short regular commutes. Nevertheless, the app is widely used and provides an indication of routes regularly used and routes which tend to be avoided
- 13.8.4 The assessment will consider health effects and data relating to population level data, rather than health data and effects relating to individuals. The aggregated data and statistics used to support the assessment cannot be used to make inferences about the health of individuals within the communities assessed.
- 13.8.5 The EIA process will assess changes in concentrations of air pollutants, as well as changes in outdoor noise at specific receptor sites. These measurements do

not equate to level of exposure experienced by people at these receptor sites. Several factors such as amount of time people spend in the locations, quality of buildings or ventilation will all affect the level of potential exposure that people may have, which cannot be quantified in the EIA with the data and techniques available.

- 13.8.6 Although the assessment will refer to research that may demonstrate evidence of association between changes in health determinants and effects on health, this should not be interpreted as causation. It is not possible to draw conclusions on cause and effect relationships for human health using aggregated population level data.

14 Road drainage and the water environment

14.1 NPSNN requirements

14.1.1 The National Policy Statement for National Networks (NPSNN) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. The Secretary of State (SoS) uses the NPSNN as the primary basis for making decisions on Development Consent Order (DCO) applications.

14.1.2 Key policies from the NPSNN relevant to this discipline includes:

- Paragraph 5.92 of the NPSNN states that applications for projects (Such as this project) in Flood Zones 2 and 3 should be accompanied by a flood risk assessment (FRA) that 'should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account';
- Paragraph 5.96 of the NPSNN states that applicants for projects that have the potential to be affected by, or increase, flood risk are advised to seek appropriate early stakeholder engagement with the Environment Agency and other relevant flood risk management bodies such as lead local flood authorities (LLFAs), Internal Drainage Boards (IDBs) and sewerage undertakers among others;
- Paragraph 5.07 in the NPSNN states that local flood risk management strategies and surface water management plans provided by LLFAs should be used to inform the assessment of the project on flood risk and the FRA. This should include consideration of surface water flood risk in addition to fluvial flood risk;
- Paragraphs 5.98 and 5.99 in the NPSNN state the requirement of the project to apply 'the Sequential Test...and, if required, the Exception Test' to demonstrate that the project will not increase flood risk elsewhere and is only located in an area at risk of flooding if appropriate. The requirements relevant to the Sequential Test are outlined in paragraph 5.105 and those relevant to the Exception Test are outlined in paragraphs 5.106-5.109;
- Paragraph 5.100 in the NPSNN state that 'For construction work which has drainage implications', the project will need to demonstrate that the proposed drainage system complies with the standards outlined in the Flood and Water Management Act 2010 and should include the provision for the adoption and maintenance of any Sustainable Drainage Systems (SuDs) and any necessary access requirements;
- Paragraph 5.102 states that the project must take reasonable steps 'to avoid, limit and reduce the risk of flooding to the proposed infrastructure and others'.
- Paragraph 5.104 in the NPSNN states that where linear infrastructure has been proposed in a flood risk area, reasonable mitigation measures should be made to 'ensure that the infrastructure remains functional in the event of predicted flooding'.
- Paragraph 5.112 in the NPSNN states that the layout of the site should be designed to cope with events that exceed the design capacity of the system to appropriately manage excess water during flood events.
- Paragraph 5.113 in the NPSNN states that the 'surface water drainage arrangements for any project should be such that the volumes and peak flow rates of surface water leaving the sites are no greater than the rates prior to

the proposed project, unless specific off-site arrangements are made and result in the same net effect'. To fulfil this requirement it may be necessary to provide infiltration and surface water storage to limit and reduce the peak rate of discharge from the site and total volume discharged from the site as outlined in paragraph 5.114 of the NPSNN.

- Paragraph 5.221 of the NPSNN states that 'Applicants should make early contact with the relevant regulators' for water quality and water supply to determine the existing status of, and complete an assessment of the impacts of the 'project on water quality, water resources and physical characteristics' of the water environment as part of the environmental statement.
- Paragraph 5.222 of the NPSNN states that, where appropriate, opportunities should be taken to improve upon the quality of existing discharges where these are identified to contribute towards Water Framework Directive (WFD) commitments.
- Paragraph 5.223 of the NPSNN outlines that the environmental statement should describe existing water quality, water resources and physical characteristics of the water environment and any impacts of the project on water bodies of protected areas under the WFD and source protection zones (SPZs) as well as any cumulative effects.
- Paragraph 5.225 of the NPSNN states the requirement for all activities that discharge to the water environment to be subject to pollution control and to include consideration of paragraphs 4.48-4.56 of the NPSNN.
- Paragraph 5.226 of the NPSNN states that the assessment of the impacts of the project on the water environment must consider 'River Basin Management Plans' and the requirements of the WFD and its daughter directives, including those on priority substances and groundwater' and that 'The overall aim of the project should be no deterioration of ecological of status in watercourses, ensuring that Article 4.7 of the WFD does not need to be applied'; and
- Paragraphs 5.228, 5.230 and 5.231 of the NPSNN outline how the project can minimise impacts on the water environment by planning and designing for the efficient use of water, introduction of SuDs and adherence to good pollution control practice.

14.1.3 The policies relevant to road drainage and the water environment as outlined above have been addressed in the proposed scoping for the Environmental Impact Assessment.

14.2 Study area

14.2.1 The study area for the road drainage and the water environment assessment has been defined as encompassing all surface water, flood risk and human health receptors (taken to be drinking water abstractions in the context of the road drainage and water environment chapter) located within 1 kilometre of the proposed scheme. The 1 kilometre radius is based on the Highways England Water Resources Assessment Tool methodology and guidance as outlined in DMRB LA 113: Road drainage and the water environment¹²⁷ which considers any protected areas for conservation located within 1 kilometre to be 'at risk', with a higher standard of protection against pollution incidents is required.

¹²⁷ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) *Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA113 Road Drainage and The Water Environment*. Available at: <https://www.standardsforhighways.co.uk/prod/attachments/d6388f5f-2694-4986-ac46-b17b62c21727?inline=true> (Accessed January 2021)

14.2.2 The 1 kilometre study area has been extended for features that have been determined as in hydraulic connectivity with the proposed scheme and, therefore, have the potential to be affected by pollutants transported downstream of the works. These features include the underlying aquifer and associated WFD groundwater bodies and habitats identified as groundwater dependent.

14.2.3 Receptors within the study area are described in the Baseline section of this chapter.

14.3 Baseline conditions

14.3.1 The sources used to compile this scoping exercise:

- Environment Agency long term flood risk map and flood map for planning¹²⁸;
- Environment Agency Catchment Data Explorer¹²⁹;
- Environment Agency Groundwater Vulnerability Map¹³⁰;
- British Geological Society (BGS) mapping¹³¹;
- Environment Agency SPZs¹³⁰;
- Somerset West & Taunton and South Somerset Councils Joint Level 1 Strategic Flood Risk Assessment (SFRA)¹³²;
- Somerset County Council Preliminary Flood Risk Assessment (SFRA)¹³³;
- Somerset County Council Local Flood Strategy¹³⁴;
- Somerset Local Flood Risk Management Strategy Summary¹³⁵; and
- River Basin Management Plan (RBMP) South West River Basin District¹³⁶.

Surface water features

14.3.2 The surface water features located in the study area are described in Table 14-1.

Table 14-1 Surface water features in the study area

Surface water feature	Main river or Ordinary watercourse	WFD waterbody	Crossed by proposed scheme (Y/N)
Old River Tone	Ordinary watercourse	Tone Ds Taunton	N
River Tone	Main River		N
Broughton Brook	Main river	Broughton Brook (South	N

¹²⁸ Environment Agency (2018) *Flood map for planning* [online] Available at: <https://flood-map-for-planning.service.gov.uk/> (Accessed January 2021)

¹²⁹ Environment Agency (2018) *Catchment Data Explorer* [online] Available at: <http://environment.data.gov.uk/catchment-planning/>

¹³⁰ Defra (2020) *Magic Map* [online] Available at: <https://magic.defra.gov.uk/>

¹³¹ British Geological Survey (2017) *Geology of Britain viewer* [online] Available at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

¹³² WSP (2019) *Somerset West & Taunton and South Somerset Councils Joint Level 1 Strategic Flood Risk Assessment*. Available at: https://www.southsomerset.gov.uk/media/3114/joint-level-1-sfra-final_revised.pdf

¹³³ Somerset County Council (2011) *Somerset County Council Preliminary Flood Risk Assessment (SFRA)*.

¹³⁴ Somerset County Council (2010) *Local Flood Risk Management Strategy*. Available at:

<https://somersetcc.sharepoint.com/sites/SCCPublic/Planning%20and%20Land/Forms/AllItems.aspx?id=%2Fsites%2FSCCPublic%2FPlanning%20and%20Land%2FLocal%20Flood%20Strategy%20Final%2Epdf&parent=%2Fsites%2FSCCPublic%2FPlanning%20and%20Land&p=true&originalPath=aHR0cHM6Ly9zb21lcnNldGNjLnNoYXJlcG9pbmQuY29tLzpiOi9zL1NDQ1B1YmxpYy9FV0w4cUdfeENEaEtWmMNL50RWckpXOEJWYXJ0aW1uVDdCUePnWDd6cU9EMGRnR3J0aW1IPTdWY2ZGWERsMkVn>

¹³⁵ Somerset County Council (2010) *Local Flood Risk Management Strategy Summary*. Available at:

<https://somersetcc.sharepoint.com/sites/SCCPublic/Planning%20and%20Land/Forms/AllItems.aspx?id=%2Fsites%2FSCCPublic%2FPlanning%20and%20Land%2FSomerset%27s%20Local%20Flood%20Risk%20Management%20Strategy%20Summary%2Epdf&parent=%2Fsites%2FSCCPublic%2FPlanning%20and%20Land&p=true&originalPath=aHR0cHM6Ly9zb21lcnNldGNjLnNoYXJlcG9pbmQuY29tLzpiOi9zL1NDQ1B1YmxpYy9FY05EMmxz1NRRkN1M0xMM3pYd19IMEJwYXpkZ0hwc3diZ3JqMkVINEhMY1lnP3J0aW1IPThaV1puWERsMkVn>

¹³⁶ Environment Agency (2015) *South West river basin district: River basin management plan*. Available from:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718339/South_West_RBD_Part_1_river_basin_management_plan.pdf

Surface water feature	Main river or Ordinary watercourse	WFD waterbody	Crossed by proposed scheme (Y/N)
Black Brook	Main river	and West Somerset)	Y
Black Brook Tributary 1	Ordinary watercourse		Y
Black Brook Tributary 2	Ordinary watercourse		Y
Black Brook Tributary 3	Ordinary watercourse		Y
River Tone Tributary 1	Ordinary watercourse	Tone Ds Taunton	Y
River Tone Tributary 2	Ordinary watercourse		N
River Tone Tributary 3	Ordinary watercourse		N
River Tone Tributary 4	Ordinary watercourse		N
River Tone Tributary 5	Ordinary watercourse		N
River Tone Tributary 6	Ordinary watercourse		N
West Sedgemoor Main Drain	Ordinary watercourse	West Sedgemoor Main Drain	Y
West Sedgemoor Main Drain Tributary 1	Ordinary watercourse		Y
Fivehead River Main Channel 1	Ordinary watercourse	Fivehead River	Y
Fivehead River Tributary 1	Ordinary watercourse		N
Fivehead River Tributary 2	Ordinary watercourse		
Fivehead River Tributary 3	Ordinary watercourse		Y
Fivehead River Main Channel 2	Ordinary watercourse		Y
Fivehead River Tributary 5	Ordinary watercourse		Y
Venner's Water	Ordinary watercourse		Y
River Isle Tributary 1	Ordinary watercourse	Isle – Cad Bk to Fivehead River	N
Cad Brook	Ordinary watercourse	Ding	Y
River Ding Main Channel 1	Ordinary watercourse		Y
River Ding Main Channel 2	Ordinary watercourse		N
River Ding Tributary 1	Ordinary watercourse		N
Back Stream	Ordinary watercourse	Isle – Upper to conf Cad Bk	Y
River Isle	Main river		N
Shudrick Stream	Main River		N

14.3.3 There are also multiple unnamed agricultural and highway drains located in the study area that will be considered as part of the baseline for this assessment. Individual drain features will only be assessed in the ES where changes to their characteristics as a result of the proposed scheme affects the local land drainage regime.

Groundwater features

14.3.4 The groundwater features located in the study area are described in Table 14-2.

Table 14-2 Groundwater features in the study area

Geology	Aquifer classification	WFD waterbody
Alluvium – Clay, silt, sand and gravel	Secondary (undifferentiated)	Tone and North Somerset Stream (Between M5 junction and West Hatch)
Colluvium – Diamicton	Secondary (undifferentiated)	
Head - Gravel	Secondary A	
Mercia Mudstone – Mudstone and Halite-Stone	Secondary B	Tone and North Somerset Stream (Between M5 junction and West Hatch)
Branscombe Mudstone Formation - Mudstone	Secondary B	
Mercia Mudstone Group - Sandstone	Secondary A	
Blue Anchor Formation - Mudstone	Secondary (undifferentiated)	
Westbury Formation and Cotham Member (undifferentiated) – Mudstone and Limestone, interbedded	Secondary (undifferentiated)	
Blue Lias Formation - Mudstone and Limestone, interbedded	Secondary A	
Charmouth Mudstone Formation - Mudstone	Secondary (undifferentiated)	
Belemnite Marl Member – Mudstone and Calcerous	Unproductive	

14.3.5 The superficial deposits, present across the majority of the study area, are designated as Secondary A and Secondary (undifferentiated) aquifers that indicates that they store limited amounts of groundwater. However, Secondary A and Secondary (undifferentiated) aquifers still have the potential to provide base flow and storage to local watercourses.

14.3.6 The bedrock deposits that are designated as Secondary A are identified as containing permeable layers capable of supporting water supplies but at a local scale rather than a strategic scale, these deposits can form an important source of baseflow to local watercourses.

14.3.7 The bedrock deposits designated as Secondary B and Secondary (undifferentiated) are considered to predominantly have lower permeability layers and likely yield limited amounts of groundwater. However, they still have the potential to provide baseflow and storage to local watercourses.

14.3.8 The bedrock deposits (Belemnite Marl Member) designated as unproductive have low permeability and negligible significance for water supply or watercourse base flow.

- 14.3.9 Groundwater vulnerability across the route of the proposed scheme predominantly varies between high and medium-high. Areas designated as high and medium-high can easily transmit pollution to groundwater and are characterised by high leaching soils and the absence of low permeability superficial deposits. In the vicinity of Ashill there is a small area of Medium/Unproductive groundwater vulnerability. Areas designated as medium offer intermediate groundwater protection and areas identified as unproductive are associated with low permeability bedrock or superficial deposits that naturally offer protection to any underlying aquifers.
- 14.3.10 SPZs are designated around groundwater abstraction points to protect the water quality of the abstraction from surface activities. There are no SPZs located within the study area.
- 14.3.11 A summary of the potential contamination risk to groundwater quality in the study area is provided in Chapter 10 Geology and Soils.

WFD waterbodies

- 14.3.12 The statutory objective of the WFD is to prevent deterioration of all water bodies at good or high status and to prevent waterbodies at less than good status from deteriorating further.
- 14.3.13 The WFD waterbodies in the study area are located within the South West River Basin District and are described in Table 14-3.

Table 14-3 WFD waterbodies in the study area

WFD waterbody	Operational catchment	Overall status (Cycle 2 - 2019)	Future objective
Surface water			
Tone Ds Taunton	Tone	Moderate	Good by 2021
Broughton Brook (South and West Somerset)	Tone	Poor	Good by 2027
West Sedgemoor Main Drain	Parrett	Moderate	Moderate by 2015 (Achieved)
Isle	Parrett	Moderate	Poor by 2015 (Achieved)
Fivehead River (GB108052015241)	Parrett	Moderate	Moderate by 2027
Isle – Cad Bk to Fivehead River waterbody (GB108052015220)	Parrett	Moderate	Good by 2027
Ding (GB108052015180)	Parrett	Poor	Poor by 2015 (Achieved)
Isle – Upper to conf Cad Bk (GB108052015190)	Parrett	Moderate	Moderate by 2015 (Achieved)
Groundwater			
Tone and North Somerset Streams (GB40802G806400)	South West GW	Poor	Good by 2027
Dyrham Formation – North of Yeovil – Fragmented GWB (GB40802G803700)	South West GW	Good	Good by 2015 (Achieved)

14.3.14 A significant proportion of the study area (from West Hatch to Ilminster) is not designated as a WFD groundwater body. The Dyrham Formation (North of Yeovil – Fragmented GWB) is not located within the 1 kilometre study area but lies directly to the south east and is considered in hydraulic connectivity with the proposed scheme.

Designated sites with potential sensitivity

14.3.15 Table 14-4 lists the national and international designated sites that have a potential hydraulic connection to the watercourses located within the study area of the proposed scheme.

Table 14-4 Designated sites with potential sensitivity close to the proposed scheme

Location	Designation name	ID no.	National designation	Associated watercourse(s)
Located 3.6km north east of the proposed scheme	Curry and Hay Moors	1076921	SSSI	River Tone Broughton Brook Black Brook
Located approximately 3km north east of the proposed scheme	Somerset Levels & Moors	UK11064	Ramsar/Special Protection Area (SPA)	
Located approximately 6.7km north east of the proposed scheme	North Moor	1001580	SSSI	River Tone
Located approximately 10km north east of the proposed scheme	Somerset Levels	1006133	National Nature Reserve (NNR)	
	Southlake Moor	1001581	SSSI	
Located approximately 4.9km north east of the proposed scheme (Forms part of the Somerset Levels and Moors SPA/Ramsar site)	West Sedgemoor	1001617	SSSI	West Sedgemoor Main Drain
Located approximately 9.6km north east of the proposed scheme	West Moor	1001591	SSSI	River Isle
Located approximately 1.7km south west of the proposed scheme	Barrington Hill	1006011/ 1001586	NNR/SSSI	Veneer's Water

14.3.16 The Severn Estuary Special Area of Conservation (SAC) is primarily designated for estuaries, mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadow habitats. The SAC extends to the tributaries of the Severn,

which include the River Tone approximately 7 kilometres downstream of Junction 25 of the M5. Therefore, it may be considered as part of the ES subject to stakeholder engagement with the Environment Agency and LLFAs.

- 14.3.17 The Thurlbear Wood and Quarrylands SSSI is located approximately 1.5km south west of the proposed scheme and the Fivehead Woods and Meadow SSSI and Fivehead Arable Field SSSI sites are located approximately 5.5km north east of the proposed scheme. However, these sites are not identified as water dependent sites and are not hydraulically linked to the proposed scheme. Therefore, they will not be considered in the ES.
- 14.3.18 In line with DMRB LA113: Road drainage and the water environment, the groundwater dependent terrestrial ecosystems (GWDTEs) in the study area will be defined in the ES. The identification of GWDTEs will be informed and agreed through stakeholder engagement and ecological surveys, this will include consideration of ancient woodland habitats.

Abstractions and discharges

- 14.3.19 There are three licensed groundwater abstractions within the study area. One of these abstraction points has been identified as used for spray irrigation and is classed as a medium sized licence (Limited to 113m³/day). The remaining two abstractions are classed as small sized. All three are located on the outcrop of the Mercia Mudstone group.
- 14.3.20 It is recognised that there are potentially unlicensed abstractions and consented discharges located in the study area. These will be identified in the Stage 3 ES.

Flood risk

Fluvial flood risk

- 14.3.21 The Environment Agency flood map for planning has been used to define the baseline flood risk for flooding from main rivers and ordinary watercourses for the proposed scheme. Flood risk is defined as follows:
- Flood Zone 1 - Land assessed as having a less than 1 in 1000 (0.1) annual probability of river flooding;
 - Flood Zone 2 - Land assessed as having between a 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of river flooding; and
 - Flood Zone 3 - Land assessed as having a 1 in 100 (1%) or greater annual probability of river flooding.
- 14.3.22 The proposed scheme crosses areas of Flood Zones 2 and 3 associated with the following watercourses (See Figure 14.1):
- Black Brook – proposed scheme passes through extensive areas of Flood Zones 2 and 3 at the western end of the scheme;
 - West Sedgemoor Main Drain – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Meare Green;
 - Fivehead River Main Channel 1 – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Hatch Green;
 - Fivehead River Main Channel 2 – proposed scheme crosses narrow extent of Flood Zones 2 and 3 in the vicinity of Capland;
 - Venner's Water – proposed scheme crosses area of Flood Zones 2 and 3 in Kenny; and

- River Ding Main Channels 1 and 2 – proposed scheme passes through area of Flood Zones 2 and 3 at eastern end of the scheme.

14.3.23 The floodplains of the River Tone (Associated with extensive areas of Flood Zones 2 and 3) extend into the study area at the western end of the proposed scheme. At the eastern end of the scheme, the study area encompasses significant extents of Flood Zones 2 and 3 associated with the floodplain of the River Isle.

14.3.24 Within the study area and to the north west of the proposed scheme is an area at risk of flooding from reservoirs associated with the Clatworthy and Luxhay Reservoirs located to the west of Taunton. The area to the south west of the proposed scheme (within the study area) in the vicinity of Ilminster is also at risk of flooding from reservoirs associated with the Chard Reservoir located to the north east of Chard.

Surface water flood risk

14.3.25 The Environment Agency Risk of Flooding from Surface Water (RoFSW) has been used to define baseline surface water flood risk. This defines areas of surface water flood risk as follows:

- High – Area that has an annual chance of flooding greater than 3.3%;
- Medium – Area that has an annual chance of flooding between 1% and 3.3%;
- Low – Area that has an annual chance of flooding between 0.1% and 1%; and
- Very low – Area that has an annual chance of flooding of less than 0.1%.

14.3.26 The proposed scheme is crossed by numerous surface water flow paths that are designated as being associated with areas of high and medium surface water flood risk. Primarily these flow paths are located within the floodplains of all the ordinary watercourses crossed by the proposed scheme. At Ashill, there is also a surface water flow path, linked to the land drains present in Ashill Wood, that flows across the A358 and is associated with low risk of surface water flooding.

14.3.27 Areas of surface water flood risk, associated with natural topographical depression, are also located along the route in the vicinity of Capland, Hatch Beauchamp and Meare Green.

Groundwater flood risk

14.3.28 The Somerset County Council Preliminary Flood Risk Assessment (PFRA) identifies that no significant incidents of groundwater flooding have been reported in the study area and across the county.

14.3.29 The Somerset West & Taunton and South Somerset Councils Joint Level 1 Strategic Flood Risk Assessment identifies that the geology in the study area (particularly the Mercia Mudstone Group) is generally characterised by low permeability which is unlikely to generate significant groundwater discharge volumes and result in significant groundwater flood risk.

14.3.30 The Somerset West & Taunton and South Somerset Councils Joint Level 1 Strategic Flood Risk Assessment identifies that the presence of springs and drains (on Ordnance Survey maps) represent the natural emergence of groundwater. During extreme rainfall events, these areas of natural emergence may flow with increased discharges and represent a localised groundwater

flooding hazard. However, there are no historical records of any such events in the study area.

14.3.31 The BGS national dataset (Areas susceptible to flooding) has for the purpose of the ES, been used to further define baseline groundwater flood risk.

Existing road drainage

On the existing A358 route, the road drainage comprises of attenuation basins (situated adjacent to the carriageway) which attenuate water flows before discharging into the surrounding watercourses via controlled outfalls. The information available at this stage identifies that runoff from the carriageway outfalls into West Sedgemoor Main Drain, Fivehead River (including its tributaries) and the River Isle.

14.4 Potential impacts

Construction

14.4.1 During construction, it is considered that there is the potential for the proposed scheme to impact on flood risk, surface water and groundwater quality and WFD waterbodies. Therefore, these aspects will be considered further in the ES.

14.4.2 The likely key impacts to the road drainage and water environment during construction are outlined below:

- Creation of pollution pathways to the surface water and groundwater WFD waterbodies and surface watercourses during works to construct the proposed scheme. Any earthworks will pose a particular risk to groundwater WFD waterbodies;
- Release of sediment, silt and construction related pollutants (e.g. fuels, lubricants and waterproofing materials) particulates and other materials into the local watercourses during routine construction activities;
- Mobilisation of groundwater contaminants, remaining from historical and associated with current industrial and agricultural land use, as a result of earthworks activities;
- Localised increase in surface water runoff and associated decrease in groundwater recharge as a result of an increase in impermeable surface area resulting in an increase in surface water and fluvial flood risk;
- Increase in surface water and fluvial flood risk as a result of storage of construction materials in areas of flood risk;
- Disruption of existing surface water and groundwater flow paths due to construction activities. Specifically, earthworks activities and installation of buried structures are likely to pose a key risk;
- Reduction in groundwater levels, disruption to existing groundwater flows and damage to existing groundwater abstractions as a result of dewatering of underlying geological strata to facilitate excavation and construction of cuttings; and
- Damage and disruption to existing culvert and hydraulic structures present along the existing A358 route.

Operation

14.4.3 During operation, it is considered that there is the potential for the proposed scheme to impact on flood risk, surface water and groundwater quality and WFD waterbodies. Therefore, these aspects will be considered further in the ES.

14.4.4 The likely key impacts of the proposed scheme on road drainage and water environment during operation are outlined below:

- Release of highway related pollutants to the WFD waterbodies and surface water courses that cross the proposed scheme. These may include hydrocarbons, particulates and maintenance materials;
- Permanent impingement into the fluvial flood zones of the surface water courses crossed by the proposed scheme;
- Reduced infiltration and increased surface water runoff due to increased impermeable surfaces;
- Modifications to baseline watercourse hydro-geomorphology on watercourses that require bridge/culvert structures for watercourse crossings and where diversion and realignment is required, such as the River Ding diversion. This has the potential to impact on WFD status and future objectives on the affected watercourses; and
- Changes to local groundwater flows and levels and potential susceptibility to groundwater flooding as a result of earthworks activities.

14.5 Design, mitigation and enhancement measures

Construction

14.5.1 During construction, the likely key mitigation measures are anticipated to include the implementation of mechanisms as part of the Construction Environmental Management Plan (EMP) to manage:

- Discharge of surface water runoff to watercourses and underlying aquifers;
- Presence of pollutants and sediment;
- Management of wastewater and foul discharge;
- Fluvial, surface water and groundwater flood risk;
- Appropriate storage and use of construction materials, fuels and solvents and equipment;
- Management of liquid tars potentially present in the make-up of the existing alignment of the A358 and side roads affected;
- Potential location and nature of contaminated materials along the alignment; and
- Existing drainage infrastructure.

14.5.2 The implementation of good practice guidance should also be implemented during construction, including:

- Design Manual for Roads and Bridges;
- SuDS Manual (C753)¹³⁷;
- Control of water pollution from construction sites: Guidance for consultants and contractors (C532)¹³⁸; and
- Environment Agency guidance on pollution prevention, reporting environmental incidents, discharging to surface and groundwater, managing water on land and working on or near water.

¹³⁷ CIRIA (2015). *C753 The SuDS Manual* [online]. Available from: https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

¹³⁸ CIRIA (2001) *Control of water pollution from construction sites: Guidance for consultants and contractors (C532)* CIRIA

Operation

- 14.5.3 A suitable drainage design for the proposed scheme will be completed in accordance with DMRB CG501 Design of highway drainage systems¹³⁹ and DMRB LA113 Road drainage and the water environment and in line with best practice for sustainable drainage design. This will provide appropriate measures to attenuate and treat (including PCU's where necessary) surface water runoff from the proposed scheme.
- 14.5.4 The design will also implement the following measures in relation to watercourse crossings to minimise impacts on the affected surface water courses:
- Crossing of watercourses will be minimised and only implemented where essential;
 - The length of crossings along the watercourse will be kept to a minimum;
 - The width and height will be based on existing crossings to maintain baseline conditions, although an iterative assessment process will be applied so that impacts in terms of flood risk, water quality and hydro-geomorphology can be reduced as far as it technically feasible; and
 - Any new crossings (including clear span bridges or culverts) would be designed to minimise effects on the existing flow regime and hydro-geomorphological conditions of the channel.
- 14.5.5 Channel diversions and realignments will be designed to match existing conditions to maintain existing flood risk, water quality and hydro-geomorphological conditions. Although measures that help reduce local flood risk and enhance hydro-geomorphology, habitat establishment and biodiversity will be applied, in consultation with Highways England, Environment Agency and Natural England.
- 14.5.6 An FRA will be completed in line with NPPF guidance to define baseline flood risk, assess the impact of the proposed scheme on flood risk, provide a detailed description of the drainage design and identify any additional mitigation required to ensure no significant effects on flood risk.
- 14.5.7 A WFD Compliance Assessment will be completed in line with stakeholder requirements to provide a detailed description of the WFD waterbodies in the study area, assess the impact of the proposed scheme on WFD waterbodies and identify any additional mitigation requirements.
- 14.5.8 In line with DMRB LA113 Road drainage and the water environment, enhancement opportunities will be considered in relation to water quality improvements, improvements to WFD waterbodies, flood risk and resilience to climate change. All environmental enhancement opportunities will be reported in the ES.

14.6 Description of the likely significant effects

- 14.6.1 During construction and operation, there is the potential for the following significant effects:

¹³⁹ Highways England (2020) *CG501 Design of highway drainage systems* [online]. Available from: <https://standardsforhighways.co.uk/dmrb/>

- Discharge of contaminated surface water runoff affecting water quality during construction and operation to surface watercourses and underlying groundwater bodies;
- Changes to existing WFD status and impacts on the future objectives of WFD surface water and groundwater bodies;
- Changes to hydro-geomorphology and water quality of watercourses affected by diversions and realignments, such as the River Ding;
- Disruption to existing discharge consents and local abstractions;
- Increase in flood risk due to the construction and operation of the proposed scheme in areas of Flood Zones 2 and 3 and areas of surface water flood risk;
- Disruption to existing culverts and hydraulic structures along the existing route of the A358; and
- Changes to the existing groundwater regime (flows and discharge) due to an increase in impermeable surfaces, excavations or subsurface infrastructure.

14.6.2 Therefore, an assessment of the proposed scheme on water quality, WFD waterbodies, abstraction and discharges, existing drainage infrastructure and flood risk is scoped into the ES for both the construction and operational phases.

14.7 Assessment methodology

14.7.1 To assess the impact and effect of the proposed scheme on the road drainage and water environment, the baseline conditions have been characterised by identifying all surface- and ground-water features located within the study area as defined in Section 14.2.

14.7.2 For the purpose of understanding and characterising baseline conditions for the Stage 3 Scoping Report, a desk-based exercise using readily available third party data has been completed. This will be refined for the purpose of the PEIR and ES following the completion of stakeholder engagement, third party asset information and site surveys including walkover surveys and water quality sampling. Data from ground investigations (GI) will also be utilised to inform the road drainage and water environment baseline.

Receptor importance

14.7.3 The importance of all surface- and ground-water receptors will be defined based on the criteria defined in Table 3.70 of DMRB LA113: Road drainage and the water environment (Table 14-5).

Table 14-5 Importance values for road drainage and water environment receptors

Importance	Typical criteria	Typical examples
Very High	Nationally significant attributes of high importance	Watercourse having a WFD classification shown in a River Basin Management Plan ¹⁴⁰ (RBMP) and $Q_{95} \geq 1.0\text{m}^3/\text{s}$. Principal aquifer providing a regionally important resource. Flood risk receptors classified as essential infrastructure or highly vulnerable development as

¹⁴⁰ River Basin Management Plans are produced by the Environment Agency and Defra.

Importance	Typical criteria	Typical examples
		defined in the National Planning Policy Framework (NPPF).
High	Locally significant attribute of high importance	Watercourse having a WFD classification shown in a RBMP and $Q_{95} < 1.0\text{m}^3/\text{s}$. Principal aquifer providing locally important resource or supporting a river ecosystem. Flood risk receptor classified as more vulnerable development in the NPPF.
Medium	Of moderate quality and rarity	Watercourse not having a WFD classification shown in a RBMP and $Q_{95} < 0.001\text{m}^3/\text{s}$. Aquifer providing water for agricultural or industrial use with limited connection to surface water. Flood risk receptor classified as less vulnerable development in the NPPF.
Low	Lower quality	Watercourse not having a WFD classification shown in a RBMP and $Q_{95} \leq 0.001\text{m}^3/\text{s}$. Unproductive strata. Flood risk receptor classified as water compatible in the NPPF.

Magnitude of impact

14.7.4 Each impact will be assigned a magnitude based on the criteria outlined in Table 3.71 of DMRB LA113: Road drainage and the water environment. This is given in Table 14-6 below.

Table 14-6 Magnitude of impact for road drainage and water environment receptors

Magnitude of impact	Description
Major adverse	Results in loss of attribute and/or quality and integrity of the attribute.
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute.
Minor adverse	Results in some measurable change in attributes, quality or vulnerability.
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.
Minor beneficial	Results in some beneficial effect on attribute of a reduced risk of negative effect occurring.
Moderate beneficial	Results in moderate improvement of attribute quality.
Major beneficial	Results in major improvement of attribute quality.
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of effects

- 14.7.5 The significance of effect has been determined based on Table 14-7. This combines the importance value as described in Table 14-5 and the magnitude of impact as described in Table 14-6.

Table 14-7 Significance matrix

	Magnitude of impact (Degree of change)					
		No change	Negligible	Minor	Moderate	Major
Environmental value (Sensitivity)	Very high	Neutral	Slight	Moderate/ Large	Large/Very Large	Very large
	High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/Very large
	Medium	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
	Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate
	Negligible	Neutral	Neutral	Neutral/ Slight	Neutral/ Slight	Slight

- 14.7.6 The overall assessment scores are based on criteria set out in DMRB LA104 Environmental assessment and monitoring. In line with DMRB LA104, effects that are Moderate or above are considered significant. However, the professional judgement of competent experts has also been applied where necessary.

Water quality and flood risk assessment methodology

- 14.7.7 Fluvial hydraulic modelling will be undertaken where necessary, in conjunction with discussions with Environment Agency, Lead Local Flood Authority and the Internal Drainage Body, to inform the design of watercourse crossing and areas where proposed infrastructure are located within areas of high and medium flood risk.
- 14.7.8 The existing surface water drainage characteristics will be determined using the Flood Estimation Handbook¹⁴¹ and associated hydrological calculation methods such as the Interim Code of Practice for Sustainable Drainage Systems¹⁴².
- 14.7.9 A routine highway runoff screening assessment will be completed in line with the guidance provided in LA113: Road drainage and the water environment. This screening assessment will identify where further assessment of the proposed scheme is required using the Highways England Water Risk Assessment Tool (HEWRAT) methodology.
- 14.7.10 An assessment of the impacts of the proposed scheme on the WFD status and future objectives of the WFD surface and groundwater bodies located within the study area will be completed in a WFD Compliance Assessment that will be appended to the ES. The assessment methodology for the WFD Compliance Assessment will be agreed with relevant stakeholders.

¹⁴¹ Centre for Ecology & Hydrology (1999) *Flood Estimation Handbook*

¹⁴² National SuDs Working Group (2004) *Interim Code of Practice for Sustainable Drainage Systems*

- 14.7.11 An assessment of the performance of the proposed drainage infrastructure and an assessment of the impact of the proposed scheme on flood risk, completed in line with the NPPF, will be completed in the FRA. The FRA will be appended to the ES.
- 14.7.12 The impact of scheme elements such as cuttings, areas of large scale dewatering, significant piling and large areas of infiltration on the groundwater regime will be undertaken where groundwater dependent receptors such as groundwater dependent terrestrial ecosystem (GWDTE), springs and groundwater abstractions exist or where there is perceived risk of groundwater flooding on vulnerable receptors. The scale and complexity of analysis will be dependent on the risk and potential scale of impact and will range from groundwater modelling to hand-based calculations.
- 14.7.13 The analysis undertaken within these technical appendices will be used to identify potential impacts and then quantify them. These quantifiable changes in water quality, volume rate or level will be compared to the Tables used to assign an impact magnitude and then reported in the ES, in line with the assessment methodology outlined above.

14.8 Assessment assumptions and limitations

- 14.8.1 This section provides a description of the assumptions and limitations to the road drainage and water environment assessment.
- 14.8.2 This assessment has been based on the collation and evaluation of available documentation provided by the Environment Agency, BGS and LLFAs. This data is assumed to be correct at the time of the assessment and representative of the local road drainage and water environment. However, it should be noted that they have not been subject to detailed review to identify any potential issues with the initial data collection methodologies or storage of historical data. No surveys have been undertaken at this stage.
- 14.8.3 It is assumed that all new drainage systems implemented as a result of the proposed scheme will be designed and maintained according to the appropriate requirements outlined in DMRB and LLFA documentation and in line with industrial best practice. This will include the provision of adequate space within the footprint of the proposed scheme to provide flood compensation and appropriate treatment facilities for pollutants.
- 14.8.4 It is assumed that stakeholder engagement will be completed throughout the assessment process and will continue throughout the construction and operation phases of the proposed scheme. This will ensure that future requirements from stakeholders (at this stage unknown) will be incorporated as appropriate throughout the project.

15 Climate change

15.1 NPSNN requirements

- 15.1.1 The Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England is set out in the National Policy Statement for National Networks (NPSNN). The Secretary of State then uses the NPSNN as the primary basis for making decisions on development consent applications for national networks nationally significant infrastructure projects in England.
- 15.1.2 The main policy requirements from the NPSNN which are relevant to climate change include:
- Paragraph 4.40 of the NPSNN specifies that new national networks infrastructure should typically be long-term investments which should remain operational over many decades, in the face of a changing climate. This means that applications should consider the impacts of climate change when planning location, design, build and operation.
 - Paragraph 4.42 of the NPSNN recommends that applications consider the potential impacts of climate change over the estimated lifetime of the new infrastructure, making use of the latest UK Climate Projections available, and that any environmental statement which is prepared should identify appropriate mitigation or adaptation measures. It further specifies that if updated UK Climate Projections become available after the preparation of any environment statement, the Examining Authority should consider whether they need to request additional information from the applicant.
 - Paragraph 4.43 of the NPSNN states that applications should demonstrate that there are no critical features of the design of new national networks infrastructure which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections.
 - Paragraph 4.44 notes that any adaptation measures should also be based on the most recent set of UK Climate Projections, the Government's national Climate Change Risk Assessment and consultation with statutory consultation bodies. The adaptation measures must also be assessed as part of any environmental impact assessment and included in the environmental statement.
 - Paragraph 5.17 of the NPSNN states that applicants need to consider carbon impacts as part of the appraisal of scheme options and to describe an assessment of any likely significant climate factors within the Environmental Statement. The NPSNN states that it is very unlikely that the impact of a road project will, in isolation, affect the ability of the Government to meet its carbon reduction targets. However, applicants should provide both evidence of the carbon impacts of a scheme and an assessment of these impacts against the Government's carbon budgets.
 - Paragraph 5.19 of the NPSNN emphasises the need for appropriate climate mitigation measures to be implemented, including both engineering plans and the use of materials, in both design and construction of a road scheme, so that the associated carbon footprint is not unnecessarily high. Of particular note is the statement that the Secretary of State's view of the adequacy of the mitigation measures relating to design and construction will be a material consideration in the decision-making process.

15.2 Study area

15.2.1 As specified in the Design Manual for Roads and Bridges (DMRB) LA 114 Climate¹⁴³, study areas must be defined for each aspect considered. Therefore, the following study areas are defined for the climate assessment:

- Greenhouse Gas (GHG) emissions resulting from construction, operation and maintenance - the study area comprises the footprint of the permanent works for the proposed scheme (including the use of materials, energy and maintenance).
- GHG emissions resulting from operational road users (i.e. use of the proposed scheme) - the study area comprises the Affected Road Network included within the Traffic Reliability Area (TRA) of the traffic model developed for the proposed scheme.
- The proposed scheme's vulnerability to climate change - the study area comprises the construction footprint of the proposed scheme, including compounds and temporary land take.

15.2.2 The proposed scheme design and boundary is shown in Figure 2.1.

15.3 Baseline conditions

Baseline sources

15.3.1 Baseline conditions have been established for the purposes of this scoping report with reference to the following sources of information:

GHG emissions:

- UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018¹⁴⁴.

Vulnerability to Climate Change:

- Current climate data for England and the South West of England and South Wales region – Met Office UK Climate Averages 1981 – 2010¹⁴⁵;
- Projected climate data for the South West of England region - UK Climate Projections 2018 (UKCP18), under the high emissions scenario (i.e. Receptor Concentration Pathway 8.5 (RCP8.5)) and for a 50% probability of occurrence¹⁴⁶;
- Climate extreme indices - State of the UK Climate 2017: Supplementary Report on Climate Extremes¹⁴⁷;
- Historical flooding events and areas at flood risk – see Chapter 14, Road drainage and water environment; and

¹⁴³ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges (DMRB). Sustainability and Environmental Appraisal. LA114 Climate. Available at: <https://www.standardsforhighways.co.uk/prod/attachments/87f12e4f-70f8-4eed-8aed-9e9a42e24183?inline=true> (Accessed January 2021)

¹⁴⁴ Department for Business, Energy and Industrial Strategy (2020) *Emissions of carbon dioxide for Local Authority areas, 2018* (<https://data.gov.uk/dataset/723c243d-2f1a-4d27-8b61-cdb93e5b10ff/emissions-of-carbon-dioxide-for-local-authority-areas>) (Accessed January 2021)

¹⁴⁵ Met Office, (2010) *UK Climate Averages (1981-2010)*. Available at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcn45vme7> (Accessed January 2021)

¹⁴⁶ Met Office. (2020) *UK Climate Projections*. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/key-results> (Accessed January 2021)

¹⁴⁷ Met Office. (2018) *State of the UK Climate 2017: Supplementary Report on Climate Extremes*. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learnabout/uk-past-events/state-of-uk-climate/soc_supplement-002.pdf (Accessed January 2021)

- Potential geological hazards, e.g. subsidence, landslides – British Geological
- Survey GeoIndex and GeoClimate UKCP09 Open¹⁴⁸.

Baseline information

GHG emissions

- 15.3.2 As part of the assessment process, DMRB LA114 requires that GHG emissions without the proposed scheme should be identified for both the current and future baseline, including all the relevant sources of GHG emissions included in the study area.
- 15.3.3 No information is available at the time of writing this Scoping Report to present a specific quantified baseline. However, as part of the assessment process, the baseline position for the proposed scheme will be calculated in respect of the GHG emission sources identified above using the information available at the time.
- 15.3.4 For wider context, information on emissions from all road transport is published annually by BEIS in its 'UK local authority and regional carbon dioxide emissions national statistics' series. This provides estimates of CO₂ emissions from users of all roads within each UK local authority. The latest available set of data from this source is for 2018, which was published in 2020.
- 15.3.5 A summary of this information is presented in Table 15-1. The data shows that GHG emissions from transport sources represent almost half of all emissions in the local authority areas within Somerset (42-52% by area in 2018). This is consistent in the three most recent years of data available. Within the transport category, almost all these emissions are from road transport, with sources of emissions from A-roads representing the largest proportion. Across all of Somerset, total emissions have fallen slightly by around 3%, despite a small increase in total transport related emissions of around 2%.
- 15.3.6 Total emissions associated with transport in the Somerset region were estimated by BEIS to be 3269 ktCO₂ in 2018, with 1,502 ktCO₂ attributable to transport (mainly roads). For context, total emissions in all of England in 2018 were 279,960ktCO₂ of which 105,399 ktCO₂e was attributable to transport.

Table 15-1 Summary of estimated GHG emissions for Somerset, by source, ktCO₂

Name	Somerset West and Taunton			South Somerset			Somerset (County) Total		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
Year									
Industry and Commercial Total	200	190	202	333	320	302	1061	995	962
Domestic Total	229	215	213	260	242	240	847	793	785
Transport Total	404	417	409	385	397	386	1477	1530	1506
of which Road Transport (A roads)	111	116	111	244	254	245	590	610	592
of which Road Transport (Motorways)	134	139	136	0	0	0	369	394	391

¹⁴⁸ British Geological Survey (2020) *GeoIndex* [online]. Available at: <http://mapapps2.bgs.ac.uk/geoindex/home.html#> (Accessed January 2021)

Name	Somerset West and Taunton			South Somerset			Somerset (County) Total		
of which Road Transport (Minor roads)	149	152	152	119	121	121	456	464	466
of which Diesel Railways	5	5	4	21	20	18	53	52	47
of which Transport Other	5	5	5	2	2	2	10	11	10
LULUCF Net Emissions	-53	-56	-57	-7	-8	-10	5	0	16
Grand Total	781	767	767	971	950	918	3390	3318	3269

Note: LULUCF = Land Use, Land Use Change and Forestry

Vulnerability to climate change

15.3.7 As specified in DMRB LA 114 for baseline climate impacts:

- the assessment of a project's vulnerability to climate change shall use published historical regional weather data to demonstrate the current climate impacts on a study area;
- recent weather patterns and extreme weather events should be identified to provide an indication of how the project will account for climate change in the immediate future (i.e. during construction); and
- historical events occurring as a result of weather patterns and extreme weather events (i.e. landslides after heavy rainfall) shall be identified to provide an indication of past vulnerability.

15.3.8 The UK Climate Change Risk Assessment 2017 details historic climate trends, which can inform and provide context for future projections¹⁴⁹. The following trends have been observed across England:

- Land temperature in the decade 2005-2014 was 1.0°C warmer than 1961–1990;
- An increase in annual mean rainfall by 3.2% between 1961-1990 and 1981–2010;
- The average count for hot and wet UK days during 1981-2010 was 4.63 for both hot days and wet days, compared with 3.65 for 1961–1990; and
- UK daily maximum and minimum temperature extremes have increased by just over 1°C since the 1950s, and heavy seasonal and annual rainfall events have also increased.

15.3.9 A climate baseline is provided by Met Office Historic Climate Data which presents a set of 30-year averages, covering the period 1981 to 2010 for a range of parameters and locations¹⁴⁵. The Met Office uses districts when generating climate data for the UK. The proposed scheme is located within the South West of England and South of Wales region. Climate data available for the region has been compared to data for England and is summarised in Table 15-2. The data indicates that historically:

- annual average maximum temperature for South West of England and South of Wales region is broadly the same compared to England;

¹⁴⁹ Committee on Climate Change (2017) *UK Climate Change Risk Assessment 2017 Evidence Report. Summary for England*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-England-National-Summary-1.pdf> (Accessed January 2021)

- annual average minimum temperature for South West of England and South of Wales region appears slightly warmer compared to England;
- the number of air frost days experienced annually for South West of England and South of Wales region appears lower compared to England; and
- rainfall experienced annually for South West of England and South of Wales region appears greater compared to the rest of England.

Table 15-2 Baseline climate data (1981 – 2010) for England and the South West of England and South Wales region

Climate variable	England	SW England & S Wales	SW England & S Wales compared to England
Average annual maximum temperature (°C)	13.5	13.4	- 0.1
Average annual minimum temperature (°C)	5.9	6.3	+0.4
Total annual air frost days	49.1	41.7	-7.4
Total annual accumulated rainfall (mm)	854.8	1263.4	+408.6

15.3.10 The State of the UK Climate 2017: Supplementary Report on Climate Extremes¹⁴⁷ provides an overview of historical and more recent extreme weather conditions recorded in the UK. The data for England and the South West of England and South Wales is summarised Table 15-3. The data indicates that historically:

- maximum temperatures in the South West of England and South of Wales region appear lower than across England and have remained the same over time;
- the duration of ‘warm spells’ appears longer in South West of England and South of Wales region than across England and has increased over time;
- the duration of ‘cold spells’ appears longer in the South West of England and South of Wales region than across England and has decreased over time;
- rainfall from ‘extremely wet days’ appears higher in the South West of England and South of Wales region than across England and has decreased over time;
- maximum ‘5-day precipitation’ appears higher in the South West of England and South of Wales region than across England and has decreased over time; and
- the ‘longest dry spell’ appears shorter in the South West of England and South of Wales region than across England and has decreased over time.

Table 15-3 Summary of climate extremes for England and the South West of England and South Wales region

Climate Variable	Period	England	SW England & S Wales	Difference
Highest maximum temperature (°C) ^a	1981-2010	28.3	26.9	- 1.4
	2008-2017	28.5	26.9	- 1.6
	1981-2010	10.0	11.7	+ 1.7

Climate Variable	Period	England	SW England & S Wales	Difference
Warm spell duration index (days) ^b	2008-2017	15.0	17.0	+2
Cold spell duration index (days) ^c	1981-2010	2.8	3.5	+0.7
	2008-2017	2.0	3.3	+1.3
Number of icing days ^d	1981-2010	2.5	2.0	-0.5
	2008-2017	1.9	1.6	-0.3
Rainfall from extremely wet days (mm) ^e	1981-2010	69.3	91.3	+22
	2008-2017	72.0	88.7	+16.7
Maximum 5-day precipitation (mm) ^f	1981-2010	67.3	91.3	+24
	2008-2017	65.7	85.7	+20
Longest dry spell (days) ^g	1981-2010	22.2	20.8	-1.4
	2008-2017	20.1	17.9	-2.2

a Highest daily maximum temperature recorded during the month
b Count of days with at least 6 consecutive days when daily maximum temperature is above the 90th percentile centred on a 5-day window for the base period of 1961-1990
c Count of days with at least 6 consecutive days when daily minimum temperature is below the 10th percentile centred on a 5-day window for the base period of 1961-1990
d Number of days when the daily minimum temperature is below 0°C
e Total rainfall falling on days with daily rainfall total in excess of the 99th percentile of daily rainfall
f Highest value of rainfall accumulated over 5 days
g Largest number of consecutive days with < 1 mm rainfall

15.3.11 As detailed in section 14.3 of Chapter 14, road drainage and the water environment, based on the Environment Agency's Historic Flood Map, the western and eastern ends of the proposed scheme are in Flood Zones 2 and 3 and are vulnerable to flooding. The north west and south west areas of the proposed scheme are at risk of flooding from reservoirs. Flood risk is related with fluvial and surface water flooding. However, there are no historical records of any flooding events in the study area.

15.3.12 The GeoIndex¹⁴⁸ provides information from the National Landslides Database for the UK. A historical landslide event was recorded within 0.5km from the current A358 road alignment at Island Copse. However, historical landslides are not commonly recorded within the proposed scheme boundary.

Receptors

15.3.13 No physical receptors can be directly defined for GHG emissions. Therefore, in line with the guidance in DMRB LA114, the change in emissions associated with the proposed scheme will be compared to the relevant UK government carbon budgets.

15.3.14 Receptors identified in relation to the proposed scheme's vulnerability to climate change are:

- receptors associated with the construction process (including the workforce, plant and machinery);
- the assets and their operation, maintenance and refurbishment (e.g. road pavement surfaces, structures, earthworks and drainage, technology assets, soft estate); and
- end-users (e.g. members of the public or commercial operators using the proposed scheme).

Future baseline

GHG emissions

15.3.15 No specific scheme information is currently available to inform a future GHG emissions baseline. As part of the assessment process, baseline GHG emissions will be calculated for the relevant GHG sources following the guidance within DMRB LA114 on the following basis, taking in to account relevant sectoral trends in GHG emissions including decarbonisation of the electricity grid and uptake of electric vehicles:

- Operational emissions from use of the proposed scheme will be quantified for the study area based on the traffic information prepared for the Do-Minimum case. This will be done for a 60-year appraisal period; and
- Operational energy use (from lighting) and maintenance within the study area will be quantified for the same 60-year appraisal period.

Vulnerability to climate change

15.3.16 Future climate projections are published by the Met Office through the UK Climate Projections website. These climate projections can be used to determine the likely future climate conditions in the locality of the proposed scheme through its operational life.

15.3.17 The general climate trends for the UK are described below, summarised from UKCP18 projections. Generally, trends become more pronounced over time with more extreme trends arising by 2080:

- Milder, wetter winters (increase in mean winter rainfall; increase in mean temperatures; decreased frequency of cold weather events);
- Warmer, drier summers (increased frequency of dry spells; increase in mean temperatures; decrease in mean summer rainfall);
- Increase in frequency of extreme weather (increase in high temperatures and heatwaves; increase in droughts; increased frequency of heavy rainfall events); and
- Increased frequency of windstorm events in the latter half of the 21st Century increased average wind speeds and increases in extreme winds.

15.3.18 The probabilistic projections in the UKCP18 provide local low, central and high changes across the UK, corresponding to various probability levels (e.g. 10 %, 50 % and 90 %). There are a number of Representative Concentrations Pathways (RCPs) available for UKCP18 with each pathway resulting in a different range of global mean temperature increases over the 21st century. DMRB LA 114 recommends the use of RCP 8.5 at the 50 % percentile, for the period covering the 60-year appraisal period from the proposed scheme opening year. The proposed scheme is located within the South West of England region of the

UKCP18 probabilistic projections for aggregated regions. Projected changes in climate for this region are summarised in Table 15-4.

Table 15-4 Future climate projections for the South West of England region

Climate Variable	Projected change relative to a baseline of 1981-2000 under the high emissions scenario (RCP8.5) and for a 50% probability of occurrence			
	2020 – 2039	2040 – 2059	2060 – 2079	2080 – 2099
Temperature				
Summer mean temperature (°C)	+1.2	+2.2	+3.6	+5.6
Winter mean temperature (°C)	+0.9	+1.6	+2.4	+3.4
Mean annual temperature (°C)	+0.9	+1.7	+2.7	+4.1
Precipitation				
Summer mean rainfall (%)	-14	-23	-35	-44
Winter mean rainfall (%)	+7	+12	+19	+28

15.3.19 Based on the UKCP18 data for the South West of England region for the period up to 2099, under the high emissions scenario and for a 50% probability of occurrence, mean summer and winter temperatures are projected to increase by up to 5.6°C and 3.4°C, respectively, whereas mean rainfall is projected to increase by up to 28% during winter and decrease by up to 44% during summer.

15.3.20 In general, climatic changes in the region of the proposed scheme are projected to result in increasingly wetter and warmer winters and drier and warmer summers, which is consistent with changes anticipated across England as a whole.

15.3.21 The GeoIndex¹⁴⁸ and the GeoClimateUKCP09 dataset provides information on the change in susceptibility of subsidence across the UK due to a changing climate and the associated changes in soil moisture. The data indicates that subsidence is considered 'improbable' under 'average' soil humidity conditions between 2030 to 2080 period for the majority of the proposed scheme. The section of the proposed scheme at the Horton Cross junction near Ilminster indicates that subsidence is considered 'possible' under 'average' soil humidity conditions between for the 2030 to 2080 period.

15.4 Potential impacts

Construction

GHG emissions

15.4.1 GHG emissions will be incurred during construction as a result of the use of materials, transport and construction plant in building the proposed scheme. During the construction these activities lead to either direct (on-site) or indirect (off-site) GHG emissions.

15.4.2 The potential activities which could lead to GHG emissions during construction are set out in Table 15-5, described in line with the structure for reporting lifecycle GHG emissions defined in PAS 2080¹⁵⁰.

Table 15-5 Summary of potential sources of GHG emissions during construction

Source	Descriptions
Use of products or materials (A1-3)	Represents emissions associated with the extraction or raw materials, materials processing and transport associated with the production of a product. Often referred to as embodied carbon.
Construction transport (A4)	Represents emissions associated with the transportation of materials and construction plant from the manufacturer or supplier to the construction location.
Construction plant (A5)	Represents the energy consumption associated with site plant, temporary accommodation and transport of workers to and from the construction site. Where materials are site-won, the emissions associated with those materials are represented in the energy use in this emissions source.
Construction waste (A5)	Represents emissions associated with the disposal of waste materials from the construction site, and the transport of that waste to other locations.
Land use change	Represents the change in emissions or removals of GHGs associated with any change in land use.

15.4.3 Emissions from construction represent a one-off source of GHG emissions. Any increase in GHG emissions of sufficient magnitude could potentially impact the ability of the UK to meet its carbon budgets, including the recently legislated Sixth Carbon Budget (see section 15.6).

15.4.4 It is not possible to quantify the potential construction GHG emissions from the proposed scheme at the time of this scoping report, although it is likely that they would represent an increase of more than 1% of the current GHG emissions associated with the operational energy and maintenance of the proposed scheme that will be changed by the proposed scheme. Therefore, in line with the guidance of DMRB LA 114, this source of GHG emissions is scoped in for further assessment.

15.4.5 Emissions associated with future decommissioning of the proposed scheme are not considered further in the assessment. As noted in DMRB LA 114, these emissions are not considered relevant due to the length of the operational phase.

Vulnerability to climate change

15.4.6 The South West of England and South Wales region has experienced increasing temperatures and precipitation events of higher intensity in recent years.

15.4.7 Furthermore, the projected changes in climate variables over the short term (2020 – 2039) suggest these trends will potentially continue, resulting in further increases in temperatures (especially during summer, +1.2°C) and precipitation during winter (+7%). Table 15-6 summarises potential climate impacts during the construction period, including temporary works, which could potentially occur as a result of these changes.

¹⁵⁰ BSI (2016) [Publicly Available Specification 2080:2016 Carbon Management in Infrastructure](#)

Table 15-6 Potential impacts resulting from climate effects during construction

Climate Effect	Receptors	Potential Impacts
Increased frequency of extreme weather	Human health (site personnel) Infrastructure (earthworks)	Windstorms could result in the damage of stockpiles. Secondary impacts could include site personnel welfare impacts.
	Infrastructure (hoarding)	Windstorms could result in damage to temporary hoarding used in construction and ability to undertake specific construction activities (e.g. site crane operations) increasing project costs.
Increased temperatures, including prolonged periods of hot weather	Human health (site personnel)	Heatwaves and higher temperatures could result in site personnel welfare impacts, for example, heat stress, dehydration and unsafe working conditions.
	Human health (site personnel/ local residents)	Heatwaves and higher temperatures could increase risks to site personnel associated with increased potential for dust generation and dispersal.
	Human health (scheme operator)	Heatwaves and higher temperatures could affect the ability to undertake certain construction activities leading to programme delays (e.g. pouring of concrete and asphalt) and increased project costs.
Increased precipitation, including intense periods of rainfall	Infrastructure	Rainfall events could affect the ability to undertake certain construction activities leading to programme delays and increased project costs.
	Infrastructure (stockpiles) Environmental (watercourses)	Rainfall events could result in the erosion of stockpiles and resultant silting of drainage assets. This could result in secondary impacts such as localised flooding or release of pollutants to watercourses.

15.4.8 The potential impacts summarised in Table 15-6 indicate that due to the vulnerability of construction activities associated with the proposed scheme to climate impacts, they should be is scoped in for further assessment.

Operation

GHG emissions

15.4.9 Changes in GHG emissions associated with the operational phase of the proposed scheme will potentially occur from the management and maintenance of the asset, and the use of the asset.

15.4.10 The potential activities which could lead to GHG emissions during operation are set out in Table 15-7, described in line with the structure for reporting lifecycle GHG emissions defined in PAS2080.

Table 15-7 Summary of potential sources of GHG emissions during operation

Source	Descriptions
Maintenance and repair of the infrastructure (modules B2-5)	Represents the use of materials, transport and equipment to keep the road in use during its lifetime
Energy use operating the infrastructure (module B6)	Represents energy used for lighting, signage or communications equipment associated with the operation of the road

Source	Descriptions
Users use of the road (B9)	Represents emissions and energy use from vehicles using the proposed scheme once operational
Changes in land-use	Any ongoing change in the rate of emissions or removals of GHG from changes in land use

15.4.11 The operation of the proposed scheme represents an ongoing source of GHG emissions. Any increase in GHG emissions of sufficient magnitude could potentially impact the ability of the UK to meet its carbon budgets, including the recently legislated Sixth Carbon Budget (see section 15.6).

15.4.12 It is not possible to quantify the potential operational GHG emissions from the proposed scheme at the time of this scoping report. Given the nature of the scheme, it is considered likely that one or more of the relevant criteria for assessment set out in DMRB LA114 for operational emissions would be met. These criteria are: a change of more than 10% in the Annual Average Daily Traffic; and change of more than 10% in Heavy Duty Vehicles; or a change of daily average speed of more than 20 km/h. Therefore, in line with the guidance of DMRB LA 114, this source of GHG emissions is scoped in for further assessment.

Vulnerability to climate change

15.4.13 As identified in Table 15-4, projected changes in climate variables by the end of the century (2080-2099) substantial increases in temperature, especially during summer (+5.6°C), and precipitation during winter (+28%) have the potential to occur in the South West of England region. Table 15-8 sets out how changes in temperature and precipitation could affect receptors during operation of the proposed scheme, including infrastructure elements (e.g. structures, drainage assets, pavement), earthworks, soft landscape design and road users.

Table 15-8 Potential impacts resulting from climate effects during operation

Climate Effect	Receptor	Potential Impacts
Increased precipitation (especially in winter), including intense periods of rainfall	Infrastructure (drainage assets)	Wetter winters and increased frequency of intense rainfall events could result in the overwhelming of drainage assets. This could result in secondary impacts such as localised flooding.
	Infrastructure (drainage assets)	Wetter winters and increased frequency of intense rainfall events could result in increased groundwater levels.
	Infrastructure (pavement)	Wetter winters and increased frequency of intense rainfall events could result in damage to road surfaces and pavements due to scour.
	Human health (road users)	Wetter winters and increased frequency of intense rainfall events could result in localised surface water flooding which could lead to hydroplaning and unsafe driving conditions.
Increased frequency of dry periods	Environmental (soft landscape)	Increasing frequency of dry summer periods could lead to vegetation failure.
Gales	Infrastructure	Damage to signs/signals and minor structures (e.g. gantries) and vegetation as a result of wind loading or wind-blown debris.

Climate Effect	Receptor	Potential Impacts
Increased temperatures, including prolonged periods of hot weather	Infrastructure (bridges)	Increased likelihood of greater thermal loading overstressed bearings that could eventually compromise structural stability of the asset.
	Infrastructure (pavements)	Stress on road surfaces (i.e. degradation of macrotexture and reduction of texture depth, wearing away of asphalt compromising support layers).
	Infrastructure (pavement)	Freeze-thaw during cold snaps and extreme high temperatures can cause damage to road surfaces including road and pavement cracking and deformation resulting in a reduction of road service life.
	Infrastructure (earthworks)	Shrink swell processes resulting in desiccation cracking and embankment and earthwork instability.
	Environmental (soft landscape)	Increased frequency and severity of extreme heat events (i.e. heat waves) could result in the soft landscape design (trees and shrubs) being compromised (e.g. plant failures).

The potential impacts summarised in Table 15-8 are considered to have the potential to be significant (in the absence of appropriate mitigation). The vulnerability of the proposed scheme to climate change during its operation should be scoped in for further assessment.

15.5 Design, mitigation and enhancement measures

GHG emissions

- 15.5.1 As noted in DMRB LA 114, all projects should seek to minimise GHG emissions wherever possible to contribute to the achievement of UK GHG targets and carbon budgets. This is also embodied in PAS 2080, which promotes the use of whole-life carbon reduction and the carbon reduction hierarchy to limit emissions associated with the construction and use of economic infrastructure.
- 15.5.2 In line with these requirements and guidance, as the proposed scheme continues to be developed, opportunities to reduce carbon will be identified and considered further. These opportunities include:
- Construction phase
 - Identification of areas where existing assets can be retained to repurposed for use in the proposed scheme;
 - Reduced material consumption associated with the required construction, identifying areas where design can be optimised or made more efficient;
 - Consider reuse of site won materials over import of new materials
 - Specification of low-carbon products which have lower GHG emissions than standard products for the aspects of construction that are required or where the construction activity reduces carbon (e.g. warm rolled asphalt);
 - Minimise double handling of materials;
 - Use of low-emissions or electric construction plant, including the potential for portable PV/wind for use in powering site offices and equipment; and
 - Use of offsite techniques or modular construction which reduces the need for construction plant or avoids waste.
 - Operational phase

- Consideration of lighting and signage strategy to either remove or reduce energy demand and/or incorporate renewable energy;
- Reducing maintenance requirements, including consideration of operational lifespan of materials to reduce the need for replacements;
- Supporting the use of low-emission/electric vehicles where possible;
- Any opportunities for carbon removals or sequestration through the land-use strategy through planting and landscape strategy; and
- Areas where GHG emissions associated with users' use of the road can be optimised.

Vulnerability to climate change

- 15.5.3 Design and construction standards, along with good engineering practice, will be applied to the design and construction of the proposed scheme. The use of such adaptation measures, which will be embedded in the design of the proposed scheme, is expected to secure the resilience of the proposed scheme for its whole lifecycle.
- 15.5.4 The following mitigation measures have the potential to reduce the vulnerability of the proposed scheme to climate effects during construction:
- prefabricating structures off-site to reduce on-site construction activities;
 - delivering construction materials 'just-in-time' to avoid onsite storage of materials and construction materials and allowing materials which are stored on-site to be protected to minimise damage and thereby enter the waste stream e.g. by periods of heavy precipitation;
 - managing risk of heat stress to site personnel from exposure to extreme temperatures through the provision of necessary personal protective equipment and facilities;
 - allowing sufficient time within the construction programme or considering changing the timing of construction activities to reduce risks relating to site personnel, plant and machinery associated with high temperatures and prolonged periods of heavy precipitation; and
 - inspecting material stockpiles and structures before and after extreme weather events to ensure stability and incorporating such measures into materials management plans.
- 15.5.5 The following mitigation measures have the potential to reduce the vulnerability of the proposed scheme to climate effects during operation:
- designing drainage infrastructure with sufficient allowance to account for climate change and to withstand extreme rainfall events (e.g. balancing pond capacity);
 - avoiding or reducing the number of structures constructed within the floodplain and provision of flood compensation storage areas;
 - selecting materials with appropriate durability requirements for design elements to ensure resilience to thermal loading from increases in peak summer temperatures;
 - using permeable pavements, where appropriate, to alleviate flooding during extreme rainfall events;

- maintaining soft landscape features following establishment through watering in periods of dry weather and carrying out periodic inspections to monitor the establishment of new planting; and
- specifying regular inspection of drainage infrastructure and structures to assess the condition after extreme weather events.

15.6 Description of the likely significant effects

GHG emissions

- 15.6.1 The Climate Change Act 2008 committed the UK to its first statutory carbon reduction target to reduce carbon emissions by at least 80% from 1990 levels by 2050. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 amended the Climate Change Act 2008 by introducing a target for at least a 100% reduction of net GHG emissions (relative to 1990 levels) in the UK by 2050, following advice from the Committee on Climate Change. The 100% reduction is often referred to as 'net zero' GHG emissions.
- 15.6.2 The Climate Change Act 2008 requires that that five-yearly carbon budgets are set and not exceeded to ensure that regular progress is made towards the target. The first three carbon budgets were set in 2009, with the fourth and fifth following in 2011 and 2016 respectively, as outlined in Table 15-9. The recommended sixth carbon budget was published by the Committee on Climate Change on 9 December 2020 and is due to be set in law by the end of June 2021, as outlined in Table 15-9. It should be noted that the 6th Carbon budget is much lower than preceding budgets, being the first to be brought into legislation since the implementation of the 100% reduction target by 2050.

Table 15-9 UK's legislated carbon budgets

Carbon budget	Carbon budget level - million tonnes of carbon dioxide equivalents (MtCO ₂ e)
3rd carbon budget (2018 - 2022)	2,544 MtCO ₂ e
4th carbon budget (2023 - 2027)	1,950 MtCO ₂ e
5th carbon budget (2028 - 2032)	1,725 MtCO ₂ e
6th carbon budget (2033 - 2037)	965 MtCO ₂ e

- 15.6.3 The proposed scheme will change the profile of GHG emissions within the study area, and therefore has the potential to increase GHG emissions. While an increase in GHG emissions can be considered as a negative impact, the proposed scheme in isolation is not likely to have a material impact on the government's ability to meet its carbon budgets (as noted in LA 114 and the NPSNN). In line with the guidance set out in DMRB LA 114, the change in emissions due to the proposed scheme will be included in further study and presented against the relevant carbon budgets.

Vulnerability to climate change

- 15.6.4 The climate assessment will identify relevant measures to help ensure that the project is resilient to future climate change and reduce any potential impacts, so they are not significant.

15.7 Assessment methodology

GHG emissions

- 15.7.1 An assessment of change in GHG emissions associated with the proposed scheme will be undertaken in line with the guidance of LA 114. GHG emissions will be quantified for the construction and operational phases and presented against the relevant carbon budgets and for the 60 year assessment period.
- 15.7.2 GHG emissions will be quantified using the following principle sources of information and tools (using the latest available versions at the time of the assessment):
- GHG Emissions associated with the construction phase including the use of products or materials (A1-3), construction transport (A4), construction plant (A5) and construction waste (A5) (as described in Table 15-5) will be quantified using the Highways England Carbon Tool (version 2.3 at the time of this Scoping Report) and any other suitable data sources (such as the Inventory of Carbon and Energy v3). Available information on the bill of materials, construction transport and construction plant associated with the proposed scheme will be used. Assumptions will be documented in the assessment.
 - GHG emissions associated with the operation and maintenance of the proposed scheme, including maintenance and repair of the infrastructure (modules B2-5) and energy use operating the infrastructure (module B6) (as set out in Table 15-7) will also use the Highways England Carbon Tool. Information relating to maintenance and energy use will be sourced from the design information and any assumptions will be documented.
 - GHG emissions from users' use of the road (module B9) will be quantified using the methodology set out in DMRB LA 114. The assessment will use the traffic data prepared for the proposed scheme for both the Do Minimum and Do Something scenarios. Specific years modelled in the traffic data will be calculated, and remaining years will be interpolated. After the final modelled year in the traffic data, it is assumed that traffic flows will remain constant. The assessment will draw on the latest available information from the DMRB Screening Tool, Transport Analysis Guidance¹⁵¹ and Data Book and the Emission Factor Toolkit v10 as appropriate.
 - Where there are any significant changes in land-use, changes in GHG emission or removal rates will be calculated using data sources appropriate for the land use type. This may include the guidance set out in the Woodland Carbon Code¹⁵² for example, if there are significant changes in woodland areas.
- 15.7.3 GHG emissions will be quantified for the Do Minimum and Do Something scenarios covering the assessment period as set out above.
- 15.7.4 Mitigation measures which limit the amount of GHG emissions associated included within the design of the proposed scheme will be presented alongside the assessment of GHG emissions.

¹⁵¹ Department for Transport (2020) *Transport Analysis Guidance: Unit A3*. Available at: <https://www.gov.uk/guidance/transport-analysis-guidance-tag> (Accessed January 2021)

¹⁵² Forestry Commission (2018) *Woodland Carbon Code version 2.0*

15.7.5 Based on the change in emissions and the magnitude of those changes compared to the relevant carbon budgets – and where an increase is observed - an assessment will be made using professional judgement as to whether any such change would affect the ability of the government to meet the relevant carbon budget, and therefore whether the change could be considered significant.

Vulnerability to climate change

15.7.6 In line with DMRB LA 114, and as required by the NPSNN, the assessment of the proposed scheme's vulnerability to climate impacts will be completed by the following:

- detailed receptor identification for the construction and operation phase, in liaison with the proposed scheme design team;
- analysis of current and projected baseline climate conditions, at a finer resolution than presented herein, utilising appropriate UKCP18 datasets in order to identify any likely significant climate changes and likely project exposure to these changes; and
- identification of adaptation measures for any significant impacts, in liaison with the proposed scheme design team and relevant environmental discipline specialists.

15.7.7 Once the climate change impacts have been identified, a risk assessment of those impacts on the identified receptors will be undertaken using the framework in Table 15-10 (likelihood categories) and Table 15-11 (measure of consequence).

Table 15-10 Likelihood categories

Likelihood category	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the project (60 years) e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the project (60 years) e.g. approximately once every five years, typically 12 events.
Medium	The event occurs limited times during the lifetime of the project (60 years) e.g. approximately once every 15 years, typically 4 events.
Low	The event occurs during the lifetime of the project (60 years) e.g. once in 60 years.
Very Low	The event can occur once during the lifetime of the project (60 years).

Table 15-11 Measure of consequence

Consequence of impact	Description
Very large adverse	Operation - national level (or greater) disruption to strategic route(s) lasting more than 1 week.
Large adverse	Operation - national level disruption to strategic route(s) lasting more than 1 day but less than 1 week or regional level disruption to strategic route(s) lasting more than 1 week.
Moderate adverse	Operation - regional level disruption to strategic route(s) lasting more than 1 day but less than 1 week.

Consequence of impact	Description
Minor adverse	Operation - regional level disruption to strategic route(s) lasting less than 1 day.
Negligible	Operation - disruption to an isolated section of a strategic route lasting less than 1 day.

15.7.8 The likelihood and consequence of each impact will be combined in the form of a matrix to identify the significance of each impact as shown in Table 15-12.

Table 15-12 Significance matrix

		Measure of likelihood / sensitivity				
		Very Low	Low	Medium	High	Very High
Measure of consequence	Very Large	Not Significant	Significant	Significant	Significant	Significant
	Large	Not Significant	Not Significant	Significant	Significant	Significant
	Moderate	Not Significant	Not Significant	Significant	Significant	Significant
	Minor	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
	Negligible	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

15.7.9 Significance conclusions for each impact will be based on and incorporate confirmed design and mitigation measures.

15.8 Assessment assumptions and limitations

GHG emissions

- 15.8.1 The assessment will be limited by the available data for both the scheme design and from the traffic model. There may be a requirement for some assumptions to be made in certain aspects of the assessments (e.g. specification of materials, or nature of maintenance activities) which will be documented and justified. There may also be some aspects where it is not possible to accurately assess the potential GHG emissions at the time of the assessment and/or are likely to represent very small sources of GHG emissions. As set out in DMRB LA 114, a principle of proportionality will be adopted, and any exclusions will be documented within the assessment.
- 15.8.2 Assumptions from the TAG Databook will be used in calculating GHG emissions in the assessment. This includes projections on fleet composition and vehicle emission rates. There is inherent uncertainty in these assumptions, including those around uptake of electric vehicles and future fuel efficiency improvements. The TAG Databook includes a separate set of data for sensitivity testing (published in July 2020) which contains an alternative set of assumptions and a sensitivity analysis will be used to determine whether this would affect the outcome of the assessment. The TAG Databook is frequently updated and the latest version available will be used at the time of the assessment.
- 15.8.3 Emission factors for both the construction phase activities and use of the road are subject to a degree of uncertainty since they generally represent 'average'

emission rates for the type of product or vehicle in question. The most appropriate emission factors will be selected based on the available information for the proposed scheme. The assessment will consider whether there are any factors that may increase uncertainty and undertake sensitivity analysis where appropriate.

Vulnerability to climate change

15.8.4 The UKCP18 climate projections are based on a range of GHG emissions scenarios which are subject to a degree of uncertainty. How the climate will react to different levels of emissions is also uncertain. There are three key sources of uncertainty within climate projections:

- Natural climate variability: either from natural external influences on climate (e.g. change in atmospheric particulates due to volcanic activity), or changes in the energy received from the sun;
- Incomplete understanding of Earth system processes and their imperfect representation in climate models (modelling uncertainty); and
- Uncertainty in future man-made emissions (of GHGs and other pollutants).

16 Assessment of cumulative effects

16.1 Introduction

16.1.1 This chapter sets out the proposed approach to the cumulative effects assessment (CEA) that will be completed as part of the ES. The CEA will comprise the assessment of Combined effects and Cumulative effects in compliance with legislative requirements and in accordance with guidance outlined in Planning Inspectorate (PINS) Advice Note 17: Cumulative Effects Assessment¹⁵³.

- Combined effects are effects which arise due to the interaction between multiple factors (for example biodiversity and air quality) resulting from the proposed scheme. These effects combine to affect a single receptor at a determined point in time.
- Cumulative effects are effects which arise when the proposed scheme interacts in combination with ‘other developments’ external to the DCO project, and act on a single receptor/or resource/group of receptors. As part of the CEA, an initial long list of ‘other developments’ is provided, however, this is subject to change and will be ‘frozen’ at key points of the assessment process.

16.2 Legislation, policy and guidance

Legislation

16.2.1 The Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017 outlines the requirement for cumulative effects assessment of Nationally Significant Infrastructure Projects (NSIP) under the Planning Act 2008.

16.2.2 Regulation 5(2)(e) states the requirement to assess “*the interaction between the factors referred to in sub-paragraphs (a) to (d) [population and human health; biodiversity; land, soil, water, air and climate; material assets, cultural heritage and landscape].*”

16.2.3 In relation to information required for inclusion in an ES, Schedule 4, paragraph 5(e) outlines requirements for “*A description of the likely significant effects of the development on the environment resulting from, inter alia: (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*”.

Policy

16.2.4 The need for the consideration of cumulative effects in planning and decision-making is set out in planning policy, in particular the National Policy Statement for National Networks (NPSNN). NPSNN under point 4.3 stipulates that “*In considering any proposed development, and in particular, when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State should take into account:*

¹⁵³ Planning Inspectorate (2019) *Advice Note Seventeen: Cumulative Effects Assessment*. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf> (Accessed February 2021)

16.2.5 *“its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.”*

16.2.6 The NPSNN reiterates the need for combined and cumulative effects to be considered within the EIA and presented in an ES under Paragraphs 4.16 and 4.17. They state:

“When considering significant cumulative effects, any environmental statement should provide information on how the effects of the applicant’s proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence)”.

“The Examining Authority should consider how significant cumulative effects and the interrelationship between effects might as a whole affect the environment, even though they may be acceptable when considered on an individual basis with mitigation measures in place.”

The NPSNN under point 4.55 also stipulates that “the effects of existing sources of pollution in and around the project are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable, particularly in relation to statutory environmental quality limits.”

Guidance

16.2.7 No standard approach to the assessment of Combined and Cumulative effects currently exists, however, the methodology outlined below follows guidance set out in PINS Advice Note 17, and will be adopted for the assessment.

16.2.8 The need to undertake a CEA is also outlined in the Design Manual for Roads and Bridges (DMRB) LA 104, Environmental Assessment and Monitoring in which it states:

“Environmental assessments shall assess cumulative effects which include those from:

- 1. a single project (e.g. numerous different effects impacting a single receptor); and*
- 2. different projects (together with the project being assessed).”*

16.3 Stakeholder engagement and consultation

16.3.1 There were no topic specific consultations relating to the combined and cumulative effects assessment during Stages 0-2. Relevant local plan documents and planning portals from local planning authorities websites within 10km of the scheme were analysed to generate a long list of developments for the assessment including South Somerset District Council, Somerset West and Taunton Deane Borough Council, Somerset County Council, East Devon District Council and Sedgemoor District Council. These authorities will be consulted on this Scoping Report and will continue to be consulted as the long list and short list of ‘other developments’ is reviewed and updated for the EIA and reported in the ES.

16.4 Assessment methodology

Combined effects

Baseline

- 16.4.1 The combined effects assessment focusses on individual receptors that have the potential to be affected by multiple impacts addressed under more than one specialist aspects. Each technical chapter will report on the receptors identified in the baseline with its Study Area or Zone of Influence (ZOI) and will provide a description of the likely effects experienced those receptors. These assessments will form the baseline for the Cumulative assessment.

Methodology

- 16.4.2 There is currently no standardised method or consistent guidance for the assessment of combined effects. However, it is recognised that the proposed scheme has the potential, individually or in combination with other developments to give rise to a variety of impacts upon several different receptors some of which may combine to become significant effects. Therefore, the following methodology is proposed.
- 16.4.3 A receptor-based approach will be used to undertake the combined effects assessment. Table 16-1 outlines the proposed assessment process to be used for both construction and operation of the proposed scheme.

Table 16-1 Combined effects assessment process

Step	Description
Step 1: Identify and categorise receptors	Identify all topic sensitive receptors and their geographical locations. These will then be categorised by type, for example but not limited to, population and human health, biodiversity, geology and soils, water, air, material assets, cultural heritage and landscape. The sensitivity to change of these receptors will be identified as part of the discipline assessments in the ES.
Step 2: Identify impacts	Identify all topic impacts associated with sensitive receptor(s)/ receptor types.
Step 3: Screen receptors and associated impacts	A screening exercise will be undertaken on the identified receptors and impacts. Items are screened out from further assessment if they are: Receptors where no topic impacts overlap; Receptors with no temporal overlap with topic impacts; or Receptors where topic effects are identified as 'neutral'.
Step 4: Assess combined effects	Qualitative assessment based on professional judgement of combined effects. Undertaken by teams of technical specialists.
Step 5: Report findings	Outcomes of the qualitative assessments reported in the ES.

- 16.4.4 There is potential for an individual receptor, or group of receptors, to be affected by adverse impacts under one aspect and beneficial impacts under another aspect, possibly as a result of the same feature of the proposed scheme. In these cases, it is necessary to determine the balance between the two and apply professional judgement based on the significance criteria identified in topic Chapters 6 to 15.
- 16.4.5 Where appropriate, combined effects within each technical discipline will be considered and reported as part of that technical assessment; for example, the

combined effect of different type of impacts on a particular species or habitat, or noise and visual effects on heritage assets.

- 16.4.6 The remaining combined effects will be identified and assessed as described in Table 16-1 and reported in the ES using the generic assessment criteria from DMRB provided in Section 5.5 of this report.

Cumulative effects

Baseline

- 16.4.7 The CEA focuses on the effects arising from interaction between the proposed scheme and ‘other developments’ external to the DCO project. The environmental conditions and matters to be considered in the cumulative assessment will be identified by each technical discipline included in the ES and provided in each individual aspect chapter.

Methodology

- 16.4.8 Both DMRB LA 104, Environmental Assessment and Monitoring (Highways England, 2019) and PINS Advice Note 17 provide guidance for the assessment of cumulative effects.
- 16.4.9 DMRB LA 104 states that the CEA should report on:
1. *“road projects which have been confirmed for delivery over a similar timeframe*
 2. *other development projects with valid planning permissions or consent orders, and for which EIA is a requirement*
 3. *proposals in adopted development plans with a clear identified programme for delivery.”*
- 16.4.10 DMRB LA 104 also outlines that there are no defined limits or criteria for use in selecting the list of projects for cumulative assessment and professional judgement using Annex III of the EIA Directive should be applied and justification provided for developments selected (and excluded). PINS Advice Note 17 describes a broader list of developments to be included in the CEA. Both guidance documents have been taken into account in developing the proposed methodology described in this report.
- 16.4.11 PINS Advice Note 17 defines a four-stage approach for undertaking a CEA. These stages are also reflected in DMRB LA 104.
- Stage 1: Establish the NSIP’s ZOI and identify a long list of ‘other developments’;
 - Stage 2: Identify a shortlist of ‘other developments’ for the CEA;
 - Stage 3: Information gathering; and
 - Stage 4: Assessment.
- 16.4.12 Stage 1 of the CEA has been provisionally undertaken as part of this Scoping Report to inform the Scoping Opinion; the methodology followed is described below. The methodology for Stage 2-4 has also been outlined below in line with Planning Inspectorate Advice Note 17 and DMRB LA 104 guidance. It is proposed that exclusion criteria is considered as part of Scoping to ensure that the cumulative effects assessment is proportionate, and only considers ‘other

developments' which have the potential to lead to likely significant environmental effects. These criteria are defined as part of Stage 1.

Stage 1: Identify ZOIs

16.4.13 ZOIs, or maximum geographical area around the proposed scheme where likely significant effects may occur, for each environmental aspect have been established based on accepted industry guidance and relevant standards; these are shown in Figure 16.1 in Volume 2 of this report and are summarised Table 16-2 as distances from the provisional order limits and reasoned justification provided.

Table 16-2 Criteria for determining the zone of influence for the CEA for each environmental aspect

Environmental aspect	Zone of Influence	Reasoning
Air quality	Up to 200m from the proposed scheme (for construction dust) and up to 200m from the affected road network (ARN) once operational.	Based on relevant guidance (DMRB LA 105), further information provided in Chapter 6.
Cultural heritage	Setting of designated heritage assets (construction and operation) up to 1km Designated and non-designated heritage assets (operation and construction) up to 300m	Based on relevant guidance (DMRB LA 106), further information provided in Chapter 7.
Landscape	Construction and operation effects up to 2km.	Based on provisional Zone of Theoretical Visibility (ZTV), professional judgement and landscape and visual survey, up to 2km for CEA. Subject to change following further design development, surveys and assessment, and agreement of representative viewpoints with relevant local authorities, and ZTV refinement.
Biodiversity	ZOIs vary depending on the ecology of the habitat or species being assessed, generally construction and operation effects are considered up to 2km, 10km where rare bat species are present, and: <ul style="list-style-type: none"> • 30km where bats are a qualifying feature of the European site • 20km where wildfowl and wader birds are a qualifying feature of the European site. • Where there is a hydrological connectivity between the proposed scheme and the European sites Limited to 10km for CEA.	Based on relevant guidance (DMRB LA 108) and likely significant effects, further information provided in Chapter 9. 10km for CEA is considered appropriate to identify other developments as for the majority of species and habitats significant cumulative effects would be expected well within this distance from the proposed scheme, however the 10km search area takes account of those species with greater mobility; most notably bats and barn owl. To be further refined on completion of surveys.
Geology and soils	Construction and operational effects on geology and soil receptors up to 250m. Landfill and waste management site up to 500m.	Based on relevant guidance and professional judgement (in the absence of a defined study area in DMRB LA 109), further information provided in chapter 10. It is not considered likely that significant effects would arise beyond this distance.

Environmental aspect	Zone of Influence	Reasoning
Materials and Waste	Construction footprints/project boundary. Study Area for martial supply and waste infrastructure in the county of Somerset where the proposed scheme is located although consideration has also been included for the wider South West region (Cornwall, Devon, Dorset, Gloucestershire, Somerset and Wiltshire). Consideration of other developments for CEA limited to 5km.	Based on relevant guidance (DMRB LA 110), further information provided in Chapter 11. Vary large areas are included in the study area to identify facilities in the baseline for the assessment. Consideration of other developments in the CEA is not feasible over a such a large area, and they are unlikely to result in significant cumulative effects.
Noise and vibration	Construction noise up to 300m. Construction vibration up to 100m. Operational noise up 600m. Operation vibration - scoped out.	Based on relevant guidance (DMRB LA 111), further information provided in Chapter 12.
Population and health	Construction and operation land use and accessibility up to 500m. Cyclists, recreational walkers and horse riders up to 10km Health effects up to 500m.	Based on DMRB LA 112, LA 111, LA 105 significant effects on land use and population health from noise, air quality, and visual intrusion considered. Professional judgement that consideration of health effects up to 500m. Further information is provided in Chapter 13.
Water environment	Groundwater, Geomorphology, Water Framework Directive (WFD), flood risk, and Water quality for operation and construction) up to 1km.	Based on professional judgement, further information provided in Chapter 14.
Climate Change	Greenhouse Gas emissions – Not applicable Vulnerability – the footprint of the proposed scheme	The receptor for greenhouse gas impacts is the global atmosphere and the assessment of impact on it is inherently cumulative Their assessment considered the vulnerability of the proposed scheme to precited climate change

Identifying a long list of ‘other developments’

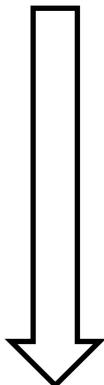
16.4.14 To identify a long list of ‘other developments’ an initial set of screening criteria for temporal, spatial and scheme scale was devised, based on experience from other EIAs of major infrastructure projects. The criteria applied to this search included categorisation of unit size and spatial scope of data collection, as shown in Table 16-3. This was to ensure proportionality as limiting the search ensured only the developments with the potential to lead to significant cumulative effects are identified and included in the assessment. Any other relevant developments identified by statutory stakeholders will also be considered.

Table 16-3 CEA Stage 1 – Categorisation by unit size, application and development type and distance

Development		Housing unit (no)	Housing land (ha)	Non - residential – m ²	Non - residential – ha	Distance from provisional order limits
Nationally Significant Infrastructure Projects		All	All	All	All	10km
Transport and Works Act Orders Mineral and Waste EIA application Transport allocations in non-statutory plans e.g. Local Transport Plans		All	All	All	All	10km
Applications or Allocations	Large Scale major	200+	4+	10,000+	2+	10km
	Medium Scale major	10-199	0.5-4	1,000-10,000	1-2	2km
	Small Scale Minor	1-9	Less than 0.5	Less than 1,000	Less than 1	200m

16.4.15 All ‘other developments’ identified in the initial search were categorised into three ‘tiers’ reflecting the likely degree of certainty attached to each development. The tiers are based on the guidance outlined in PINS Advice Note 17 and are defined in Table 16-4.

Table 16-4 ‘Other development’ for inclusion in CEA

Tier	‘Other development’	
Tier 1	Under construction	
	Permitted applications whether under the Planning Act 2008 (PA2008) or other regimes, but not yet implemented.	
	Submitted applications whether under the PA2008 or other regimes but not yet determined.	
Tier 2	Projects on the Planning Inspectorate’s Programme of Projects where a scoping report has been submitted.	
	Projects that have requested a scoping opinion from the relevant local planning authority and is accompanied with a scoping report.	
Tier 3	Projects on the Planning Inspectorate’s Programme of Projects where a scoping report has not been submitted.	
	Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the relevant proposals.	
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	

Tier	'Other development'	
	Projects that have requested a screening opinion from the relevant local planning authority. It is important to recognise that screening opinion requests are not always reported on the planning portal.	

16.4.16 The search was used to produce a long list of 'other developments' and allocations to be considered as part of the CEA, categorised into their respective Tiers which is presented in Appendix E of this Scoping Report.

16.4.17 The search will be updated as necessary over the course of the EIA and frozen three months ahead of the submission of the ES.

Stage 2: Identify a short list of other developments

16.4.18 The long list of 'other developments' presented in Appendix E of this Scoping Report (and any additional identified) will be screened against a series of inclusion and exclusion criteria to compile a more proportionate short list of 'other development'. These criteria include the following when considering the 'other developments':

- Their scale and nature;
- Their temporal scope;
- Their spatial scope; and
- Whether they have been subject to environmental assessment and suitable information for consideration is available.

16.4.19 PINS Advice Note 17 recommends that 'other developments' categorised within Tier 1 and 2 should be included within the CEA. Where possible, Tier 3 developments should also be included, however, the potential limitations associated with the availability of information for these developments should be recognised.

16.4.20 Professional judgement will be used in the development and application of the inclusion and exclusion criteria, and relevant planning authorities and statutory consultees will be consulted.

16.4.21 Local development plans, policies and programmes will be reviewed to determine present and future potential interactions with the proposed scheme. Although this information may be limited, it could identify emerging developments relevant to the EIA.

16.4.22 This proposed scheme should also be included in any cumulative effects assessment undertaken by applications submitted for 'other developments' after the submission of the application for this project.

16.4.23 The finding of this short list screening will be present in the ES in the format provided as Matrix 1 in Appendix 1 to PINS Advice Note 17.

Stage 3: Information gathering

16.4.24 Stage 3 requires the gathering of environmental information associated with each of the identified 'other developments' shortlisted at Stage 2 to allow a robust assessment of the likely cumulative effects. Therefore, this is dependent on the level of information available for each of the 'other development'.

16.4.25 Available data will be sourced from the relevant planning authorities and include:

- the development location;
- the nature of the development;
- planning status;
- known the potential environmental effects or other relevant environmental information;
- programme of works and approximate completion date; and
- details of construction and operation.

Stage 4: Assessment

- 16.4.26 After the compilation of the information gathered in association with the 'other developments', a review of each development will be undertaken to assess whether significant cumulative effects may arise. This will require the application of professional judgement to identify cumulative effects associated with a particular environmental topic. The results of this assessment will also be recorded in Matrix 2 in Appendix 2 to PINS Advice Note 17.
- 16.4.27 Justification for scoping out potential cumulative effects which will not lead to significant effects will be clearly provided.

Significance criteria

- 16.4.28 DMRB LA 104 states that significance should be determined by the extent to which the impacts can be accommodated by the resource.
- 16.4.29 For the CEA, the value of a resource and magnitude of impact is determined according to the criteria set within each of the environmental aspect chapters. The significance of effect will then be carried forward from the environmental aspect chapters to identify the significance of cumulative effects with other developments.
- 16.4.30 The assessment of significance of the cumulative effects will be determined in accordance with the significance assessment as detailed within Chapter 5 Environmental assessment methodology, of this report.
- 16.4.31 Where significant cumulative effects beyond those identified as residual significant effects from the proposed scheme in isolation are identified, an assessment of the need for additional mitigation, further to that already set out in the technical aspect chapters, will be undertaken.

17 Summary

- 17.1.1 Table 17-1 provides a summary of environmental aspects and matters that have been scoped in to and out of the proposed EIA on ES.
- 17.1.2 Following PINS Advice Note 12, a screening matrix has been completed regarding potential **transboundary effects** for the proposed scheme which is provided in Appendix A. This concludes that proposed scheme would not result in likely significant transboundary effects and this is therefore scoped out of further assessment.
- 17.1.3 The proposed scheme is a road improvement scheme, as such it would not generate any notable emission of **heat and/or radiation** from the proposed works, technology or operation that could result in likely significant effects on the environment. Therefore, the further consideration or assessment of heat and radiation is scoped out of the EIA and ES.
- 17.1.4 A Risk Identification exercise reported in Appendix B, concluded that all relevant major accidents and disasters considered would be appropriately assessed and mitigated through other environmental topics proposed in the EIA for the proposed scheme and reported in the ES. Appropriate risk and environmental mitigation measures would be considered, developed, and adopted through compliance with DMRB design standards, applicable legislation and best practice measures employed by Highway England. Therefore, no risks of **major accidents and disasters** are anticipated, and this topic is scoped out of the EIA and ES.

Table 17-1 Summary of aspect and matter scoped into and out of the EIA

Environmental Aspect	Environmental Matter	Scoped in - construction	Scoped in - operation
Air quality	Construction dust receptors (human and ecological)	✓	n/a
	Human health receptors	✓	✓
	Designated ecological sites	✓	✓
	PCM compliance risk	✓	✓
Cultural heritage	Designated heritage resources	✓	✓
	Non-designated heritage resources	✓	✗
Landscape	Effects on national landscape character	✓	✓
	Effects on local landscape character that	✓	✓
	Visual effects (road users scoped out)	✓	✓
Biodiversity	European designated sites (SAC, SPA and Ramsar)	✓	✓
	SSSI and NNR	✓	✓
	Locally designated sites	✓	✓
	Ancient Woodland Inventory sites and ancient woodland habitat	✓	✓

	Priority habitats	✓	✓
	Notable vascular plants	✓	✓
	Badger	✓	✓
	Bats	✓	✓
	Birds – breeding, wintering and schedule 1 species (including barn owl)	✓	✓
	Dormouse	✓	✓
	Freshwater fauna (fish, macro-invertebrates and whiteclawed crayfish)	✓	✓
	Great crested newt	✓	✓
	Otter	✓	✓
	Reptiles	✓	✘
	Terrestrial invertebrates	✓	✓
	Water vole	✓	✓
	Priority species	✓	✓
	INNS – plants and animals	✘	✘
Geology and soils	Geology (SSSI)	✘	✘
	Soils	✓	✘
	Human health (site users/general public)	✓	✘
	Human health (construction/maintenance workers)	✓	✓
	Human health (residential properties near landfill sites)	✓	✓
	Groundwater and surface water from contaminated land	✓	✘
Material assets and waste	Materials assets	✓	✘
	Waste	✓	✘
Noise and Vibration	Construction noise	✓	n/a
	Construction vibration	✓	n/a
	Operational traffic noise	n/a	✓
	Operational traffic vibration	n/a	✘
Population and health	Population and housing	✓	✓
	Community land and assets	✓	✓
	Development land and business	✓	✓
	Agricultural land holdings	✓	✓
	Walkers, cyclists and horse riders	✓	✓
	Human health	✓	✓
Road drainage and the water	Surface water quality	✓	✓
	Fluvial geomorphology	✓	✓

environment	Groundwater	✓	✓
	Groundwater and surface water dependent terrestrial ecosystems	✓	✓
	Abstractions and discharges	✓	✓
	Flood risk	✓	✓
	Existing road drainage infrastructure	✓	✓
	WFD compliance	✓	✓
Climate	GHG emissions associated with construction	✓	n/a
	GHG emissions associated with operations	n/a	✓
	GHG emissions from road users	n/a	✓
	Vulnerability of proposed scheme to climate change from changes in seasonal precipitation and temperature	✓	✓
	Vulnerability of proposed scheme to climate change from increased frequency of extreme precipitation and temperature events	✓	✓
All	Demolition	✘	✘

Abbreviations List

AADT	Annual Average Daily Traffic
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
AQOs	Air Quality Objectives
ARN	Affected Road Network
AST	Appraisal Summary Table
AURN	Automatic Urban and Rural Network
AVR	Accurate Visual Representation
AWI	Ancient Woodland Inventory
BCR	Benefit to Cost Ratio
BGS	British Geological Survey
BMV	Best Most Versatile
BPM	Best Practice Measures
CEA	Cumulative Effects Assessment
CO ₂	Carbon Dioxide
COMAH	Control of Major Accident Hazards Regulations 2015
ComMA	Combined Modelling and Appraisal Report
COPD	Chronic Obstructive Pulmonary Disease
CRTN	Calculation of Road Traffic Noise
CSZ	Core Sustenance Zone
DCO	Development Consent Order
Defra	The Department for Environment, Food and Rural Affairs
DLL	District Level Licencing
DM	Do Minimum
DMOY	Do-Minimum Opening Year
DMRB	Design Manual for Roads and Bridges
DS	Do Something
DSFY	Do-Something Future Year
DSOY	Do-Something Opening Year
EA	Environment Agency
EAR	Environmental Assessment Report

EAST	Early Assessment Sifting Tool
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017 (SI 2017/572 HMSO)
EMP	Environmental Management Plan
ENVIS	Environmental Information System
EPA	Environmental Protection Act
ES	Environmental Statement
ESR	Environmental Scoping Report
FRA	Flood Risk Assessment
GCN	Great Crested Newt
GHG	Greenhouse Gas
GI	Ground Investigations
GIS	Geographical Information Systems
GWDTE	Groundwater Dependent Terrestrial Ecosystem
GWR	Great Western Railway
HAGDEMS	Highways Agency Geotechnical Data Management Systems
HAPMS	Highways England Pavement Management System
HDV	Heavy Duty Vehicle
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HRA	Habitat Regulations Assessment
HSE	Health and Safety Executive
IAN	Interim Advice Note
IDB	Internal Drainage Boards
IEMA	Institute of Environmental Management and Assessment
IMD	Index of Multiple Deprivation
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
KSI	Killed or Seriously Injured
LAA	Local Aggregate Assessment
LGS	Local Geological Site

LI	Landscape Institute
LLCA	Local Landscape Character Area
LLFA	Lead Local Flood Authorities
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LRV	Local Road Verges
LVIA	Landscape and Visual Impact Assessment
LVMF	London View Management Framework
LVs	Limit Values
LWS	Local Wildlife Site
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside
MCA	Mineral Consultation Area
MPP	Monument Protection Programme
MSA	Mineral Safeguard Area
NCA	National Character Area
NHLE	National Heritage List for England
NIA	Noise Important Area
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
NPFF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NPSNN	National Policy Statement for National Networks
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptors
NVC	National Vegetation Classification
OME	Order of Magnitude Estimate
ONS	Office for National Statistics
OS	Ordnance Survey
PCAG	Parish Council Area Group
PCF	Project Control Framework
PCM	Pollution Climate Mapping

PEIR	Preliminary Environmental Information Report
PFRA	Preliminary Flood Risk Assessment
PFS	Petrol Filling Station
PIA	Personal Injury Accident
PINS	The Planning Inspectorate
PM ₁₀	Particulate Matter
PRA	Preferred Route Announcement
PRoWs	Public Rights of Ways
PSSR	Preliminary Sources Study Addendum
RBMP	River Basin Management Plan
RCP	Representative Concentrations Pathways
RIS	Road Investment Strategy
RIS2	Road Investment Strategy 2
SAC	Special Area of Conservation
SAR	Standard Admission Ratio
SCC	Somerset County Council
SDC	Sedgemoor District Council
SEB	Statutory Environmental Body
SERC	Somerset Environmental Records Centre
SFRA	Strategic Flood Risk Assessment
SMP	Soils Management Plan
SMR	Standard Mortality Ratio
SOAEL	Significant Observed Adverse Effect Level
SoCC	Statement of Community Consultation
SoPI	Species of Principal Importance
SoS	Secretary of State
SPA	Special Protection Area
SPZ	Source Protection Zone
SRN	Strategic Road Network
SSDC	South Somerset District Council
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWAWP	South West Aggregates Working Party

SWMP	Site Waste Management Plan
SWTC	Somerset West and Taunton Council
TG16	The Defra Local Air Quality Management Technical Guidance 2016
TMP	Traffic Management Plan
TRA	Traffic Reliability Area
UXO	Unexploded Ordnance
WCH	Walkers, Cyclists and Horse-Riders
WCHAR	Walkers, Cyclists and Horse Riders Assessment and Review
WebTAG	The Transport Analysis Guidance – The Transport Appraisal Process
WFD	Water Framework Directive
WHO	World Health Organization
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Glossary

Glossary Term	Description
Affected Road Network (ARN)	The extended area of the roads that will be affected by the proposed scheme with particular reference to air quality effects.
Agricultural Land Classification (ALC)	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.
Ancient woodland	Ancient woods are areas of woodland that have persisted since 1600 in England and Wales, and 1750 in Scotland. This is when maps started to be reasonably accurate so we can tell that these areas have had tree cover for hundreds of years. They are relatively undisturbed by human development. As a result, they are unique and complex communities of plants, fungi, insects and other microorganisms.
Annual Average Daily Traffic (AADT)	Annual average daily traffic, abbreviated AADT, is a measure used primarily in transportation planning, transportation engineering and retail location selection. Traditionally, it is the total volume of vehicle traffic of a highway or road for a year divided by 365 days.
Area of Outstanding Natural Beauty (AONB)	A protected area recognised and classified by the International Union for the Conservation of Nature (IUCN). AONBs in England and Wales fall into Category V – Protected Landscapes and are protected by the Countryside and Rights of Way Act (2000) (CROW Act). AONBs are designated in recognition of their national importance and to ensure that their character and qualities are protected for all to enjoy. Under the CROW Act, Natural England can make orders to designate AONBs or vary the boundaries of existing ones.
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the proposed scheme 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.

British Geological Survey	The British Geological Survey is a government organisation which aims to advance geoscientific knowledge of the United Kingdom landmass and its continental shelf by means of systematic surveying, monitoring and research.
Clean Air Zones	A Clean Air Zone defines an area where targeted action is taken to improve air quality and resources are prioritised and coordinated in order to shape the urban environment in a way that delivers improved health benefits and supports economic growth.
Combined effects	Combined effects are effects which arise due to the interaction between multiple factors (for example biodiversity and air quality) resulting from the proposed scheme. These effects combine to affect a single receptor at a determined point in time.
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.
Land Contamination Risk Assessment	It covers the main hazards that might happen during the construction project and the risk management that is required.
Conceptual Site Model (CSM)	A Conceptual Site Model will identify and assess contaminant linkages using the source-pathway-receptor model. Development of the CSM forms the main part of preliminary risk assessment and the model is subsequently refined or revised as more information becomes available (for example ground investigation data).
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 a 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 effects	Cumulative effects are effects which arise when the proposed scheme interacts in combination with 'other developments' external to the DCO project, and act on a single receptor/or resource/group of receptors. As part of the CEA, an initial long list of 'other developments' is provided, however, this is subject to change and will be 'frozen' at key points of the assessment process.
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.

Desk Study	A non-intrusive study and review of all available information pertaining to a site, including historical records, collated and monitored data, and consultation with relevant stakeholders.
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': a) The case where works will be carried out regardless of whether or not the 'do something' proposed scheme is built. b) The case where the existing network may be improved to form a 'do minimum' proposed scheme which can be tested as an alternative to carrying out major 'do something' improvements. c) The case where traffic conditions can be improved without significant capital expenditure. d) The case where the area covered by the modelled network includes road proposals other than the one under immediate consideration.
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.
EIA Development	Development that fulfils certain criteria of the EIA Regulations and therefore a full EIA (presented in an Environmental Statement) is required for planning purposes.
EIA Scoping	An initial stage in determining the nature and potential scale of the environmental impacts arising from a proposed development and assessing what further studies are required to establish their significance.
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 Designated Funds (EDF)	Funds allocated by the Department for Transport for actions beyond business as usual to help Highways England to invest in retrofitting measures to improve the existing road network and to maximise opportunities to deliver additional improvements as part of new road schemes. The environment is one of five designated funds.
Environmental Impact Assessment (EIA)	A process by which information about the environmental effects of a development is collected and taken into account by the relevant decision-making body before a decision is given on whether the development should go ahead. This process is required under the EIA Regulations.
Environmental Statement (ES)	An Environmental Statement is prepared by an applicant as part of an Environmental Impact Assessment (EIA) in support of certain planning

	applications. It summarises the findings of the EIA process and is used primarily to inform decision makers regarding the environmental implications of the development.
'EIA Regulations' (Infrastructure Planning (Environmental Impact Assessment) (EIA) Regulations 2017)	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/572 HMSO) revoke and replace the infrastructure Planning (Environmental Impact Assessment) Regulations 2009, and its amendments. The regulations transpose the amendments made to the Environmental Impact Assessment (EIA) Directive 2011/92/EU by Directive 2014/52/EU.
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 (FRA)	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	A place where an organism lives; a type of environment inhabited by a particular species and/or community; often characterised by dominant plant forms, physical characters, or a combination of these.
Greenhouse Gas (GHG)	Gasses that once emitted into the atmosphere contribute to the 'greenhouse effect' of warming the planet.
Habitat Directive	EC Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (Habitats Directive 1982) as amended (92/43/EEC).
Habitat Regulations Assessment (HRA)	Habitat Regulations Assessment (HRA) is a recognised step-by-step process to determine the likely significant effects and (where appropriate) assess adverse impacts on the integrity of European designated sites. Where likely significant effects are identified, the assessment examines alternative solutions and provides justification for imperative reasons of over-riding public interest (IROPI).
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.
Heavy Goods Vehicle (HGV)	HGVs are vehicles over 3.5 tonnes and includes rigid and articulate lorries.
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).
In situ	In the natural, original or appropriate position.
Interim Advice Note (IAN)	Interim Advice Notes (IANs) issued by Highways England contain specific guidance in connection with works on motorways and trunk roads in England. IAN are largely superseded through the new DMRB.
Local Landscape Character Area (LLCA)	Geographically unique areas where a combination of factors such as topography, vegetation pattern, land use and cultural associations combine to create an area with a distinct, recognisable character.
Landscape Character Type (LCT)	Generic classifications of landscape which share broadly similar combinations of physical and cultural landscape attributes.

Local Wildlife Sites (LWS)	Local Wildlife Sites (LWS) are areas of substantive nature conservation value and make an important contribution to ecological networks in the local landscape.
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.
Made ground	Soils or other material which has been deposited by man rather than natural processes, for example to make up ground levels.
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	Any process, activity of thing designed to avoid, reduce or remedy adverse environmental effects likely to be caused by a development project.
Mitigation measure	These measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects.
National Character Areas (NCA)	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.
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 Policy Statement for National Networks (NPSNN)	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 vegetation classification (NVC)	The NVC assesses the full suite of vascular plant, bryophyte and macro-lichen species with a certain vegetation type.
National Trust	A UK conservation charity founded in 1895, with governance arrangements underpinned by the Charities (National Trust) Order 2005. The charity protects and manages historic places and green spaces, and allows public access to these.
Nationally Significant Infrastructure Project (NSIP)	Nationally Significant Infrastructure Projects (NSIP) are major infrastructure developments in England and Wales that bypass normal local planning requirements. The proposed scheme is considered a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 and therefore Highway England proposes to submit an application for a Development Consent Order (DCO) to provide the appropriate planning consent for the proposed scheme.
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;

	<ul style="list-style-type: none"> 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.
Non-Motorised User (NMU)	Someone walking, cycling or a horse rider, or using an electric powered mobility vehicle.
Non-Technical Summary (NTS)	The NTS is a supporting document to the ES that summarises the findings of the EIA in non-technical language.
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 (Nitrogen Oxide) and NO ₂ .
NO ₂	Nitrogen Dioxide.
Offline (road)	A section of proposed road routing on land that is not currently road use (i.e. brand new road).
Online (road)	A section of proposed road routing on existing road (e.g. widening of existing road).
Opening Year	The estimated year that the proposed scheme would become operational.
Operation	The functioning of a project on completion of construction.
Other Developments	Development outside the proposed scheme that is taken into consideration for the cumulative effects assessment. DMRB LA 104 states that the cumulative effects assessment should report on: <ol style="list-style-type: none"> <i>“road projects which have been confirmed for delivery over a similar timeframe;</i> <i>other development projects with valid planning permissions or consent orders, and for which EIA is a requirement</i> <i>proposals in adopted development plans with a clear identified programme for delivery.”</i>
Outline Environmental Management Plan (EMP)	The Outline EMP provides an over-arching framework for environmental management during design, construction and operation and identifies the environmental risks associated with the implementation of the proposed scheme. All site work and maintenance must be undertaken in accordance with the EMP.
Publicly Available Specification (PAS)	PAS are streamlined standards, specifications and codes of practice or guidelines developed by sponsoring organisations to meet an immediate market need, produced by The British Standards Institute (BSI).
PAS2080	Publicly Available Specification (PAS) 2080 is a standard for managing infrastructure carbon which provides guidance on how to reduce carbon emission, improve efficiency and decrease the rate of climate change.
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.
Pink Modified Route	The preferred route for development (i.e. the route of the proposed scheme).
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.
PM ₁₀	Particulate matter with a diameter of 10 microns or less.

Preliminary Environmental Information Report (PEIR)	As part of the statutory consultation, a Preliminary Environmental Information Report (PEIR) will be published. This PEIR will describe the findings of a preliminary environmental assessment to allow both technical and non-technical consultees to understand the likely significant environmental effects of the proposed scheme, and measures proposed to mitigate such effects, and assist in informing their consultation response.
Project Control Framework (PCF)	Project Control Framework supports the implementation of project management within an organisation because: <ol style="list-style-type: none"> 1. It supports the development and replication of accepted practice; 2. Helps communication within the team because of a common language; 3. Streamlines the use of tools and techniques for key project management processes; 4. Establishes a consistent approach which aid customers understand the project management processes; and 5. Ensure that focus is maintained on the early stage of the project lifecycle.
Preliminary Sources Study Report (PSSR)	PSSR relates to the preliminary stages of data collection. It can include a detailed summary of factual information included within various reports pertaining to historic data sources.
Public Rights of Way (PRoW)	A right to access land for walking or certain other leisure activities such as cycling, horse riding or for the use of powered wheelchairs. Definitive maps make a legal record of public rights of way in 4 categories: footpaths, bridleways, restricted byways and byways open to all traffic.
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.
Residual Effect	Those effects of a development that cannot be mitigated following implementation of mitigation proposals.
Risk Assessment	An assessment of the likelihood and severity of an occurrence.
Proposed Scheme	The "proposed scheme" refers to the A358 Taunton to Southfields Dualling scheme in Somerset, connecting the existing A303 at Southfields Roundabout near Ilminster and with junction 25 of the M5 at Taunton.
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.
Scoped in	An environmental topic that has been 'scoped in' will have a dedicated assessment chapter in the ES as it has been identified to have a likely significant effect(s) and requires further assessment in the EIA.
Scoped out	An environmental topic that has been 'scoped out' will not have a dedicated assessment chapter in the ES as it has been identified to not have any likely significant effects and therefore requires no further assessment in the EIA. However, it should be noted that a scoped out technical topic could still be covered in the EIA through indirect assessment. Often, scoped out topics are assessed in standalone technical reports to support the planning application/DCO (e.g. Flood Risk Assessment or Habitats Risk Assessment).
Scoping Opinion	The formal response given by consultees on the proposed EIA scope (and methodology). This is used to inform the final methodology and assessment scope of the EIA.
Scoping Report	This document, which presents the proposed scope (and methodology) of the EIA. It is used to inform the consultees in providing the Scoping Opinion.
Significant Observed Adverse	This is the level of noise above which significant adverse effects on health and quality of life occur.

Effect Level (SOAEL)	
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.
Soils Management Plan	A Soil Management Plan ensures soil sustainability during the construction phase of the development process. The plan can contain information on topsoil and subsoil types, methods for stripping, stockpiling and improving soils, location and content of each soil stockpile, who is responsible for supervising soil management.
Source Protection Zone (SPZ) (Groundwater)	The Environment Agency has designated SPZs for groundwater sources and include wells, boreholes and springs used for public drinking water supply. Zones are set up as pollution prevention measures in areas which are at a high risk, and to monitor the activities of potential polluters nearby.
Special Areas of Conservation (SAC)	Special Areas of Conservation (SACs) are strictly protected sites designated under the EC Habitats Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level.
Statement of Community Consultation (SoCC)	The Statement of Community Consultation (SoCC) is a report prepared to set out how we propose to consult people living in the vicinity of the Scheme about the new proposals.
Statutory environmental bodies (SEB)	The statutory consultees that must be consulted upon for environmental aspects during the project, comprising: Environment Agency, Natural England, and Historic England.
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
Study Area	Defined area surrounding the site in which is collected and analysed in order to set the site into its context. This varies as stated within each technical assessment.
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.
Traffic Management Plan (TMP)	The Traffic Management Plan describes the type and extent of traffic management layouts and arrangements required for the construction of a scheme whilst providing a safe environment for those travelling through the works, as well as those engaged in the construction of the works. The plan will detail proposed access routes for construction traffic and site compound locations.
Transboundary Effects	Regulation 32 of the EIA Regulations outlines a requirement to consider the likely significant effects of the proposed scheme on the environment of another European Economic Area State (the nearest to the proposed scheme being France and Republic of Ireland).
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 three stage process: <ul style="list-style-type: none"> • Stage one – option development, identifying the need for intervention and developing options;

	<ul style="list-style-type: none"> • Stage two – further appraisal – the focus of the analysis is on estimating the likely performance and impact of intervention(s) in detail; and • Stage three – implementation, monitoring and evaluation.
UKCP09	United Kingdom Climate Projections (UKCP) 2009 provides details on observed climate data and a number of different projected climate change scenarios.
Unexploded ordnance (UXO)	Unexploded Ordnance (UXO), which include explosive weapons such as bombs, shells, grenades, land mines, naval mines, cluster munitions that did not explode when they were employed, still pose a risk of detonation as civilians often children continue to be killed by these engines.
Zone of Theoretical Visibility (ZTV)	In the context of landscaping and investigating the visibility of the Scheme, a study area should extend to all areas in which visual impacts have the potential to occur based on topographical indications only.

Appendices

Appendix A Transboundary screening matrix

Table A-1 Transboundary screening matrix

Characteristics of the development	<p>The proposed scheme comprises the following main components:</p> <ul style="list-style-type: none"> • Provision of 13.6km of new, rural all-purpose dual carriageway for the A358, connecting M5 roundabout junction 25 at Taunton to Southfields roundabout at Ilminster, comprising: <ul style="list-style-type: none"> ○ Offline route from the existing A358 between the M5 roundabout junction 25 and Griffin Lane and ○ Online widening of the rest of the existing A358 to Southfields roundabout. • Modifications to junction 25 of the M5, including a designated left turn lane from Toneway (Taunton access) onto the M5 northbound carriageway, and widening to southbound M5 off-slip. • Improvements to Southfields Roundabout to accommodate the new dual carriageway. • Local road diversions. • Local junction and access modifications. • New and improved drainage infrastructure. • Vehicle recovery areas. <p>The proposed scheme will be progressed within the administrative boundaries of: Somerset West and Taunton Council and South Somerset Council.</p> <p>A review of the characteristics of the proposed scheme concluded that:</p> <ul style="list-style-type: none"> • some of the resources required to construct the proposed scheme are likely to be obtained from the global market (e.g. steel); however, it is envisaged that such materials would also be able to be obtained locally within the UK; • no waste, nuisances or accidents are likely that would extend beyond the border of the UK as a result of construction or operation of the proposed scheme; and • no novel technologies are proposed that would introduce potential for transboundary effects to occur on other EEA States.
Location of Development (including existing use) and Geographical area	<p>The western offline section of the proposed scheme is predominantly grade 3 and 4 agricultural land, with post-1988 ALC studies showing pockets of grade 1 and 2 land. The eastern online portion of the proposed scheme is the existing A358 road, with agricultural land (grade 3 and 4) either side.</p> <p>A review of the geographical area of impact associated with the proposed scheme has concluded that any environmental effects associated with its construction and operation are unlikely to extend beyond the jurisdiction of the UK, with the exception of potential release of greenhouse gas emissions from vehicles (traffic) in relation to their contribution to climate change.</p>

	<p>A review of the location within which the proposed scheme would be constructed and would operate has concluded that existing land uses are mixed (such as residential and commercial) but predominantly agricultural. The majority of the areas of land that would be permanently taken by the proposed scheme are currently occupied by existing A358 highway network.</p> <p>The location of the proposed scheme is situated approximately 155km from France and 285km from the Republic of Ireland. The study areas proposed within each individual assessment have been reviewed, and it has been concluded that none of their boundaries would extend into these EEA states.</p>
Environmental importance	<p><u>Air Quality:</u></p> <ul style="list-style-type: none"> • East Reach AQMA, approximately 2km west; and Henlade AQMA, located approximately 300m north – both declared by SWTC for exceedance of national NO₂ annual mean objective. <p><u>Noise and Vibration:</u></p> <ul style="list-style-type: none"> • Existing noise and vibration climate is generally anticipated to be dominated by road traffic noise from the A358, A303, A378 and M5. • There are three Noise Important Areas (NIA) along the section of the A358 between the A303 and the A378 junctions (NIAs 3502, 12940 and 3501), all of which are on sections of the route proposed for online widening. There are five NIAs on the section of the A358 proposed to be bypassed by the scheme between the A378 and the M5 junctions (NIAs 3497, 3498, 3499, 34500 and 12939). These NIAs include individual or small groups of isolated dwellings; however, NIA 3497 includes a larger number of dwellings and is located in Henlade. <p><u>Biodiversity:</u></p> <ul style="list-style-type: none"> • Somerset Levels and Moors SPA and Ramsar, located approximately 3.5km from the proposed scheme. • Hestercombe House SAC, Exmoor and Quantock Oakwoods SAC, Beer and Quarry Caves SAC, and Bracket's Coppice SAC located within 30km. • Severn Estuary SAC and Ramsar site (7km north), which extends to the tributaries of the Severn, which include the River Tone approximately 7km downstream of the Junction 25 of the M5. • Thurlbear Woods and Quarrylands SSSI, located 1.5km (at its closest point) south west; and Barrington Hill Meadows SSSI, located 1.7km south, which is also designated as a NNR. • Further 15 SSSIs located within 200m of the affected road network. • Bickenhall Orchard LNR (550m south west); South Taunton Streams LNR (690m west of the link road to Junction 25 on the M5); and Children's Wood / Riverside Park LNR (900m north). • Protected and notable species and non-statutory designated sites are also present in sites adjacent to the current A358 and along the offline route of the proposed scheme. <p><u>Cultural Heritage:</u></p> <ul style="list-style-type: none"> • Cross in St Aldhelm and St Eadburga churchyard scheduled monument and Grade II*, located approximately 270 metres south west in Broadway at the south-eastern end of the proposed scheme. • 141 listed buildings within 1km of the proposed scheme, including:

	<ul style="list-style-type: none"> ○ Four Grade I listed buildings: Church of St John the Baptist (970m east at Hatch Beauchamp); Church of St George (720m east at Ruishton); Church of the Holy Cross (720m east at Thornfalcon); and Church of St Aldhelm and Eadburga (270m west of the village of Broadway); ○ 10 Grade II* listed buildings, with the closest assets being: Musgrave Farmhouse (30m west at Henlade); The Old Rectory (215m west at Ashill); and The Grotto at Jordans (290m east, north-east of Horton Cross); and ○ 127 Grade II listed buildings, 12 of which are located within 200m of the proposed scheme – refer to Section 7. <ul style="list-style-type: none"> ● Grade II registered park and garden: Hatch (Beauchamp) Court, located 490m east near Hatch Beauchamp. ● Two conservation areas located within 1km at Hatch Beauchamp and Thornfalcon. ● There are a number of areas of woodland, some of which are categorised by Natural England as semi-natural ancient woodland, which contributes to the historic landscape character. <p><u>Geology and Soils:</u></p> <ul style="list-style-type: none"> ● The extent of the A358 is situated adjacent to land dominated by grade 3 (potentially grade 3a of 3b) soils, with two small areas of grade 4 at the southern portion of the A358 and land associated with Venner's Water further north. ● There are approximately 25-30 different farm holdings located adjacent to the proposed scheme. ● The study area is a predominately rural setting however a number of potentially contaminative land uses have been identified, including historical landfills, sewage works, commercial activities and fuel storage sites and evidence of Made Ground of unknown quality. ● Six records of historical landfills have been identified within 500m of the study area, and two are noted to intersect the proposed scheme: Thornfalcon Refuse Tip at West Hatch Land Junction off-slip embankment of the east bound carriageway which accepted commercial and household wastes, located in a former railway cutting; and Ashill Bypass Site A Landfill at the crest of cutting, the facility accepted inert waste. <p><u>Road Drainage and Water Environment:</u></p> <ul style="list-style-type: none"> ● Surface water features, including main rivers: River Tone, Broughton Brook, Black Brook, River Isle and Shudrick Stream; ordinary water courses associated main river tributaries, channels and tributaries associated with West Sedgemoor, Fivehead River, River Ding, Venner's Water, Cad Brook and Back Stream; and multiple unnamed agricultural and highways drains. ● Groundwater features, such as secondary A, B and undifferentiated aquifers associated with Tone and North Somerset Stream. ● WFD waterbodies located within the South West River Basin District. ● Three licensed groundwater abstractions. ● The proposed scheme crosses areas of Flood Zones 2 and 3 associated with the aforementioned watercourses. ● The proposed scheme is in an area at risk of flooding from the Clatworthy and Luxhay Reservoirs located to the west of Taunton and from Chard Reservoir located to the north east of Chard.
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	<p><u>Landscape and Visual:</u></p> <ul style="list-style-type: none"> • The proposed scheme passes through three National Character Areas (NCA): NCA 140, Yeovil Scarplands; NCA 143, Mid Somerset Hills; and NCA 146, Vale of Taunton and Quantock Fringes. An additional NCA (NCA 147, Blackdowns) is located approximately 1.5 kilometers to the south west at its nearest point. • The proposed scheme passes through the following local landscape character areas (LLCA) from the Taunton Deane Landscape Character Assessment: 1a, Vale of Taunton Deane; 4a, Fivehead Farmed and Wooded Vale; and 5a, North Curry; and will also pass through the following Lower Lias Foothills and Lowland LLCA within Region 2 (Blackdown Hills Plateau Foothills and Valleys) of the Landscape of South Somerset character assessment. • Although there are no Tree Preservation Orders present within or adjacent to the proposed scheme, various non-designated trees are present along the A358. • Blackdown Hills AONB, located approximately 2.2km at nearest point, and specifically two viewpoints from the AONB: at Staple Hill and Castle Neroche. <p><u>Overview</u></p> <p>At this stage it is not predicted that environmental sites of sensitivity outside the UK will be affected, apart from the roads contribution to greenhouse gas emissions (see below).</p>
Potential impacts and Carrier	Environmental effects would derive from the physical introduction of new and widened A358 highway infrastructure into the receiving environment, and from vehicles (traffic) travelling on the highway network. Potential effects associated with noise, biodiversity, landscape and visual, flood risk and land use (land take) would be relative to the proposed scheme and would be focused within the adopted assessment study areas identified for these topics. Emissions to air (specifically greenhouse gases rather than air pollutants affecting local air quality) derived from vehicles travelling on new and improved sections of the highway network would be spread and dispersed by normal atmospheric processes and conditions. Such emissions have the potential to combine with greenhouse gas emissions associated with other developments within EEA states, and with identified cumulative developments.
Extent	The only potential transboundary environmental impact would be from greenhouse gas emissions, which could contribute to climatic changes on a global scale. Based on a review of the characteristics of the proposed scheme, it has been concluded that such changes to the existing A358 strategic highway network are unlikely to result in a significant contribution to global climate change.
Magnitude	<p>Total emissions associated with transport in the Somerset region were estimated by BEIS to be 3269 ktCO₂ in 2018, with 1,502 ktCO₂ attributable to transport (mainly roads). For context, total emissions in all of England in 2018 were 279,960ktCO₂ of which 105,399 ktCO₂e was attributable to transport.</p> <p>A review of the proposed scheme has concluded that there would likely be a negligible contribution to the UK's overall greenhouse gas emissions associated with changes of the type proposed, and accordingly negligible potential to contribute to global climate change when considered against emissions from other EEA States in a transboundary context (and with other identified cumulative developments).</p>
Probability	By virtue of its Nature, form and scale, the proposed scheme would result in greenhouse gas emissions. Greenhouse gases would principally derive from vehicle exhaust emissions during operation of the proposed scheme, with reduced emissions from plant, machinery and other vehicles during its construction (note that construction plant emissions would be in addition to existing vehicle

	emissions along the A358 as the road will remain open during construction).. Both increases and decreases in air quality (and greenhouse gas emissions) are likely to occur at different locations as a result of the proposed scheme implementation.
Duration	Greenhouse gas emissions are likely to occur over a long period of time, and would be predominantly associated with the operational stage of the proposed scheme where traffic would travel continuously on both new and improved sections of the highway network. Notwithstanding this, it is expected that improvements (reductions) in the levels of greenhouse gas emissions from individual vehicles and the vehicle fleet will be achieved in the medium to long term through technological advancements, and the UK's drive to decrease its dependency on carbon-based fuels such as diesel. Increasing percentage of electric vehicles in the vehicle fleet and improvements in electric vehicle technology will lead to an increased reduction in Greenhouse gas emissions. This is being framed by UK Government policy.
Frequency	In the short term, the pattern of greenhouse gas emissions is likely to be relatively constant, due to the proposed scheme forming part of the existing highway network and being in constant use. However, the volumes of greenhouse gas emissions will reduce over time as changes in the vehicle fleet to use non-fossil fuel fuels occurs.
Reversibility	The impact of greenhouse gas emissions is considered irreversible, as the highways improvements are unlikely to be decommissioned within the next 120 years.

Appendix B Major accidents and disasters screening matrix

Table B-1 Major accidents and disasters screening matrix (construction)

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
Construction Stage Risks						
Flooding	Extreme weather event Flash flooding Reservoir overtopping/failure	Designated Sites Local community Heritage Assets	Chapter 14: Road drainage and the water environment, states that the proposed scheme crosses areas of Flood Zones 2 and 3 associated with the following watercourses: <ul style="list-style-type: none"> Black Brook – proposed scheme passes through extensive areas of Flood Zones 2 and 3 at the western end of the scheme; West Sedgemoor Main Drain – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Meare Green; Fivehead River Main Channel 1 – proposed scheme crosses area of 	Fatality / injury to public Contamination of environmental receptor from wastewater (flooding) Damage to infrastructure	Chapter 14: Road drainage and the water environment outlines the following mitigation to be followed to reduce the flood risk during construction which should be detailed in the Construction Environmental Management Plan (EMP): <ul style="list-style-type: none"> Discharge of surface water runoff to watercourses and underlying aquifers; Presence of pollutants and sediment; Management of wastewater and foul discharge; 	No

¹⁵⁴ As defined by the National Risk Register of Civil Emergencies, Cabinet Office

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/644968/UK_National_Risk_Register_2017.pdf

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>Flood Zones 2 and 3 in the vicinity of Hatch Green;</p> <ul style="list-style-type: none"> • Fivehead River Main Channel 2 – proposed scheme crosses narrow extent of Flood Zones 2 and 3 in the vicinity of Capland; • Venner’s Water – proposed scheme crosses area of Flood Zones 2 and 3 in Kenny; and • River Ding Main Channels 1 and 2 – proposed scheme passes through area of Flood Zones 2 and 3 at eastern end of the scheme. <p>The floodplains of the River Tone (Associated with extensive areas of Flood Zones 2 and 3) extend into the study area at the western end of the proposed scheme. At the eastern end of the scheme, the study area encompasses significant extents of Flood Zones 2 and 3 associated with the floodplain of the River Isle. Within the study area and to</p>		<ul style="list-style-type: none"> • Fluvial, surface water and groundwater flood risk; • Appropriate storage and use of construction materials, fuels and solvents and equipment; • Management of liquid tars potentially present in the make-up of the existing alignment of the A358 and side roads affected; • Potential location and nature of contaminated materials along the alignment; and • Existing drainage infrastructure. <p>For mitigation for contamination of environmental receptor from wastewater (flooding) see Pollution Incidents section.</p>	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>the north west of the proposed scheme is an area at risk of flooding from reservoirs associated with the Clatworthy and Luxhay Reservoirs located to the west of Taunton. The area to the south west of the proposed scheme (within the study area) in the vicinity of Ilminster is also at risk of flooding from reservoirs associated with the Chard Reservoir located to the north east of Chard.</p> <p>In addition, the proposed scheme is crossed by numerous surface water flow paths that are designated as being associated with areas of high and medium surface water flood risk. Primarily these flow paths are located within the floodplains of all the ordinary watercourses crossed by the proposed scheme. At Ashill, there is also a surface water flow path, linked to the land drains present in Ashill Wood, that flows across the A358 and is</p>			

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>associated with low risk of surface water flooding.</p> <p>Moreover, areas of surface water flood risk, associated with natural topographical depressions, are also located along the route in the vicinity of Capland, Hatch Beauchamp and Meare Green.</p> <p>Moreover, the Somerset County Council Preliminary Flood Risk Assessment (PFRA) identifies that no significant incidents of groundwater flooding have been reported in the study area and across the county. During extreme rainfall events, areas of natural emergence may flow with increased discharges and represent a localised groundwater flooding hazard. However, there are no historical records of any such events in the study area.</p>			
Severe weather	Localised flooding	Designated sites	Ground collapse/landslides:	Fatality / injury to public	Ground collapse/landslides:	No

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
	Ground collapse/landslides and associated disruption to services (e.g. trees striking overhead cables)	Local community Heritage Assets	<p>Chapter 15: Climate Change considers the effects that an increase in frequency of severe weather events, including an increase in high temperatures and heatwaves, increase in droughts and increased frequency of heavy rainfall events, associated with climate change, may have on the resilience of the proposed scheme. As part of its baseline, it considers historical flooding events and areas at flood risk and potential geological hazards, such as subsidence, landslides.</p> <p>Chapter 10: Geology and soils also considers geological hazards, including subsidence and landslides, in its baseline as DMRB LA 114 states that historical events as a result of weather patterns and extreme weather events (i.e. landslides after heavy rainfall) shall be identified to provide an indication of past vulnerability.</p>	Damage to infrastructure	<p>Chapter 10: Geology and soils states that, during construction, material stockpiles and structures should be inspected before and after extreme weather events to ensure stability and incorporating such measures into materials management plans.</p> <p>Localised flooding: Chapter 14: Road drainage and the water environment outlines the following mitigation to be followed to reduce the flood risk during construction which should be detailed in the Construction Environmental Management Plan (EMP):</p> <ul style="list-style-type: none"> • Discharge of surface water runoff to watercourses and underlying aquifers; • Presence of pollutants and sediment; 	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>The shared baseline of these two chapters (Chapter 15: Climate Change and Chapter 10: Geology and soils) indicated one historical landslide had occurred 0.5km from the current A358 road alignment but that landslides were not commonly recorded within the proposed scheme boundary.</p> <p>Localised flooding: Chapter 14: Road drainage and the water environment, states that the proposed scheme crosses areas of Flood Zones 2 and 3 associated with the following watercourses:</p> <ul style="list-style-type: none"> • Black Brook – proposed scheme passes through extensive areas of Flood Zones 2 and 3 at the western end of the scheme; • West Sedgemoor Main Drain – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Meare Green; 		<ul style="list-style-type: none"> • Management of wastewater and foul discharge; • Fluvial, surface water and groundwater flood risk; • Appropriate storage and use of construction materials, fuels and solvents and equipment; • Management of liquid tars potentially present in the make-up of the existing alignment of the A358 and side roads affected; • Potential location and nature of contaminated materials along the alignment; and • Existing drainage infrastructure. 	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<ul style="list-style-type: none"> • Fivehead River Main Channel 1 – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Hatch Green; • Fivehead River Main Channel 2 – proposed scheme crosses narrow extent of Flood Zones 2 and 3 in the vicinity of Capland; • Venner’s Water – proposed scheme crosses area of Flood Zones 2 and 3 in Kenny; and • River Ding Main Channels 1 and 2 – proposed scheme passes through area of Flood Zones 2 and 3 at eastern end of the scheme. <p>The floodplains of the River Tone (Associated with extensive areas of Flood Zones 2 and 3) extend into the study area at the western end of the proposed scheme. At the eastern end of the scheme, the study area encompasses significant extents of Flood Zones 2 and</p>			

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>3 associated with the floodplain of the River Isle. Within the study area and to the north west of the proposed scheme is an area at risk of flooding from reservoirs associated with the Clatworthy and Luxhay Reservoirs located to the west of Taunton. The area to the south west of the proposed scheme (within the study area) in the vicinity of Ilminster is also at risk of flooding from reservoirs associated with the Chard Reservoir located to the north east of Chard.</p> <p>In addition, the proposed scheme is crossed by numerous surface water flow paths that are designated as being associated with areas of high and medium surface water flood risk. Primarily these flow paths are located within the floodplains of all the ordinary watercourses crossed by the proposed scheme. At Ashill, there is also a surface water flow</p>			

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>path, linked to the land drains present in Ashill Wood, that flows across the A358 and is associated with low risk of surface water flooding.</p> <p>Moreover, areas of surface water flood risk, associated with natural topographical depression, are also located along the route in the vicinity of Capland, Hatch Beauchamp and Meare Green.</p> <p>Moreover, the Somerset County Council Preliminary Flood Risk Assessment (PFRA) identifies that no significant incidents of groundwater flooding have been reported in the study area and across the county. During extreme rainfall events, areas of natural emergence may flow with increased discharges and represent a localised groundwater flooding hazard. However, there are no historical records of any such events in the study area.</p>			

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
Poor air quality	Construction dust Vehicle/plant exhaust fumes	Designated sites Local community	<p>Vehicle/plant exhaust fumes: Chapter 6: Air Quality states that there are three AQMAs in close proximity to the scheme. East Reach AQMA and Henlade AQMA were both declared in 2003 for exceedances of the annual mean NO₂ AQO. The East Reach AQMA is located approximately two kilometres west of the proposed scheme and the Henlade AQMA is located approximately 300 metres north of the proposed scheme. The A358 currently goes into the Henlade AQMA and the new alignment of the A358 for the proposed scheme will bypass the Henlade AQMA, which is expected to lead to improvements in local air quality at these locations. Yeovil AQMA was declared in 2002 for exceedances of the annual mean NO₂ AQO. It is located approximately 17 kilometres east of the proposed scheme and is not</p>	<p>Injury e.g. Breathing problems (especially in vulnerable groups) Plant and ecosystem damage</p>	<p>Vehicle/plant exhaust fumes: Chapter 6: Air Quality states that, should vehicle movements for construction traffic be screened into the assessment, the Air Quality assessment will detail mitigation measures required to reduce the impact on the local community receptors, including best practice mitigation measures such as:</p> <ul style="list-style-type: none"> • Using less polluting construction vehicles such as ensuring that HGVs meet Euro VI emissions standards which reduce NO_x emissions); • Defining haul routes along the proposed scheme to avoid villages and towns for hauling and deliver; and 	No

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>in the study area. With the construction works expected to last at least three years, construction emissions from vehicles and plant have the potential to exceed the two-year threshold defined in the DMRB LA 105 standards. This will be determined following receipt of vehicle movement data.</p> <p>Construction dust: Chapter 6: Air Quality states dust generated by construction works has the potential to cause nuisance to property, and very high levels of soiling can affect plants and ecosystems. There is the potential for dust nuisance on receptors within 200 metres of construction and haulage routes associated with the proposed scheme. This nuisance, which is separate from adverse effects on health, can arise through annoyance caused by the soiling of windows, cars, washing and other property. There is a potential for</p>		<ul style="list-style-type: none"> Minimise waste materials to reduce HGV movements. <p>Construction dust: Chapter 6: Air Quality states that, in accordance with DMRB LA 105, best practice mitigation measures must be put in place to ensure dust does not cause a nuisance to the local community or cause harm to ecological receptors. These may include:</p> <ul style="list-style-type: none"> Minimisation of areas stripped of vegetation. Revegetate earthworks as soon as possible; Wheel washes at construction sites to minimise transfer of mud onto the local highway network; Dampening down of dust generating activities and materials, including site roads during dry weather, in addition to 	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			adverse impacts for those receptors which could be directly affected by dust nuisance associated with proposed scheme works or construction vehicle traffic.		site monitoring (e.g. periodic visual inspections within and along site boundaries); <ul style="list-style-type: none"> • Ensuring vehicles entering and leaving sites are covered to prevent escape of materials during transport; • As far as possible, temporary roads should be hard surfaced to reduce dust generation; • Optimising placement of batching plant to avoid nuisance; • Reduce double handling of soils; • Road sweeping to be carried out on access roads and local roads to remove any material tracked out of the site; and • Management of stockpiled materials with the potential to generate dust by 	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
					rolling, covering and/or revegetating as soon as appropriate.	
Wildfires	Fire caused by construction activities or construction plant	Designated sites Local community Heritage Assets	The Forestry Commission Wildfire Statistics for England 2009-10 to 2016-17 ¹⁵⁵ states that the south west region experienced between 10,000-20,000 wildfires between 2009-10 to 2016-17, the lowest number by region in the UK. Of these, the vast majority occurred in open habitat, with only a very small number occurring in woodland and built-up area or gardens.	Fatality / injury to public Damage to infrastructure Damage to habitats and injury/fatality of species individuals Damage to heritage assets	Emergency plans will be written as part of the development of the proposed scheme, which would be agreed with Local Authorities, utilities and blue light authorities. Environmental Management Plan (EMP) will set out best practice measures with regards to storage of fuel and use of construction plant.	No
Widespread electricity failure	Damage to electricity infrastructure and utilities by construction activities leading to network outage	Local community and businesses	Utilities plans <u>outline the various utilities crossing the site, including multiple electricity cables.</u>	Fatality / injury to public	Emergency plans will be written as part of the development of the proposed scheme, which would be agreed with Local Authorities, utilities and blue light authorities. All machinery powered by mains electricity should have built in safety switches that help prevent	No

¹⁵⁵https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779468/FC_Wildfire_Statistics_for_England_2009_10_to_2016_17.pdf

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
					<p>accidents in the event of a power failure.</p> <p>The DMRB scheme design will include clash schedules for all utilities and therefore mitigate the risk of damage to utilities.</p>	
System failures	Damage to major sewer by construction machinery leading to the pollution of a watercourse or habitat	Designated sites	Utilities plans <u>outline the various utilities crossing the site. Chapter 10: Geology and soils identifies existing potential contaminated land sources, including those associated with utilities. See 'Pollution Incidents' section for further baseline information.</u>	Damage to designated sites	<p>See 'Pollution Incidents' for mitigation measures</p> <p>The DMRB scheme design will include clash schedules for all utilities and therefore mitigate the risk of damage to utilities.</p>	No
Pollution Incidents	<p>Pollution of a watercourse</p> <p>Ground contamination</p> <p>Release of ground gases/vapours</p>	<p>Designated sites</p> <p>Local community</p>	Chapter 10: Geology and soils outlines the existing potential contaminated land sources for which there is the potential that contaminants from contaminated land and landfills may impact on groundwater and surface water. Disturbance of these sources may cause an increase in leaching of contaminants in soils and	<p>Fatality / injury to public</p> <p>Damage to designated sites and protected species</p>	<p>Pollution of a watercourse and ground contamination:</p> <p>Chapter 11: Road drainage and the water environment details the likely key mitigation measures which are anticipated as part of the Environmental Management Plan (EMP)</p>	No

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>mobilising of contaminants along new or existing surface or sub-surface pollution pathways. This may lead to the quality of surface waters and groundwater aquifers being impacted through runoff, infiltration and vertical and horizontal movement of contaminated groundwater and leachate:</p> <ul style="list-style-type: none"> • former Thornfalcon Refuse Tip/Thornfalcon Tip as it intersects the proposed slip embankment; • former inert Ashill Bypass Site A Landfill is located directly on the route corridor; • Off line bulk fuel storage/fuel stations; former Ashill petrol filling station (PFS) (Stewley Cross) and Shell Services, Horton Cross; • unknown made ground at former Great Western Railway (GWR) cutting on line at West Hatch Lane; 		<p>to reduce the likelihood of pollution pathways:</p> <ul style="list-style-type: none"> • Discharge of surface water runoff to watercourses and underlying aquifers; • Presence of pollutants and sediment; • Management of wastewater and foul discharge; • Fluvial, surface water and groundwater flood risk; • Appropriate storage and use of construction materials, fuels and solvents and equipment; • Management of liquid tars potentially present in the make-up of the existing alignment of the A358 and side roads affected; • Potential location and nature of contaminated 	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<ul style="list-style-type: none"> • commercial industrial site; Foresters Garden Buildings north west of West Hatch Lane, manufacturers of timber products; • Other landfills in the study area i.e. nr Dairy Farm; • former Butlers Fuel Depot, off-line, Kenny Lane, Ashill; • Texaco service station at Mattock’s Tree Hill; • Hatch Green Garage and PFS at Hatch Green; • depot at Greenway Lane • Farm yards (potential contamination sources include fuel tanks and slurry pits); • sewage works north of the alignment at Ashill and a second southwest at Horton Cross; • Other commercial sites include a builder’s yard at Hatch Beauchamp and used motorhome dealer at Mattock’s Tree Hill ; and • presence of made ground associated with existing 		<p>materials along the alignment; and</p> <ul style="list-style-type: none"> • Existing drainage infrastructure. • Surface water and groundwater will be monitored, as part of the ground investigation works, to enable assessment of the potential impact of the scheme on groundwater and surface water. <p>Release of ground gases/vapours: Chapter 10: Geology and soils states that remedial works will be undertaken where risk from land contamination to human health and/or controlled waters is assessed as high or moderate eg: associated with landfill sites (or sites identified following the GI/SI which may identify areas of existing contamination) and control measures will be implemented to</p>	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>road construction and the immediate environment of the route corridor, infilled disused quarries and former gravel pits.</p> <p>Chapter 11: Road drainage and the water environment states that groundwater vulnerability across the route of the proposed scheme predominantly varies between high and medium-high. Areas designated as high and medium-high can easily transmit pollution to groundwater and are characterised by high leaching soils and the absence of low permeability superficial deposits. In the vicinity of Ashill there is a small area of Medium/Unproductive groundwater vulnerability. Areas designated as medium offer intermediate groundwater protection and areas identified as unproductive are associated with low permeability bedrock or superficial deposits that</p>		<p>mitigate potential effects from gas migration, dust / vapour generation.</p> <p>Pollution events as a result of road traffic will be considered within the Highways Agency Water Risk Assessment Tool (HAWRAT). Balancing ponds that show a risk in HAWRAT will have a pollution control system applied to mitigate risk to the water environment.</p>	

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>naturally offer protection to any underlying aquifers.</p> <p>During the construction works the following pollution impacts may arise:</p> <ul style="list-style-type: none"> • Creation of pollution pathways to the surface water and groundwater WFD waterbodies and surface watercourses during works to construct the proposed scheme. Any earthworks will pose a particular risk to groundwater WFD waterbodies; • Release of sediment, silt and construction related pollutants (e.g. fuels, lubricants and waterproofing materials) particulates and other materials into the local watercourses during routine construction activities; and • Mobilisation of groundwater contaminants, remaining from historical and associated with current 			

Risk Event ¹⁵⁴	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>industrial and agricultural land use, as a result of earthworks activities.</p> <p>Ground gases /vapours may also be associated with the existing historical landfills at Thornfalcon/nr Dairy Farm which could migrate to a small number of commercial/residential properties in close proximity to the proposed scheme. However, the current scheme design suggests there would be limited interaction with the landfills. Vapours could also be associated with former fuel sites where there is residual contamination which could also migrate to adjacent properties.</p>			
Unexploded Ordnance (UXO)	Disturbance of unknown UXO as a result of construction activity leading to explosion	Designated sites Local community Heritage Assets	Chapter 10: Geology and soils states that an unexploded ordnance (UXO) pre-desk study assessment was completed by Zetica and has identified the site to be at low UXO hazard level meaning no further UXO investigation is required.	N/A	N/A	No

Table B-2 Major accidents and disasters screening matrix (operation)

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
Operation stage risks						
Flooding	<p>Extreme weather event</p> <p>Flash flooding</p> <p>Reservoir overtopping/failure</p>	<p>Designated sites</p> <p>Local community</p> <p>Heritage Assets</p>	<p>Chapter 14: Road drainage and the water environment, states that the proposed scheme crosses areas of Flood Zones 2 and 3 associated with the following watercourses:</p> <ul style="list-style-type: none"> • Black Brook – proposed scheme passes through extensive areas of Flood Zones 2 and 3 at the western end of the scheme; • West Sedgemoor Main Drain – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Meare Green; • Fivehead River Main Channel 1 – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Hatch Green; • Fivehead River Main Channel 2 – proposed scheme crosses narrow 	<p>Fatality / injury to public</p> <p>Contamination of environmental receptor from wastewater (flooding)</p> <p>Damage to infrastructure</p>	<p>Chapter 11: Road drainage and the water environment states the following mitigation will be employed:</p> <ul style="list-style-type: none"> • A suitable drainage design for the proposed scheme will be completed in accordance with DMRB CG501 Design of highway drainage systems and DMRB LA113 Road drainage and the water environment and in line with best practice for sustainable drainage design. This will provide appropriate measures to attenuate and treat (including PCU's where necessary) surface water runoff from the proposed scheme. 	No

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>extent of Flood Zones 2 and 3 in the vicinity of Capland;</p> <ul style="list-style-type: none"> • Venner's Water – proposed scheme crosses area of Flood Zones 2 and 3 in Kenny; and • River Ding Main Channels 1 and 2 – proposed scheme passes through area of Flood Zones 2 and 3 at eastern end of the scheme. <p>The floodplains of the River Tone (Associated with extensive areas of Flood Zones 2 and 3) extend into the study area at the western end of the proposed scheme. At the eastern end of the scheme, the study area encompasses significant extents of Flood Zones 2 and 3 associated with the floodplain of the River Isle. Within the study area and to the north west of the proposed scheme is an area at risk of flooding from reservoirs associated with the Clatworthy and Luxhay Reservoirs located to the west of Taunton. The area to the south west of the proposed scheme (within the</p>		<ul style="list-style-type: none"> • Crossing of watercourses will be minimised and only occur where essential; • The length of crossings along the watercourse will be kept to a minimum; • The width and height will be based on existing crossings to maintain baseline conditions, although an iterative assessment process will be applied so that impacts in terms of flood risk, water quality and hydro-geomorphology can be reduced as far as it technically feasible; • Any new crossings (including clear span bridges or culverts) would be designed to minimise effects on the existing flow regime and hydro-geomorphological conditions of the channel; 	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>study area) in the vicinity of Ilminster is also at risk of flooding from reservoirs associated with the Chard Reservoir located to the north east of Chard.</p> <p>In addition, the proposed scheme is crossed by numerous surface water flow paths that are designated as being associated with areas of high and medium surface water flood risk. Primarily these flow paths are located within the floodplains of all the ordinary watercourses crossed by the proposed scheme. At Ashill, there is also a surface water flow path, linked to the land drains present in Ashill Wood, that flows across the A358 and is associated with low risk of surface water flooding.</p> <p>Moreover, areas of surface water flood risk, associated with natural topographical depression, are also located along the route in the vicinity of Capland, Hatch Beauchamp and Meare Green.</p>		<ul style="list-style-type: none"> Channel diversions and realignments will be designed to meet current standards and match existing conditions as a minimum (standards applied may lead to better channels) in order to maintain existing flood risk, water quality and hydro-geomorphological conditions. Measures that help reduce local flood risk and enhance hydro-geomorphology, habitat establishment and biodiversity will be applied, in consultation with Highways England, Environment Agency and Natural England. An FRA will be completed in line with NPPF guidance to define baseline flood risk, assess the impact of the proposed scheme on flood risk, provide a detailed 	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>Moreover, the Somerset County Council Preliminary Flood Risk Assessment (PFRA) identifies that no significant incidents of groundwater flooding have been reported in the study area and across the county. During extreme rainfall events, areas of natural emergence may flow with increased discharges and represent a localised groundwater flooding hazard. However, there are no historical records of any such events in the study area.</p>		<p>description of the drainage design and identify any additional mitigation required to ensure no significant effects on flood risk.</p> <p>For mitigation for contamination of environmental receptor from wastewater (flooding) see Pollution Incidents section.</p>	
Severe weather	<p>Localised flooding</p> <p>Ground collapse/landslides and associated disruption to services (e.g. trees striking overhead cables)</p>	<p>Designated sites</p> <p>Local community</p> <p>Heritage Assets</p>	<p>Ground collapse/landslides: Chapter 15: Climate Change considers the effects that an increase in frequency of severe weather events, including an increase in high temperatures and heatwaves, increase in droughts and increased frequency of heavy rainfall events, associated with climate change, may have on the resilience of the proposed scheme. As part of its baseline, it considers historical flooding events and areas at</p>	<p>Fatality / injury to public</p> <p>Damage to infrastructure</p>	<p>Chapter 15: Climate Change will consider the effects that severe weather events, associated with climate change, may have on the resilience of the proposed scheme. The current safety regulations controlling the design of new roads means the proposed scheme will be safer in extreme rainfall events and other severe weather than the current</p>	No

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>flood risk and potential geological hazards, such as subsidence, landslides.</p> <p>Chapter 10: Geology and soils also considers geological hazards, including subsidence and landslides, in its baseline as DMRB LA 114 states that historical events as a result of weather patterns and extreme weather events (i.e. landslides after heavy rainfall) shall be identified to provide an indication of past vulnerability.</p> <p>The combined baseline of these two chapters indicated 1 historical landslide had occurred 0.5km from the current A358 road alignment but that they were not commonly recorded within the proposed scheme boundary. As part of the baseline, the chapter states that the GeoIndex (BGS, 2020) and the GeoClimateUKCP09 dataset provides information on the change in susceptibility of subsidence across the UK due to a changing climate and the associated changes in soil</p>		<p>road, and other roads within the area.</p> <p>Chapter 10: Geology and soils states the following mitigation should be employed during operation in order to reduce the risk of severe weather contributing to flooding issues, subsidence or landslides, and the associated disruption to services this can cause:</p> <ul style="list-style-type: none"> • designing drainage infrastructure with sufficient allowance to account for climate change and to withstand extreme rainfall events; • avoiding or reducing the number of structures constructed within the floodplain and provision of flood compensation storage areas; • selecting materials with appropriate durability requirements for design to ensure resilience to thermal 	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>moisture. The data indicates that subsidence is considered ‘improbable’ under ‘average’ soil humidity conditions between 2030 to 2080 period for the majority of the proposed scheme. The section of the proposed scheme at the Horton Cross junction near Ilminster indicates that subsidence is considered ‘possible’ under ‘average’ soil humidity conditions between for the 2030 to 2080 period.</p> <p>Localised flooding: Chapter 14: Road drainage and the water environment, states that the proposed scheme crosses areas of Flood Zones 2 and 3 associated with the following watercourses:</p> <ul style="list-style-type: none"> • Black Brook – proposed scheme passes through extensive areas of Flood Zones 2 and 3 at the western end of the scheme; • West Sedgemoor Main Drain – proposed scheme crosses area of Flood 		<p>loading from increases in peak summer temperatures;</p> <ul style="list-style-type: none"> • using permeable pavements to alleviate flooding during extreme rainfall events; and • specifying regular inspection of drainage infrastructure and structures to assess the condition after extreme weather events. <p>Chapter 10: Geology and soils also considers vegetation failure in the context of future climate change scenarios, where increased frequency of dry periods could lead to plant failures which could result in fallen trees. As mitigation, it recommends maintaining soft landscape features following establishment through watering in periods of dry weather and carrying out periodic inspections to</p>	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>Zones 2 and 3 in the vicinity of Meare Green;</p> <ul style="list-style-type: none"> • Fivehead River Main Channel 1 – proposed scheme crosses area of Flood Zones 2 and 3 in the vicinity of Hatch Green; • Fivehead River Main Channel 2 – proposed scheme crosses narrow extent of Flood Zones 2 and 3 in the vicinity of Capland; • Venner's Water – proposed scheme crosses area of Flood Zones 2 and 3 in Kenny; and • River Ding Main Channels 1 and 2 – proposed scheme passes through area of Flood Zones 2 and 3 at eastern end of the scheme. <p>The floodplains of the River Tone (Associated with extensive areas of Flood Zones 2 and 3) extend into the study area at the western end of the proposed scheme. At the eastern end of the scheme, the study area encompasses significant extents of Flood Zones 2 and 3 associated with</p>		monitor the establishment of new planting.	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>the floodplain of the River Isle. Within the study area and to the north west of the proposed scheme is an area at risk of flooding from reservoirs associated with the Clatworthy and Luxhay Reservoirs located to the west of Taunton. The area to the south west of the proposed scheme (within the study area) in the vicinity of Ilminster is also at risk of flooding from reservoirs associated with the Chard Reservoir located to the north east of Chard.</p> <p>In addition, the proposed scheme is crossed by numerous surface water flow paths that are designated as being associated with areas of high and medium surface water flood risk. Primarily these flow paths are located within the floodplains of all the ordinary watercourses crossed by the proposed scheme. At Ashill, there is also a surface water flow path, linked to the land drains present in Ashill Wood, that flows across the A358 and is associated with</p>			

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>low risk of surface water flooding. Moreover, areas of surface water flood risk, associated with natural topographical depression, are also located along the route in the vicinity of Capland, Hatch Beauchamp and Meare Green.</p> <p>Moreover, the Somerset County Council Preliminary Flood Risk Assessment (PFRA) identifies that no significant incidents of groundwater flooding have been reported in the study area and across the county. During extreme rainfall events, areas of natural emergence may flow with increased discharges and represent a localised groundwater flooding hazard. However, there are no historical records of any such events in the study area.</p> <p>Potential operational impacts in relation to flooding are as follows:</p> <ul style="list-style-type: none"> • Permanent impingement into the fluvial flood zones of the surface water 			

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>courses crossed by the proposed scheme;</p> <ul style="list-style-type: none"> • Reduced infiltration and increased surface water runoff due to increased impermeable surfaces; and • Changes to local groundwater flows and levels and potential susceptibility to groundwater flooding as a result of earthworks activities. <p>In addition, based on the UKCP18 data for the South West of England region for the period up to 2099, under the high emissions scenario and for a 50% probability of occurrence, mean summer and winter temperatures are projected to increase by up to 5.6°C and 3.4°C, respectively, whereas mean rainfall is projected to increase by up to 28% during winter and decrease by up to 44% during summer.</p>			
Poor air quality	Emissions from vehicles	Designated sites	<p>Vehicle exhaust fumes: Chapter 6: Air Quality states that there are three AQMAs in</p>	Injury eg. Breathing problems	Chapter 6: Air Quality states that the PCF Stage 2 assessment concluded	No

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
		Local community	<p>close proximity to the scheme. East Reach AQMA and Henlade AQMA were both declared in 2003 for exceedances of the annual mean NO₂ AQO. The East Reach AQMA is located approximately two kilometres west of the proposed scheme and the Henlade AQMA is located approximately 300 metres north of the proposed scheme. The A358 currently goes into the Henlade AQMA and the new alignment of the A358 for the proposed scheme will bypass the Henlade AQMA, which is expected to lead to improvements in air quality. Yeovil AQMA was declared in 2002 for exceedances of the annual mean NO₂ AQO. It is located approximately 17 kilometres east of the proposed scheme and is not in the study area.</p> <p>The proposed scheme has the potential to directly affect ambient concentrations of NO₂ for human receptors during the operational phase. It also has the potential to directly affect</p>	Plant and ecosystem damage	<p>that none of the human receptors along the PCF Stage 2 ARN were predicted to exceed the annual mean AQO for NO₂ in the opening year DS scenario. It was determined that the proposed scheme would result in a 'large' improvement (i.e. a significant benefit). The predicted NO_x concentrations at all ecological receptors were below 30µg/m³.</p> <p>It should be noted, however, that the PCF Stage 2 assessment was based on DMRB HA207/07 and associated IANs which has been superseded by DMRB LA 105. The air quality assessment will be carried out in accordance with DMRB LA 105 in the PEIR and EAR but it is unlikely that the proposed scheme will be assessed as high risk.</p>	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			ambient concentrations of NOx and Nitrogen deposition during the operational phase for ecological receptors.		On the basis that the proposed scheme would have a significant positive impact (due to relieving congestion and moving the road away from the Henlade AQMA) on local air quality concentrations, no specific mitigation or Air Quality Action Plans are expected to be required for the operation of the proposed scheme.	
Pollution Incidents	Pollution of a watercourse Release of ground gases/vapours	Designated sites Local community	Chapter 10: Geology and soils states that, during the operational stage, potential contaminated land linkages would have been broken due to the construction of the road and therefore no additional impacts are predicted in relation to ground and surface water receptors from contaminated land. Chapter 11: Road drainage and the water environment states that groundwater vulnerability across the route of the proposed scheme predominantly varies between high and medium-high. Areas designated as high and	Fatality / injury to public Damage to designated sites	Pollution of a watercourse: Chapter 11: Road drainage and the water environment details the likely key mitigation measures which are anticipated to be required during operation of the proposed scheme: <ul style="list-style-type: none"> A suitable drainage design for the proposed scheme will be completed in accordance with DMRB CG501 Design of highway drainage systems and DMRB LA113 Road drainage and the water 	No

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>medium-high can easily transmit pollution to groundwater and are characterised by high leaching soils and the absence of low permeability superficial deposits. In the vicinity of Ashill there is a small area of Medium/Unproductive groundwater vulnerability. Areas designated as medium offer intermediate groundwater protection and areas identified as unproductive are associated with low permeability bedrock or superficial deposits that naturally offer protection to any underlying aquifers.</p> <p>Ground gases /vapours may be associated with the existing historical landfills at Thornfalcon/nr Dairy Farm which could migrate to a small number of commercial/residential properties in close proximity to the proposed scheme. However, the current scheme design suggests there would be limited interaction with the landfills. Vapours could also be</p>		<p>environment and in line with best practice for sustainable drainage design. This will provide appropriate measures to attenuate and treat (including PCU's where necessary) surface water runoff from the proposed scheme.</p> <ul style="list-style-type: none"> • Crossing of watercourses will be minimised and only implemented where essential; • The length of crossings along the watercourse will be kept to a minimum; • The width and height will be based on existing crossings to maintain baseline conditions, although an iterative assessment process will be applied so that impacts in terms of flood risk, water quality and hydro-geomorphology can be reduced as far 	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
			<p>associated with former fuel sites where there is residual contamination which could also migrate to adjacent properties.</p> <p>Chapter 11: Road drainage and the water environment states during operation of the proposed scheme, there is the potential for a release of highway related pollutants to the WFD waterbodies and surface water courses that cross the proposed scheme. These may include hydrocarbons, particulates and maintenance materials.</p>		<p>as it technically feasible; and</p> <ul style="list-style-type: none"> • Any new crossings (including clear span bridges or culverts) would be designed to minimise effects on the existing flow regime and hydro-geomorphological conditions of the channel. • Channel diversions and realignments will be designed to match existing conditions to maintain existing flood risk, water quality and hydro-geomorphological conditions. Although measures that help reduce local flood risk and enhance hydro-geomorphology, habitat establishment and biodiversity will be applied, in consultation with Highways England, Environment Agency and Natural England. 	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
					<ul style="list-style-type: none"> • An FRA will be completed in line with NPPF guidance to define baseline flood risk, assess the impact of the proposed scheme on flood risk, provide a detailed description of the drainage design and identify any additional mitigation required to ensure no significant effects on flood risk. • A WFD Compliance Assessment will be completed in line with stakeholder requirements to provide a detailed description of the WFD waterbodies in the study area, assess the impact of the proposed scheme on WFD waterbodies and identify any additional mitigation requirements. • In line with DMRB LA113 Road drainage and the water environment, 	

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
					<p>enhancement opportunities will be considered in relation to water quality improvements, improvements to WFD waterbodies, flood risk and resilience to climate change.</p> <ul style="list-style-type: none"> • Pollution events as a result of road traffic will be considered within the Highways Agency Water Risk Assessment Tool (HAWRAT). <p>Release of ground gases/vapours: Chapter 10: Geology and soils states that control measures will be implemented to mitigate potential effects from gas migration, dust / vapour generation.</p>	
Attacks	Terrorist attacks on crowded places	Local community	The UK's threat level is currently categorised as severe meaning an attack is highly likely ¹⁵⁶ .	Fatality / injury to public	Emergency plans will be written as part of the development of the proposed scheme, which	No

¹⁵⁶ <https://www.mi5.gov.uk/threat-levels>

Risk Event	Source and /or Pathways	Receptor	Baseline Conditions	Reasonable worst consequence if event did occur	Mitigation	Could this lead to a major accident and disaster with mitigation in place?
	Terrorist attacks on transport systems Terrorist attacks on infrastructure Chemical, biological, radiological and nuclear attacks				would include the plans for a proposed coordination of emergency services if the need arose.	

Appendix C Species survey scope and methodology

Table C-1 Ecology Survey Scope for 2021

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
Desktop records	<p>The Somerset Environmental Records Centre (SERC) will be contacted to capture updates to records received in 2016</p> <p>Environment Agency (EA) ecology and fish data explorer to be accessed to capture updates to the search for aquatic ecological receptors undertaken in 2020</p>	<ul style="list-style-type: none"> Records within a 2km buffer of the Proposed Scheme footprint to be obtained Identify EA sampling sites on watercourses with connectivity to the site up to a 3km buffer 	<ul style="list-style-type: none"> SERC records initially obtained in 2016, to be updated prior to statutory consultation EA sampling data last reviewed in 2020, to be updated during 2021
Phase 1 and UK habitat classification	<p>Walkover and mapping of all habitats following standard methods as described in the Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017) and the Phase 1 Habitat Survey Methodology (JNCC, 2010).</p> <p>INNS will be identified and mapped during the Phase 1 survey. Habitats will additionally be classified against UK habitats classification system (Butcher et al., 2020) and condition scored using criteria within the Biodiversity Metric 2.0 Technical Supplement (Crosher et al., 2019).</p> <p>Note: Biodiversity Metric 2.0 Technical Supplement is a beta version and may be subject to update during survey period, in which circumstance the updated version will be utilised for condition scoring criteria.</p>	<ul style="list-style-type: none"> Survey up to 250m from proposed scheme Can be conducted any time, but optimal period March-October 	<ul style="list-style-type: none"> Phase 1 survey conducted up to 500m buffer of the route options (prior to selection of pink modified route) in 2016 Phase 1 and UK habitats classification to be updated in 2021 up to 250m from the proposed scheme and to cover land where access was not previously granted
National Vegetation Classification NVC – grassland and woodland habitats	<p>NVC surveys follow standardised methodology for woodlands (Rodwell, 1990) and grasslands (Rodwell, 1992) using up to date nomenclature for vascular plants (Stace, 2019).</p> <p>For woodland NVC, a 50x50m plot is strategically placed within the habitat parcel, classifying the canopy and understorey compositions, including relative abundance (Domin scale) percentage cover and height. A subset 4x4m quadrat is then used to assess the ground flora (extended to 10x10m where</p>	<ul style="list-style-type: none"> Woodland and grassland habitats up to 250m from the proposed scheme to assess for potential air quality impacts Woodland NVC survey period April-June, grassland NVC period May-August 	<ul style="list-style-type: none"> Surveys conducted in 2017 and 2019 Initial survey of identified woodland and grassland habitats in 2021 where access was not previously granted

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
	<p>vegetation sparse). Key aspects of the woodland management and condition are also noted.</p> <p>For grassland NVC, five 2x2m quadrats are undertaken within each homogenous habitat parcel, with relative abundance of each species again recorded against the Domin scale. The data is subsequently combined to produce a floristic table for each type of vegetation. Key aspects of the grassland management and condition are also noted.</p>		
Hedgerows	<p>Hedgerow surveys are conducted as per standard methodology (Hedgerow Survey Handbook, 2007) for linear features meeting the qualifying criteria for hedgerows in order to determine their 'Importance' status.</p> <p>Representative 30m sections are subject to detailed survey for each 100m of continuous hedgerow. The detailed survey records information which is assessed against a number of potential 'Importance' qualifying criteria, relating to the hedgerow composition, ecologically associated features and potential to support certain protected and/or notable species.</p>	<ul style="list-style-type: none"> • Hedgerows that fall within 50m of the proposed scheme, including extension beyond 50m where hedgerows fall only partially within buffer • Conducted at any time of year but optimal May-July 	<ul style="list-style-type: none"> • Surveys conducted 2017 to 2020 • Reaffirmation of existing results during Phase 1 in 2021 • Targeted survey of hedgerows within areas where access was not previously granted
River Habitat	<p>River Habitat Survey (RHS) and River Corridor Survey (RCS) to be undertaken concurrently.</p> <p>In line with standard methodology (Environment Agency, 2003) RHS surveys comprise a series of spot checks of 10 1m (physical attributes) and 10m (vegetation and land use) wide transects across the channel at 50m intervals, recording physical structure, artificial modification and vegetation structure of banks and channel. The survey also records the total number of physical features, land-use, bank profile and structure, extent of trees, extent of channel features, channel dimensions, flow features and features of special interest. RHS results are entered into the RHS ToolBox (Naura, 2017) to allow the habitat modification score, and habitat quality assessment score, to be calculated.</p> <p>RCS standardised methodology (National Rivers Authority, 1992) is used to characterise and assess the physical structure</p>	<ul style="list-style-type: none"> • 500m stretch of watercourse with centre point where proposed scheme crosses the watercourse • Conducted between May and September 	<ul style="list-style-type: none"> • Survey undertaken on the River Ding in 2020 • All watercourses subject to direct impacts, such as realignment, as a result of the proposed scheme are to be subject to survey in 2021

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
	of the surveyed reach. The RCS generally describes the stretch of a river, its bank and adjacent land within 50m of the bank top.		
Badger	<p>Walk over survey in key habitats (woodlands, field edges etc.) to identify potential setts and habitats (Harris et al., 1989). If deemed necessary and based on results of sett identification survey, setts will be monitored to determine sett classification (main breeding sett; annex; subsidiary; or outlier) and whether the sett is in active use (Harris et al., 1989).</p> <p>Based on results of sett identification survey and likely impact, a badger territory mapping survey will be conducted by leaving peanuts (baited with different coloured balls and mixed in syrup / molasses) at main setts and other appropriate locations (Delahey et al., 2000). The bait would be provided daily for at least 10 -21 consecutive days and the area searched each day for latrines, which would indicate the territorial area of each main sett.</p>	<ul style="list-style-type: none"> • Walk over surveys of suitable land up to 500m from the proposed scheme footprint for offline areas and 250m for online areas • Territory mapping of all main setts identified within the ZOI where access agreed • Walk over for field signs can be conducted any time, territory mapping restricted to spring (optimal) and autumn (secondary) 	<ul style="list-style-type: none"> • Walkover and field sign surveys between 2017 and 2020, followed by territory mapping in 2020 • Walkover surveys to identify field signs in areas where access was not previously granted, with continual updating of incidental records • Update bait-marking to fill in gaps where main setts omitted and access previously denied.
Barn owl	Barn owl habitat will be surveyed in accordance with Shawyer (2011). This is a four-stage process; an initial desktop study, stage 1 field surveys to scope habitats and broadly define habitat features of potential value, stage 2 field surveys to identify potential nest sites, active roosts and potential foraging and commuting habitat, and lastly, stage 3 surveys to confirm the presence of occupied breeding sites.	<ul style="list-style-type: none"> • Initial desktop study to 2km • Stage 1-3 surveys will only be undertaken up to 500m from offline sections (a deviation from best practice but considered sufficient to provide a robust baseline and consistent with the approach on other HE schemes). • Stage 1 and 2 can be undertaken at any time. Stage 3 surveys should avoid March to May when young may be more susceptible to disturbance. 	<ul style="list-style-type: none"> • Stage 1-3 surveys undertaken in 2017, with additional land surveyed in 2018 • Stage 1 and 2 surveys to be undertaken in 2021, with targeted stage 3 surveys of features where impacts to barn owl are anticipated

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
Breeding birds	Key habitats within 250m of the proposed scheme have been identified using aerial maps and Phase 1 habitat data. Breeding bird surveys comprise walking pre-determined (though partially flexible) transects through habitats with the potential to be impacted by the Proposed Scheme. Surveys will be undertaken following Common Bird Census and Breeding Bird Survey (Bibby, 2000). A number of semi-fixed transects encompassing key habitats will be visited once a month for four months between March and June. Transects will be completed by pairs of experienced ornithologists commencing at dawn and finishing before midday.	<ul style="list-style-type: none"> • Suitable habitats up to 250m • Mid-March to June 	<ul style="list-style-type: none"> • Full surveys undertaken in 2017 and partial surveys in 2020 • Full resurvey of whole route in 2021 survey season
Wintering birds	Field surveys are conducted following guidance from British Trust for Ornithology Winter Farmland Bird Survey (Gillings, et al., 2008). The purpose of the survey is identify the importance of habitats around the proposed scheme for target bird species, defined as: species listed as qualifying features of Special Protection Areas (SPA) and Ramsar sites with identified impact pathways; winter farmland birds; waders and waterfowl; and uncommon bird species, using professional judgement. Pre-defined transects encompassing suitable wintering habitats are surveyed three times by experienced ornithologists capable of identifying bird species by both sight and calls.	<ul style="list-style-type: none"> • Transects cover habitats up to 500m from the proposed scheme • Surveys timed between October and March (optimal months November to February) 	<ul style="list-style-type: none"> • Surveys completed during winter 2020/21
Hazel dormouse	Habitat assessment of all potentially suitable habitat for dormice (e.g. scrub, woodland, hedgerows), followed by a combined nest tube and nest box survey of selected suitable habitat parcels. Tubes are installed and checked once per month as per best practice guidance (Bright et al., 2006). The number of tubes will be appropriate for the habitats to be surveyed, with at least ten tubes in each habitat parcel. Checks will ensure that 20 index points are achieved to ascertain presence / likely absence.	<ul style="list-style-type: none"> • Suitable connective habitats up to 250m from proposed scheme • Habitat assessment any time but optimal during spring/summer • Nest tube survey April to October 	<ul style="list-style-type: none"> • Habitat assessment undertaken in 2016 with nest tube surveys conducted in 2017 • Updated habitat assessment followed by full survey utilising nest tubes and boxes in 2021 targeted where impact to habitat anticipated. • Nest tube and box deployment in March 2021, prior to survey season

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
<p>Bats (activity and roosts)</p>	<p><u>Roosts</u> All bat surveys carried out with reference to standard survey methodology (Collins, 2016). Ground roost assessments for trees, buildings bridges/culverts were undertaken in accordance with Collins, 2016. Trees identified as having potential to support roosting bats (as well as previously confirmed roosts) will be subject to climbing inspections where it is safe to do so. Climbers will inspect potential roost features internally using an endoscope, with the roosting potential superseding the ground level assessment. Climbers will also note indicative signs of use by bats (e.g. droppings, presence of live or dead bats). Buildings directly impacted by the scheme were also subject to internal inspection, including DNA analysis of droppings where identified. The final roosting potential will to inform the need for emergence/re-entry surveys throughout the active season. In order to determine roost utilisation and classify roost status:</p> <ul style="list-style-type: none"> • Buildings/structures with low potential will be subject to a single survey, moderate potential two surveys, and high and confirmed roosts three surveys. • Trees with low potential will not be surveyed, moderate potential will be subject to two surveys and high or confirmed potential three surveys. <p>To supplement emergence/re-entry surveys, radiotracking surveys are also used to identify roosts. This involves trapping targeted bat species at specific locations of significance in relation to the proposed scheme, fitting with radio tags and tracking them to roosting locations the following morning. Specific surveys will additionally be carried out during the winter months of building and tree features that have been previously scoped as having potential to support hibernating bats. Internal building inspections are led by a Natural England Class 2 bat licence holder.</p> <p><u>Activity</u></p>	<ul style="list-style-type: none"> • Trees and structures within 100m of the proposed scheme assessed for roosting potential (any time of year) • Aerial roost (tree climbing) inspection surveys on trees with moderate roost potential within 20m of the scheme and high roosting potential within 100m of the scheme. • Trees and buildings subsequently subject to emergence / return surveys, all moderate trees or buildings within 20m and all high trees/buildings within 100m of the proposed scheme. Surveys undertaken during optimal active season of May-September. • Radiotracking undertaken at targeted locations of import to bat species in relation to the proposed scheme (during active season, but avoiding sensitive breeding periods) • Hibernation surveys to 100m, during the winter months (December-February) 	<ul style="list-style-type: none"> • Identification and classification of roosts undertaken at various times 2017-2019 • Updated roost classification surveys for out of data or incomplete features during 2021 active season. All previously confirmed roosts to be subject to repeat survey in 2021. • Trapping undertaken at key location in 2017 and trapping and radiotracking undertaken in 2018 and 2020 • Additional radiotracking at key locations (access permitting) and potentially one in September (post-breeding) depending on survey findings on transect 14 (access not previously available). • Potential requirement for swarming surveys at key locations. • Any buildings, bridges/culverts with hibernation roost potential will be surveyed in winter 2020/21. • Activity transects and deployment of static

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
	<p>Bat activity surveys in the form of walked transects will be undertaken along pre-determined routes. Eleven transects designed to be representative of bat foraging and commuting habitats along the scheme will be walked by a team of two ecologists stopping at listening points at regular intervals during the survey period. Each transect will be walked by a team of two ecologists stopping for 10, 5-minute spot checks at pre-determined stopping locations. These transects will be walked once a month (April-October). Transects will be walked at a steady pace and the direction of passage alternated each time the route was walked. All surveys to be undertaken in suitable weather conditions (start temperature of 10°C or above, no rain or strong winds), as defined in Collins (2016).</p> <p>Three static bat detectors will be deployed for each activity transect, in accordance with BCT Good Practice Guidelines (Collins, 2016). Static detectors were deployed for one week per month April to October to collect data for five consecutive nights per month.</p> <p>Surveys designed to identify the presence and relative frequency of bats crossing the scheme undertaken monthly between May and September. Crossing point location are selected based on presence of significant linear features that would be severed by the scheme which provide high quality commuting and foraging habitats for bats. Each survey involves a team of two ecologists recording the number of times bats cross the scheme. Where possible the species and height will also be recorded. The ecologists will use bat detectors to help identify the bats crossing the scheme.</p>	<ul style="list-style-type: none"> • Activity transects once per month in full active season (April-October) along pre-determined routes encompassing suitable habitats within 250m • Deployment of static detectors once per month in targeted locations during full active season • Crossing point surveys within active season at key locations along the proposed scheme which are likely to suffer from severance impacts 	<p>detectors undertaken during 2017-2019</p> <ul style="list-style-type: none"> • Static monitoring surveys to be undertaken during 2021 at key habitats along the route. • Crossing point surveys undertaken 2017-2020 (single point in 2017, majority in 2019 and limited in 2020) • Additional crossing point surveys to complement those undertaken 2019/20 and provide a better picture of key flight route severance.
Freshwater environment (fish, invertebrates, aquatic habitats and plants)	<p><u><i>Aquatic macro-invertebrate surveys</i></u></p> <p>At each site a macro-invertebrate sample to be collected alongside associated environmental information using a handheld water quality instrument and visual assessment by a two-person team. Following standard guidance (Environment Agency, 2008) one surveyor enters the water to collect a standard 3-minute kick sample, using a pond net to disturb the</p>	<ul style="list-style-type: none"> • 100m upstream and downstream for each watercourse crossed by the proposed scheme • Two surveys, one in Spring and one in Autumn 	<ul style="list-style-type: none"> • Surveys undertaken in 2017 • A resurvey, including Spring and Autumn visits, will be undertaken in 2021.

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
	<p>substrate and margins. This is followed by a 1-minute hand search of rocks/submerged objects/plants. Samples are preserved in Industrial Methylated Spirit and returned to the laboratory for analysis to mixed taxon and species level (TL5) by an experienced taxonomist.</p> <p><i>Fish</i> Where desk data is deficient, electric fishing surveys will be carried out by qualified and experienced ecologists. Surveys conducted by placing a stop net at two points at the upstream and downstream extents to create a 100m section from which fish cannot escape. Survey teams comprised of three surveyors (when using the backpack in small watercourses). The lead surveyor will operate the anode and a hand net and where required will be followed by another surveyor to capture any fish missed and to operate the emergency stop button on the backpack (on very small watercourses this can be done by the surveyor on the bank). Wider sections of watercourses up to 5m wide may require the use of two surveyors with linked anodes and one surveyor to capture missed fish (leaving the fourth surveyor on the bank to man the control box and offer assistance). Conditions at the time of survey will dictate the requirement for one or two anodes. Data collected including the species of fish recorded and their abundances.</p>	<ul style="list-style-type: none"> • Single targeted 100m survey section in watercourse to be diverted (River Ding) • Time to avoid disruption of fish spawning activities; late autumn to early winter for salmonids, and spring through to early summer for coarse fish. 	<ul style="list-style-type: none"> • Survey completed in 2020, no further survey required.

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
	<p><u>White-clawed crayfish</u></p> <p>Habitats suitability assessment undertaken in 100m section samples. Where suitable habitats are identified, white-clawed crayfish will be surveyed following standard monitoring protocol (Peay, 2003). Surveys will be undertaken under a Natural England class licence. One member of the team will work within the channel setting baited traps and undertaking manual searches. If water is clear and less than approximately 60cm deep manual searching will be conducted, searching under stones for crayfish, sweep netting in vegetation and under tree roots for up to 45 minutes. Torchlight surveys can be used as an alternative method where water is too deep to enter, or otherwise inaccessible, and clear enough to observe any crayfish on the river bed. Trapping can be used in watercourses that are too deep or turbid for manual searching. Plastic mesh traps with funnel entrances are baited with scraps of fish, although cat food can be used. Funnel traps are normally set one day and inspected the next morning. Traps are set from the bank with no need to enter the water and fix discretely to the bank edge.</p> <p>Any white-clawed crayfish will be identified, measured (carapace length) and returned to the watercourse. Any non-native crayfish are not permitted by law to be returned to the watercourse, they will be humanely destroyed in accordance with statutory guidance.</p>	<ul style="list-style-type: none"> • 250m of each watercourse crossed by proposed scheme, including and tributaries/side ditches • Habitat suitability assessment—any time of year, optimal spring • Presence/likely absence survey – between Spring and Autumn (avoiding late May and June when females vulnerable carrying young) 	<ul style="list-style-type: none"> • Surveys undertaken during 2017 • Re-assess habitat suitability in 2021 to ensure watercourse remains similar • Presence/likely absence surveys to be undertaken in 2021, targeted at watercourses with suitability to support white-clawed crayfish, scope to be agreed in liaison with the Environment Agency,
Great crested newt (GCN)	<p><u>Habitat Suitability Index (HSI)</u></p> <p>All waterbodies identified within the desk study are assessed for their potential to support GCN using the standardised Habitat HSI methodology (Oldham et al, 2000), which equates the likelihood of GCN presence in a waterbody through the combination of environmental factors known to affect this species. Ponds scoring <0.5 (HSI category Poor) are generally scoped out for further assessment unless overridden by professional judgement.</p> <p><u>Environmental DNA (eDNA)</u></p>	<ul style="list-style-type: none"> • Assessment of all waterbodies within 500m of the offline sections of the proposed scheme and within 250m of the online sections. • HSI conducted at any time of year, but optimal period during the spring and summer 	<ul style="list-style-type: none"> • Population survey previously undertaken 2017-2019 • eDNA surveys previously undertaken in 2018-2020 • HSI of all watercourses within 500m of the offline sections of the Proposed Scheme, and within 250m of the online sections.

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
	<p>eDNA survey involves the collection of 20 water samples from around the perimeter of a waterbody, which are then subject to laboratory analysis of eDNA present in the water column to assess presence or absence of GCN.</p> <p><u>Traditional survey methods</u></p> <p>For all waterbodies which return a positive (or indeterminate) eDNA result, a suite of 'traditional' surveys are employed. These surveys follow guidelines outlined in the Great Crested Newt Mitigation Guidelines (English Nature, 2001), utilising a combination of the most applicable survey methods from bottle trapping, torching, egg search, sweep netting and refuge search (if egg search affirms breeding this method is terminated). An initial four visits are undertaken to affirm presence/absence, with a further two visits where GCN are confirmed, in order to provide a population size class estimate.</p>	<ul style="list-style-type: none"> eDNA survey can be conducted 15th April – 30th June Traditional surveys undertaken mid-March to mid-June, with at least 4 visits within optimal period mid-April to mid-May 	<ul style="list-style-type: none"> All ponds within 50m of the proposed scheme, and any with HSI score of greater than 0.5 to be subject to eDNA presence/absence surveys and subsequent traditional population surveys where GCN are present (or eDNA indeterminate).
Otter	<p><u>Habitat assessment</u></p> <p>Watercourses, waterbodies and surrounding terrestrial habitat are assessed against criteria of suitability for utilisation by otter (Chanin, 2003).</p> <p><u>Field signs</u></p> <p>A search for field signs is carried out using the standard methodology (JNCC, 2004) and involve systematically walking all pre-determined watercourse and waterbodies to search for evidence of otter, including: holts, spraints, footprints, slides, feeding signs (fish scales etc.) and actual sightings.</p>	<ul style="list-style-type: none"> Watercourses surveyed up to 1km up and downstream of where watercourse crosses proposed scheme Can be undertaken at any time provided suitable conditions 	<ul style="list-style-type: none"> Surveys completed 2017-2020 however limited land access. Full resurvey of watercourses in 2021 100m up and downstream of Proposed Scheme crossing
Water vole	<p><u>Habitat assessment</u></p> <p>Watercourses, waterbodies and surrounding terrestrial habitat are assessed for suitability based of habitat criteria in water vole conservation handbook (Strachan et al., 2011).</p> <p><u>Field signs</u></p> <p>Water vole survey will be undertaken as per the water vole conservation handbook. Search for evidence of water vole, including: burrows, latrines, footprints, runs, feeding signs (grazed 'lawns') and actual sightings. Two surveys necessary, approximately two months apart.</p>	<ul style="list-style-type: none"> Watercourses surveyed up to 250m up and downstream of where watercourse crosses proposed scheme Two field sign surveys should be undertaken spaced at least two months apart (survey 1 in mid-April to end of June and survey 2 in July to end of September. 	<ul style="list-style-type: none"> Surveys undertaken 2017-2019 however limited land access. Full resurvey of watercourses in 2021 100m up and downstream of Proposed Scheme crossing

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
Reptiles	<p>Surveys involve the deployment of artificial refugia which act as basking locations and cover from predators. Refugia are spaced at 10m intervals within areas of suitable habitat.</p> <p>Checking of refugia commences a minimum of 14 days following deployment, with subsequent checks used to determine presence of reptiles and provide a population size assessment.</p>	<ul style="list-style-type: none"> • Suitable habitats surveyed up to 100m from the Proposed Scheme • Conducted between March and October in suitable conditions (optimal survey months; April, May and September) 	<ul style="list-style-type: none"> • Full population size assessment surveys undertaken in 2017 • Resurvey of suitable habitats to be impacted by the proposed scheme in 2021 • Full survey of land where access was not previously granted if suitable habitats identified
Terrestrial invertebrates	<p>Phase 1 surveys and aerial photographs are used to identify suitable habitats that may be optimal for terrestrial invertebrates. Where suitable habitats are identified, a two-person survey team undertakes standard surveying protocols including, but not limited to, sweep netting, beating, aerial netting and hand searching of suitable habitats. The use of pitfall traps may be deployed on a site by site basis. Surveys are carried out in line with Natural England's Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation (Report NERR005). Each site will be subject to a visual appraisal and separated into stations for survey according to the size of the site, habitats, and likely species present.</p>	<ul style="list-style-type: none"> • Suitable habitats within the construction footprint of the proposed scheme or immediately adjacent habitats. • Between June and September 	<ul style="list-style-type: none"> • Surveys completed in 2017 • Habitat of survey sites will be reassessed in Spring 2021 to ensure no significant changes, with detailed surveys where required (in key locations)
Brown hairstreak	<p>Phase 1 surveys and aerial photographs are used to identify suitable habitats for brown hairstreak. Where suitable habitats are identified within the footprint of, or within 50m of, the proposed scheme targeted brown hairstreak egg searches are undertaken between late-November and mid-February. Surveys involve a two-person survey team walking a transect through suitable habitat (largely following hedgerows and edges of woodland) methodically searching for the distinctive brown hairstreak eggs on blackthorn growth with a particular focus on young growth and suckers. Once an egg has been identified within a habitat patch, the surveyors move on to a new area, therefore the signed is a presence/absence survey rather than a</p>	<ul style="list-style-type: none"> • Suitable habitats within the construction footprint of the proposed scheme and within 50m. • Between mid-November – early March (optimal November – late December) 	<ul style="list-style-type: none"> • Surveys undertaken winter 2020/21. • Further survey subject to land access and presence of suitable habitats.

Survey	Methodology	Survey area and timeframe	Surveys undertaken and proposed programme
	population estimate. Survey methodology largely follows the guidance for the UK Butterfly Monitoring Scheme (UKBMS, 2016).		

Appendix D Detail of landfills within 500m of proposed scheme

Table D-1 Detail of landfills within 500m of proposed scheme

Name	Location	Dates of Operation	Waste Types	LA / Landmark Data	Former Land Use	Approximate Distance from Route (m)
Near Dairy House Farm	327970, 122857	Not known	Not known	NGR: 327845,123133 Ref: US 403, W/J/7/4	Railway Cutting	60m S, Ch.3600m.
Ashe Farm	327965, 121997	13/06/1989 to 14/02/1990	Inert, Industrial and Household	No known restriction on source of waste. Poisonous, Noxious, Polluting Wastes Prohibited. NGR:327970,121990	Disused Quarry	500m S, Ch.4300m.
Thornfalcon Refuse Tip / Thornfalcon Tip	327970, 122857	31/12/1965	Commercial and Household	NGR: 328002,122832 WRC Ref: 3300/0172 BGS Landfill Site. NGR: 327813,123187 'No threat to ground water'. 'No threat to surface water' Local Authority Recorded Landfill Site, Railway Cutting, Ash Bridge, Henlade. NGR: 327842,123132 Closed 31/12/1974. Railway Cutting Ash (runs from 450m south east of Ash Bridge to Greenway Bridge.(US402 and US403), Pre 1974, alleged domestic, commercial and industrial.1973 operator advised to complete the site with sub/topsoil and tipping ceased in 1973.	Railway Cutting	Proposed embankment traverses feature at Ch.4700m.
Ashill Bypass Site A	332277,117745	21/12/1992	Inert	Ashill Farm Registered Landfill Site. NGR 332300,117750 Licence Ref. 486 Waste Type; Natural Excavated .Material, Sub/Topsoil Poisonous, Noxious, Polluting Wastes Prohibited	Fields	Proposed cutting within the feature at ~Ch.11300m to Ch.11500m.

Name	Location	Dates of Operation	Waste Types	LA / Landmark Data	Former Land Use	Approximate Distance from Route (m)
				Licence holder Raymond L Brown (Const) Ltd		
Land East of Bowbridge	333393,116491	Not known	Inert	Registered Landfill Site. NGR 333400,116500 Waste Type; Natural Excavated Material, Sub/Topsoil Poisonous, Noxious, Polluting Wastes Prohibited	Gravel Pit	150m E, Ch.13000m.
Saw Mills	333500,116425	01/04/1981 to 24/11/1987	Inert, Industrial and Household	Registered Landfill Site. NGR 333480,116410 Waste Type; Construction/Demolition. Inert/Non-Hazardous /Non-Toxic. Licence known to be surrendered	Gravel Pit	260m E, Ch.13100m.

Appendix E Provisional Long List of other developments for Cumulative Effects Assessment

Table E-1 Provisional Long List of other developments for Cumulative Effects Assessment

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
NSIP Projects								
68	A303 Sparkford to Ilchester Dualling NSIP	Highways England	A303 Sparkford to Ilchester Dualling.	20	NSIP/DCO approved.	Tier 1	Air Quality	Yes
69	Hinkley Point C New Nuclear Power Station NSIP	EDF	The proposal is for a nuclear power station with two nuclear reactors capable of generating a total of up to 3,260MW of electricity at Hinkley Point C and associated development.	21	NSIP approved.	Tier 1	Air Quality	No - unlikely to have significant cumulative air quality effects due to distance and disconnection from the proposed scheme or ARN
TWAO Projects								
-	None within 10km	-	-	-	-	N/A	N/A	N/A
Minerals and Waste EIA planning applications								
-	None within 10km	-	-	-	-	N/A	N/A	N/A
Transport Allocations/ Schemes								
-	None within 10km	-	-	-	-	N/A	N/A	N/A

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within ZoI?	Progress to Stage 2?
Planning Applications								
Somerset West and Taunton								
42	08/15/0012	David Wilson Homes South West	Large scale major development. Nerrols drive the crown estate. Application for approval of reserved matters following outline application 08/10/0024 in respect of appearance, landscaping, layout and scale for the erection of 260 no dwellings with associated works on land off Nerrols Drive, Taunton, Somerset	2.3	Planning application approved 17/03/2016	Tier 1	Air Quality, Biodiversity, Population & Health	Yes
43	25/17/0026	St Modwen Homes	Large Scale Major Development. Taunton Trading Estate, Norton Fitzwarren. Application for approval of reserved matters following outline approval 25/12/0032 for the erection of 227 No. dwellings, greenways, the western LEAP, landscaping, infrastructure, highways, parking and road access on land parcels H1, H1A, H2 and H3 at Langford Mead, Norton Fitzwarren	5.5	Planning application approved 16/03/2018	Tier 1	Air Quality, Biodiversity, Population & Health	Yes
51	34/16/0014	Pegasus Planning Group	Large Scale Major Development. Staplegrove (East). Outline permission (with all matters reserved except for access) for the erection of up to 915 residential units, a primary school, 1 ha of employment land, local centre, open space including allotments and sports pitches, green infrastructure, landscaping, woodland planting, sustainable drainage systems and associated works; including provision of	3.6	Pending consideration.	Tier 1	Biodiversity, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within ZoI?	Progress to Stage 2?
			an internal spine road to connect A358 Staplegrove Road to Kingston Road on land at Staplegrove (East), Taunton, Somerset					
52	34/16/0007	Private developer	Large Scale Major Development. Staplegrove (West). Outline permission (with all matters reserved except for access) for a residential-led, mixed use urban extension to include up to 713 dwellings, 1 ha of employment land comprising use classes B1(a) (up to a maximum of 2500sqm), B1(b), B1(c), B2, B8 together with green infrastructure, landscaping, play areas, sustainable drainage systems (SUDS) and associated works. An internal spine road is proposed to connect the A358 Staplegrove Road and Taunton Road at land at Staplegrove (West), Taunton, Somerset	4	Planning application approved 15/04/2019	Tier 1	Biodiversity, Population & Health	Yes
53	42/14/0069	Taylor Wimpey	Large scale major development. Outline planning application with all matters reserved (except points of access) for a residential and mixed use urban extension at comeytrove/trull to include up to 2000 dwellings, up to 5.25 hectares of employment land, 2.2 hectares of land for a primary school, a mixed use local centre, and a 300 space 'park and bus' facility on land at comeytrove/trull amended and additional information received 04 September 2015.	5	Planning application approved 08/08/2018	Tier 1	Biodiversity, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within ZoI?	Progress to Stage 2?
70	Nexus 25 LDO	Taunton Deane Borough Council	Large Scale Major Development. Development of Strategic Employment Site 'Nexus 25' (25ha). 6 Plot development proposal with B1(a), B1(b), B2, B8 and ancillary uses.	0.05	Approved on 14/03/2018	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment, Climate Change	Yes
63	38/20/0187	Lidl Great Britain Ltd	Large Scale Major Development. Demolition of Lidl store and buildings at Six Acres Centre and erection of replacement Class A1 foodstore with associated parking and servicing at Lidl/Six Acres Centre, Roman Road, Taunton. 64,000sqm floorspace proposed.	1.2	Planning application approved 11/02/2021	Tier 1	Air Quality, Biodiversity, Landscape, Population & Health	Yes
35	38/18/0162	Galliford Try Partnerships	Medium Scale Major Development. Residential development of 176 no. dwellings on land to the North of Tangier and Castle Street, Taunton.	3.2	Planning application approved 27/06/2019	Tier 1	Air Quality, Biodiversity, Population & Health	Yes
64	14/16/0031	West of England Developments	Medium Scale Major Development. Outline application with some matters reserved for the erection of 35 No dwellings on land to the south west of Creech Medical Centre, Hyde Lane, Creech St Michael	1.2	Planning application refused 04/11/2016	Tier 1	Air Quality, Biodiversity, Landscape, Population & Health	No - application refused and therefore not a material consideration for cumulative effects
47	48/15/0053	Persimmon Homes (South West)	Medium scale major development. Monkton Heathfield local centre. Erection of local centre including 5 no retail units with 18 no apartments above	1.2	Planning application	Tier 1	Air Quality, Biodiversity,	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
			plus 69 no dwellings, with associated works and access including highway works to the adjacent a38 on land off Bridgwater road, Monkton Heathfield		approved 11/08/2016		Population & Health	
37	38/20/0285	Taunton Central Holdings Ltd	Medium Scale Major Development. Redevelopment of site with re-configuration of ground floor commercial use and the erection of a third and fourth floor with conversion into a total of 62 No. apartments (60 additional) over 4 floors at 59-63 High Street, Taunton	3	Pending consideration.	Tier 1	Air Quality, Biodiversity, Population & Health	Yes
South Somerset District Council								
14	15/04772/OUT 18/01902/REM	Gladman Developments Ltd	Large Scale Major Development. Development of up to 200 residential dwellings (including up to 35% affordable housing), introduction of structural planting and landscaping, informal public open space and children's play area, surface water attenuation, access points form Forton Road and Tatworth Road and associated ancillary works.	7.6	Planning applications approved 02/08/2017 and 21/02/2019.	Tier 1	Biodiversity, Population & Health	Yes
15	16/02874/FUL	Persimmon Homes	Large Scale Major Development. Proposed residential development with associated access and infrastructure - 263 units.	7.7	Pending consideration.	Tier 1	Biodiversity, Population & Health	Yes
57	18/04057/OUT	Mactaggart & Mickel	Large Scale Major Development. Outline application for mixed development comprising residential development of up to 295 dwellings, provision of a floodlit full size football	5.7	Pending consideration.	Tier 1	Biodiversity, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within ZoI?	Progress to Stage 2?
			pitch, unlit full size training pitch and community sports pitch with associated multi use clubhouse, spectator facilities and vehicular parking area; hub for local neighbourhood facilities and other community uses, public open space, landscaping, drainage and other facilities; associated vehicular and pedestrian accesses, land regrading, associated infrastructure and engineering works					
60	16/05500/OUT	Persimmon Homes	Large Scale Major Development. Outline application for residential development for up to 400 dwellings with associated access.	0.9	Pending consideration.	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Population & Health, Water Environment	Yes
22	19/01309/OUT	Private developer	Medium Scale Major Development. Development of the site to comprise up to 18 self-contained single storey retirement dwellings with community shop and café (145sqm approx).	0.4	Planning application refused 03/03/2021	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Noise & Vibration, Population & Health, Water Environment	No - application refused and therefore not a material consideration for cumulative effects
20	17/03409/OUT	Private developer	Medium Scale Major Development. Erection of 24 bed residential home and formation of new vehicular access (outline application)	0.4	Planning application approved 04/07/2018	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Noise & Vibration,	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
							Population & Health, Water Environment	
21	17/03800/OUT	Ark	Medium Scale Major Development. Erection of 25 dwellings and formation of access (outline application)	0.01	Planning application approved 19/03/2019	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes
24	19/03418/FUL	Private developer	Medium Scale Major Development. Erection of 10 No. dwellings with garages and ancillary parking.	0.01	Pending consideration.	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes
28	20/03697/REM	Burrington Estates Ltd	Medium Scale Major Development. Application for approval of appearance, landscaping and scale ('the reserved matters'), landscaping (condition 4), ecological mitigation (condition 5), access details (condition 9), cycle and footpath links (condition 16) and foul and surface water drainage (condition 20) pursuant to outline planning permission ref. 17/03800/OUT for the	0.2	Pending consideration.	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within ZoI?	Progress to Stage 2?
			erection of 25 dwellings and formation of access					
29	17/04301/REM	Larkfleet Homes South West Ltd	Medium Scale Major Development. The erection of 47 No. dwellings (reserved matters following approval of 14/04158/OUT to include details of appearance, landscaping, layout and scale).	1.8	Planning application approved 07/03/2018	Tier 1	Biodiversity, Population & Health, Landscape	Yes
30	17/04802/REM (of 13/04935/OUT)	Woodsome Estates Ltd	Medium Scale Major Development. Erection of 72 No. dwellinghouses and 600 square metres of office space (Use Class B1). Reserved matters of 13/04935/OUT	0.7	Planning application approved 31/08/2018	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Population & Health, Water Environment	Yes
31	17/04857/FUL	Woodsome Estates Ltd	Medium Scale Major Development Erection of 19 No. dwellinghouses, car parking and relocation of public open space	0.7	Planning application approved 31/08/2018	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Population & Health, Water Environment	Yes
32	19/03505/FUL	West of England Developments (Taunton) No2 Ltd	Medium Scale Major Development. The erection of 15 dwellings, formation of new access and associated works.	2	Pending consideration.	Tier 1	Biodiversity, Population & Health, Landscape	Yes
61	18/00082/FUL	Persimmon	Medium Scale Major Development. Erection of 144 No. dwellinghouses with open space, landscaping and other associated works. Formation of access.	1.6	Pending consideration.	Tier 1	Air Quality, Landscape, Biodiversity, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
62	19/00012/OUT	Dairygold Co-op	Medium Scale Major Development. Outline planning application for the erection of flexible class B1 (B1a or B1b) building (or buildings) and up to 150 No. dwellings on the land to the north of Station Road; and for class B1(C), B2, B8, D1, A3, A4 , A5 or Motor Dealership uses on the land to the South of Station Road; and details of accesses off of Station Road together with other road infrastructure, engineering works, landscaping all to facilitate phased redevelopment	0.08	Pending consideration. (Local Plan allocation ME/ILMI/4))	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes
13	19/01219/FUL	Numatic International	Medium Scale Major Development Proposed offices, warehousing and research and development buildings	6.4	Planning application approved 13/12/2019	Tier 1	Biodiversity, Population & Health	Yes
66	17/04328/OUT	Private developer	Medium Scale Major Development Erection of 10 dwellings and associated works including the formation of 2 No. accesses (outline)	0.3	Planning application approved 23/07/2019	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Noise & Vibration, Population & Health	Yes
67	19/03070/FUL	Private developer	Medium Scale Major Development The erection of 25 No. dwellings along with associated vehicular access and landscaping	1	Planning application pending.	Tier 1	Cultural Heritage, Landscape, Biodiversity, Population & Health, Water Environment	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
23	19/02812/OUT	Private developer	Small Scale Minor Development. Outline application with all matters reserved save for access for the erection of 2No. dwellings	<0.2	Pending consideration.	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes
25	20/01902/PIP	Private developer	Small Scale Minor Development. Permission in principle for the demolition of former office building previously used in association with fuel storage and distribution business and erection of 6 No. dwellings.	<0.2	Planning application approved 28/08/2020	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes
26	20/03456/FUL	Private developer	Small Scale Minor Development. Erection of two detached dwelling houses	<0.2	Pending consideration.	Tier 1	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within ZoI?	Progress to Stage 2?
Sedgemoor District Council								
76	37/17/00031	Private housebuilder	Medium Scale Large Development: Request for an EIA Screening Opinion of the proposed erection of 259 dwellings, community hub, MUGA and a primary school with associated infrastructure and landscaping.	9.6	Proposal is EIA development - Decided 02/05/2017.	Tier 2	Biodiversity, Population & Health	Yes
77	37/17/00043	Private developer	Request for an EIA Screening Opinion for a proposed hotel and office development.	10	EIA is not required - Decided 02/06/2017.	Tier 2	Air Quality, Biodiversity, Population & Health	Yes
78	37/17/00045	Private developer	Request for an EIA Screening Opinion for the proposed development of land to include a mix of Use Classes B1, B2 & B8 to include a motorway service area, petrol filling station and a hotel.	10	Proposal is EIA development - Decided 02/06/2017.	Tier 2	Air Quality, Biodiversity, Population & Health	Yes
79	37/17/00072	Private developer	Request for an EIA Scoping Opinion for the proposed development of land to include a mix of Use Classes B1, B2 & B8 to include a motorway service area, petrol filling station and a hotel.	10	Proposal is EIA development - Decided 29/09/2017.	Tier 2	Air Quality, Biodiversity, Population & Health	Yes
Site Allocations								
Somerset West and Taunton								
4	Comeytrove / Trull SADMP (TAU1)	Somerset West and Taunton	Site Allocation (Core Strategy (SS7), SADMP (TAU1)). Phased delivery of around 2,000 new homes at an overall average net density of 35-40 dwellings per hectare. A new mixed-use local centre comprising a convenience store (Class A1) of up to 500 m2 (gross); plus 500m2 of other retailing (Class A1),	6	Site Allocation adopted - planning applications identified (see ID 53)	Tier 3	Biodiversity, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
			financial/professional services (Class A2), restaurants and cafes (Class A3), at least one public house (Class A4), take-away (Class A5) and a community hall building (comprising of main hall, meeting room, activity room, storage, kitchen, toilets) and associated parking, together with 0.25 ha of land for a place of worship. A minimum of 5 hectares of serviced employment land comprising Class B1 b and c., Class B2 and Class B8 use. Land reserved (approx 2.5ha) for a 14-class, 2-form intake primary school with pre-school facilities.					
5	Staplegrave SADMP (TAU2)	Somerset West and Taunton	Site Allocation (SADMP TAU2). Phased delivery of around 1,500 new homes at an overall average net density of 35-40 dwellings per hectare. A new mixed-use local centre at the intersection of radial and orbital routes adjacent to Kingston Road, comprising a convenience store (A1) of up to 500 m2 (gross); 500 m2 of other convenience retailing (A1), financial/professional services (A2), restaurants and cafes (A3); at least one public house (A4), take-away (Class A5) and a community hall building (comprising of main hall, storage, kitchen, toilets) and associated parking, together with 0.25ha of land for a place of worship. A minimum of 2 hectares of serviced employment land comprising Class B1 b and c., Class B2 and Class B8 use. A 2.5ha site for a 14-class, 2-	5.5	Site Allocation adopted - planning applications identified (see IDs 51 and 52)	Tier 3	Air Quality, Biodiversity, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
			form intake primary school with preschool facilities.					
6	Ford House Farm Churchinford (SADMP TAU4)	Somerset West and Taunton	Site Allocation (SADMP TAU4). Approximately 400 new dwellings with a mix of family and other housing types. Completing the Norton Fitzwarren link road.	7	Adopted - no planning application identified.	Tier 3	Biodiversity, Population & Health	Yes
1	Hyde Lane, Creech St. Michael (SADMP MIN2)	Somerset West and Taunton	Site Allocation (SADMP MIN2). Land at Hyde Lane, Creech St. Michael, as indicated on the Policies Map, is allocated for around 40 dwellings.	1.5	Adopted - no planning application identified.	Tier 3	Air Quality, Biodiversity, Landscape, Population & Health	Yes
2	North of school, Creech St. Michael (SADMP MIN3)	Somerset West and Taunton	Site Allocation (SADMP MIN3). Land north of the School, Creech St. Michael, as indicated on the Policies Map, is allocated for around 55 dwellings	1.5	Adopted - no planning application identified.	Tier 3	Air Quality, Biodiversity, Landscape, Population & Health	Yes
3	Land off Hyde Lane, Creech St. Michael (SADMP MIN4)	Somerset West and Taunton	Site Allocation (SADMP MIN4). Land off Hyde Lane, Creech St. Michael, as indicated on the Policies Map, is allocated for around 44 dwellings.	1.5	Adopted - no planning application identified.	Tier 3	Air Quality, Biodiversity, Landscape, Population & Health	Yes
8	Hamilton Road Bus Depot (TAU9)	Somerset West and Taunton	Site Allocation (TAU9). Land at Hamilton Road Bus Depot, as indicated on the Policies Map, is allocated for around 50 dwellings.	1.5	Adopted - no planning application identified.	Tier 3	Air Quality, Biodiversity, Landscape, Population & Health	Yes
9	East of Crown Industrial Estate (TAU10)	Somerset West and Taunton	Site Allocation (TAU10). A site of 5.5 hectares east of the Crown Industrial Estate, as indicated on the Policies Map, is allocated for employment purposes.	1.5	Adopted - no planning application identified.	Tier 3	Air Quality, Biodiversity, Landscape, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
33	Morrison's (Cr5)	Somerset West and Taunton	Site Allocation (Cr5) Taunton Town Centre Area Action Plan Allocations – March 2019. Site identified in Taunton Deane BC's 5-Year Land Supply for approximately 200 dwellings.	3	Adopted - no planning application identified.	Tier 3	Air Quality, Biodiversity, Population & Health	Yes
34	Tangier (Tg2)	Somerset West and Taunton	Site Allocation (Tg2) Taunton Town Centre Area Action Plan Allocations – March 2019. Site identified in Taunton Deane BC's 5-Year Land Supply for approximately 525 dwellings.	3.2	Site Allocation adopted - planning applications identified (see ID 35)	Tier 3	Air Quality, Biodiversity, Population & Health	Yes
38	Monkton Heathfield (SS1)	Somerset West and Taunton	Site Allocation (SS1). Core Strategy Allocations – March 2019. Site identified in Taunton Deane BC's 5-Year Land Supply for approximately 2950 dwellings.	1.5	Site Allocation adopted - planning applications identified (see ID 47)	Tier 3	Air Quality, Biodiversity, Landscape, Population & Health	Yes
39	Nerrols / Priorswood	Somerset West and Taunton	Site Allocation (SS2). Core Strategy Allocations – March 2019. Site identified in Taunton Deane BC's 5-Year Land Supply for approximately 270 dwellings.	2	Adopted - no planning application identified.	Tier 3	Air Quality, Biodiversity, Landscape, Population & Health	Yes
36	High Street	Somerset West and Taunton	Site Allocation (Hs1) Taunton Town Centre Area Action Plan Allocations – March 2019. Site identified in Taunton Deane BC's 5-Year Land Supply for approximately 210 dwellings.	3	Site Allocation adopted - planning applications identified (see ID 37)	Tier 3	Air Quality, Biodiversity, Population & Health	Yes
40	Longforth	Somerset West and Taunton	Site Allocation (SS3). Core Strategy Allocations – March 2019. Site identified in Taunton Deane BC's 5-Year Land Supply for approximately 400 dwellings.	11.5	Adopted - no planning application identified.	Tier 3	None	No - development too distant from proposed scheme to result in likely

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
								significant cumulative effects
South Somerset District Council								
71	Chard Strategic Growth Area (PMT1, PMT2)	South Somerset District Council	<p>Site Allocation Land at Chard is allocated for strategic growth to provide the following within the plan period and beyond: At least 2,716 dwellings; Approximately 13 hectares of employment land; 2 new primary schools; 4 neighbourhood centres (Avishayes, Stop Line Slopes, Millfields and Holbear); Highway infrastructure and improvements; Sports and open space provision.</p> <p>To ensure the timely delivery of highway and other infrastructure to support the proposed growth of Chard Eastern Development Area, a phased approach to delivery will be taken with the following to be delivered: Within the plan period: At least 1,220 dwellings; Approximately 13 hectares of employment land; 1 new primary school; 2 neighbourhood centres (Millfields & Holbear); Sports and open space provision. Post 2028: At least 1496 dwellings, 1 new primary school, 2 neighbourhood centres (Avishayes & Stop Line Slopes)</p>	5.5	<p>Adopted local plan.</p> <p>Planning applications identified (see ID 13,14,15),</p>	Tier 3	Air Quality, Biodiversity, Population & Health	Yes
73	Land west of Horlicks Ltd, Hort Bridge,	South Somerset	Land west of Horlicks Ltd, Hort Bridge, Ilminster (approximately 3.0 hectares/7.5 acres)	0.01	Saved local plan allocation.	Tier 1	Air Quality, Cultural Heritage, Landscape,	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
	Ilminster EP1 (Saved local plan Allocation ME/ILMI/3)	District Council	is carried forward as an allocated site for employment (classes B1, B2 and B8 of the use classes order).		Application 09/04401/FUL gives approval for half of the site for Highway Agency maintenance depot - built out. Caravan business approved as part of site.		Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	
74	Land off Station Road, Ilminster (Saved local plan Allocation ME/ILMI/4)	South Somerset District Council	Land of Station Road, Ilminster (approx. 12.9ha / 31.7 acres) allocated for employment (classes B1, B2 and B8 of the Use Classes Order). The size of the net developable area will need to reflect the requirement to accommodate satisfactory highway access and comprehensive flooding/ land drainage improvements.	0.5	Saved local plan allocation. Planning applications identified (see ID 62)	Tier 3	Air Quality, Cultural Heritage, Landscape, Biodiversity, Noise & Vibration, Population & Health, Water Environment	Yes
75	Land adjacent to Powrmatic, Hort Bridge, Ilminster (Saved local plan Allocation ME/ILMI/5)	South Somerset District Council	Ilminster (approximately 5.1 hectares/12.6 acres of net developable area) is allocated for employment (classes B1, B2 and B8 of the Use Classes Order). The site is being allocated specifically to meet the requirements of Powrmatic Ltd.	0.03	Saved local plan allocation.	Tier 3	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
80	Chard Eastern Development Area (CH1)	South Somerset District Council	Land at Chard is allocated for strategic growth to provide the following during the period 2016 to 2036: <ul style="list-style-type: none"> - About 1,342 dwellings, including 29% affordable housing; - Approximately 13.5 hectares of employment land; - One new primary school; - Two neighbourhood centres (Millfields and Holbear); - Highway infrastructure and improvements; and - Sports and open space provision. 	5.5	Emerging Plan - Preferred Options.	Tier 3	Biodiversity, Population & Health	Yes
81	Housing Growth at Land East of Crimchard, (CH2)	South Somerset District Council	The site east of Crimchard is allocated for residential development to provide the following: <ul style="list-style-type: none"> - About 110 dwellings, including 29% affordable housing; - Children's formal and informal play space - Public open space 	6.5	Emerging Plan - Preferred Options.	Tier 3	Biodiversity, Population & Health	Yes
82	Housing Growth South West of Canal Way, Ilminster (IM1)	South Somerset District Council	The site south west of Canal Way is allocated for residential development to provide the following: <ul style="list-style-type: none"> - About 400 dwellings; including 29% affordable housing; - A new primary school; - Children's formal and informal play space; - Public open space 	0.2	Emerging Preferred Options Plan. (see ID 60)	Tier 3	Air Quality, Cultural Heritage, Landscape, Biodiversity, Geology & Soils, Noise & Vibration, Population & Health, Water Environment	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
65	Land South of Shudrick Lane, Townsend, Ilminster	South Somerset District Council	Housing Growth at Shudrick Lane , Ilminster (IM2) The site at Shudrick Lane (as defined on the Policies Map) is allocated for residential development to provide the following: - About 220 dwellings; including 29% affordable housing; - Children's formal and informal play space - Public open space	2	Emerging Preferred Options Plan.	Tier 3	Air Quality, Biodiversity, Population & Health, Landscape	Yes
Sedgemoor District Council								
54	Land east of A38, west of Newton Road, North Petherton (NP1)	Sedgemoor District Council	Land East of A38, west of Newton Road (as defined on the Policies Map) is allocated for residential development. Development will provide (unless otherwise agreed with the Local Planning Authority) 230 dwellings.	8	Site Allocation adopted - no planning application identified that meets the EIA thresholds (between 2016-2021).	Tier 3	Air Quality, Biodiversity, Population & Health	Yes
55	Land at Bridgwater Gateway (B4)	Sedgemoor District Council	Land at Bridgwater Gateway Phase 2 (as defined on the Policies Map) is allocated for mixed-use development. Development will provide (unless otherwise agreed with the Local Planning Authority): Approx. 400 new homes of a mixed size and type appropriate to the area. 6 hectares (gross) B1 employment and other appropriate ancillary uses.	8.5	Site Allocation adopted - no planning application identified that meets the EIA thresholds (between 2016-2021).	Tier 3	Biodiversity, Population & Health	Yes

Development							Stage 1	
ID	Application Reference	Applicant	Brief Description	Distance from project (km)	Application status	Tier	Within Zol?	Progress to Stage 2?
56	Land at Huntworth, East of Junction 24 (B8)	Sedgemoor District Council	Land at Huntworth, East of J.24, Bridgwater (as defined on the Policies Map) is allocated for employment development. Development will provide (unless otherwise agreed with the Local Planning Authority): Approx. 32 hectares (gross) of employment land. An agreed mix of uses including B1, B2, B8 use classes, potential motorway service area, supporting ancillary uses including hotel, commercial centre.	8.5	Site Allocation adopted - planning applications identified (see ID 78 and 79)	Tier 3	Air Quality, Biodiversity, Population & Health	Yes