A303 Sparkford to Ilchester Dualling Scheme TR010036

6.1 Environmental Statement Chapter 8 Biodiversity

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A303 Sparkford to Ilchester Dualling Scheme

Development Consent Order 201[X]

6.1 Environmental Statement
Chapter 8 Biodiversity

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Table of Contents

8 Biodiversity

8.1 Introduction

8.1.1 This chapter considers the likely significant effects of the proposed A303 Sparkford to Ilchester scheme (hereafter referred to as 'the scheme') on important ecological resources including designated sites, habitats and species.

8.1.2 Effects on ecological resources from infrastructure projects can arise from direct and indirect impacts upon designated sites, habitats or species, and be of a temporary or permanent nature. Indirect effects can occur through pollution of air and water and via changes in noise or hydrology, and this chapter is therefore supported by information contained within the following chapters of the Environmental Statement (ES):

- Chapter 5 Air Quality, Volume 6.1
- Chapter 11 Noise and Vibration, Volume 6.1
- Appendix 4.3 Road Drainage and the Water Environment Assessment Summary, Volume 6.3

8.1.3 This assessment has been undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volumes 10[1] and 11[2], Interim Advice Note (IAN) 130/10[3] and supported by the Guidelines for Ecological Impact Assessment[4] from the Chartered Institute of Ecology and Environmental Management (CIEEM).

8.1.4 A ***Habitat Regulations Assessment: Finding of No Significant Effects Report* (*document reference TR010036/APP/6.6*)** has been compiled in parallel to the production of this ES in accordance with the *Conservation of Habitats and Species Regulations 2017*, in relation to European designated sites and follows guidance set out in DMRB HD 44/09[5] (assessment of

[1] Highways England. Design Manual for Roads and Bridges (DMRB), Volume 10 Environmental Design. HMSO, London.
[2] Highways England (2008) Design Manual for Roads and Bridges, Volume 11 Environmental Assessment Section 2 Environmental Impact Assessment.
[3] Highways England (2010) Interim Advice Note 130/10 *Ecology and Nature Conservation: Criteria for Impact Assessment* [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian130.pdf (last accessed April 2018).
[4] CIEEM (2016) *Guidelines for Ecological Impact Assessment in the United Kingdom* [online] available at: https://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/EcIA_Guidelines/TGS EcIA-EcIA_Guidelines-Terestrial_Freshwater_Coastal.pdf (last accessed April 2018).
[5] Highways England (2009) Design Manual for Roads and Bridges (DMRB) Volume 11, Section 4; Part 1 Assessment of Implications (of highways and / or road projects) on European sites (including appropriate assessment).

implications (of highways and / or roads projects) on European sites (including appropriate assessment).

8.1.1 Chapter 2 The Scheme of Volume 6.1 contains a detailed description of the scheme. The drawings referenced in this chapter can be found in Volume 6.2, while the technical appendices are presented in Volume 6.3.

8.2 Competent expert evidence

8.2.1 The competent expert is a Chartered Environmentalist (CEnv) and a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM), with over 12 years' experience in the field of environmental and ecological assessment, management and mitigation within both the public and private sectors. The competent expert holds a Natural England Class licence for both dormouse and great crested newt (GCN) and is also a Registered Consultant for the GCN Low Impact Class Licence (GCN LICL).

8.3 Legislative and policy framework

8.3.1 The principal legislative and planning context for the assessment of the effects of the scheme on habitats and designated sites is presented below.

8.3.2 Legislation and policies specific to individual species likely to be present within the scheme red line boundary are presented in Appendix 8.1, Volume 6.3.

European legislation

EU Habitats Directive

8.3.3 The Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, commonly referred to as the EU Habitats Directive, has been transposed into national law and is known as the *Conservation of Habitats and Species Regulations 2017*. The main objective is to maintain or restore natural habitats and wild species of European importance (listed in Annexes I and II respectively) at a favourable conservation status (as defined in Articles 1 and 2). Special Areas of Conservation (SAC) are protected sites designated under the EU Habitats Directive to ensure the conservations of these habitats and species.

Birds Directive

8.3.4 The *Directive 2009/147/EC*, commonly referred to as the *Birds Directive*, provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. The Directive applies to the UK and to

its overseas territory of Gibraltar. Special Protection Areas (SPA) are protected sites classified for rare and vulnerable birds (as listed on Annex I of the *Birds Directive*), and for regularly occurring migratory species, in accordance with Article 4 of the *Birds Directive*.

National legislation

Conservation of Habitats and Species Regulations 2017

8.3.5 The *Conservation of Habitats and Species Regulations 2017*, commonly referred to as the *Habitats Regulations*, transpose the EU Habitats Directive into national law for England (and Wales). The Regulations provide for the designation and protection of 'European sites', and the protection of 'European protected species' stating that competent authorities have a general duty, in the exercise of any of their functions, to have regard to habitats or species of importance as listed in Annex I and II (respectively) of the EU Habitats Directive.

Wildlife and Countryside Act (WCA) 1981 (as amended)

8.3.6 The *WCA 1981 (as amended)* consolidates and amends existing national legislation to implement the EU *Habitats Directive* and the *Birds Directive* in Great Britain. The Act is divided into 17 Schedules which detail the protection of wildlife (birds, some animals and plants), the countryside (Public Rights of Way (PRoW)), National Parks, the designation of protected areas (including, but not limited to, Sites of Special Scientific Interest (SSSI) and Sites of Nature Conservation Importance (SNCI)) in England and Wales.

Natural Environment and Rural Communities (NERC) Act 2006

8.3.7 Highways England has a legal obligation under Section 40 (S40) of the *NERC Act 2006* to have regard, as far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity and make biodiversity an integral part of the policy and decision-making process. This includes considering the restoration and enhancement of species and habitats. The NERC Act also improves wildlife protection by amending the *WCA 1981 (as amended)*. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of Principal Importance for the conservation of biodiversity in England (listed in Annexes I and II of the EU Habitats Directive respectively).

National policy

National Policy Statement for National Networks

8.3.8 Paragraph 5.22 of the *National Policy Statement for National Networks*[6] (NPSNN) states that *"Where the project is subject to EIA the applicant should ensure that the environmental statement clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems".*

8.3.9 Paragraph 5.25 states "*As a general principle, and subject to specific policies, development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives. The applicant may also wish to make use of biodiversity offsetting in devising compensation proposals to counteract any impacts on biodiversity which cannot be avoided or mitigated. Where significant harm cannot be avoided or mitigated, as a last resort, appropriate compensation measures should be sought*".

8.3.10 Paragraph 5.32 states the importance of ancient woodland as a valuable biodiversity resource, which once lost cannot be replaced. It states *"The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss".*

8.3.11 Paragraph 5.36 details that applicants should include appropriate mitigation measures as an integral part of their proposed development, including identifying where and how construction activities will be confined to minimum areas required for the works, best practice mitigation for species and habitats is followed during construction, the restoration of habitats post construction, the provision of green corridors and minimise habitat fragmentation where possible, and habitat enhancement measures where possible.

[6] Department for Transport (2014) *National Policy Statement for National Networks* (NPSNN) [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf (last accessed July 2018).

UK Post-2010 Biodiversity Framework (2012)

8.3.12 The country strategies for biodiversity and the environment in each of the 4 countries of the United Kingdom underpin the *UK Post-2010 Biodiversity Framework*[7]. The *UK Biodiversity Framework* supersedes the UK *Biodiversity Action Plan* (BAP) 2007 and *Conserving Biodiversity – the UK Approach*[8]. The *UK Post-2010 Biodiversity Framework* sets out the overarching vision, strategic goals and priority activities for the UK's work towards international biodiversity targets. The Framework's overall vision is that "*by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people*".

8.3.13 Objectives include, but are not limited to:

- Halt the loss of biodiversity and continue to reverse previous losses through targeted actions for species and habitats.
- Restore and enhance biodiversity in urban, rural and marine environments through better planning, design and practice.
- Develop an effective management framework that ensures biodiversity is considered in wider decision-making.

Biodiversity 2020: A strategy for England's wildlife and ecosystem services (2011)

8.3.14 In England, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services*[9] is the national strategy for biodiversity and environment, which supersedes *Working with the grain of nature - A Biodiversity Strategy for England 2002*[10]. *Biodiversity 2020*'s stated mission is "…*to halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people*."

8.3.15 To focus activity and assess performance in achieving this mission, *Biodiversity 2020* sets objectives relating to terrestrial and marine habitats and ecosystems, species and people. These include:

[7] JNCC (2012) The UK Post-2010 Biodiversity Framework [online] available at: http://jncc.defra.gov.uk/page-6189 (last accessed April 2018).
[8] Defra on behalf of the UK Biodiversity Partnership (2007) *Conserving Biodiversity – The UK Approach* [online] available at: http://jncc.defra.gov.uk/PDF/UKBAP_ConBio-UKApproach-2007.pdf (last accessed April 2018).
[9] Defra (2013) Biodiversity 2020: A strategy for England's wildlife and ecosystem services.
[10] Defra (2002) *Working with the grain of nature: A biodiversity strategy for England* [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69284/pb7718-biostrategy-021016.pdf (last accessed July 2018).

- Establishing coherent and resilient ecological networks, described as "*a network of high quality sites, protected by buffer zones, and connected by wildlife corridors and smaller, but still wildlife-rich, 'stepping-stone' sites*".
- Taking targeted action for the recovery of priority species whose conservation is not delivered through wider habitat-based and ecosystem measures.
- Establishing Nature Improvement Areas and Marine Protected Areas.
- Bringing more SSSIs into favourable condition.
- Reducing environmental pressures by working with sectors such as agriculture, forestry, planning and development.

Local policy

Wild Somerset: The Somerset Biodiversity Strategy 2008-2018

8.3.16 The *Somerset Biodiversity Strategy*[11] is intended to represent a long term blueprint for successful biodiversity conservation in Somerset. It proposes a vision and long term goals for biodiversity conservation locally and sets out a series of objectives and actions aimed at making significant progress towards achieving them.

South Somerset Local Biodiversity Action Plan

8.3.17 The South Somerset Local *Biodiversity Action Plan* (BAP)[12] outlines a number of actions taken from the *Somerset Biodiversity Strategy* and details how planning authorities should safeguard and seek to enhance biodiversity in their work. Key targets listed within the Local BAP of relevance to this scheme include the following:

- "*Reduction in biodiversity loss from development and an increase in the number of significant developments where biodiversity is enhanced*."
- "*Fewer developments affecting Local Wildlife Sites and BAP Priority Habitats*."

[11] Somerset Biodiversity Partnership (2008) Wild Somerset: The *Somerset Biodiversity Strategy* 2008 – 2018 [online] available at: http://www.somerset.gov.uk/policies-and-plans/strategies/biodiversity/ (last accessed April 2018).
[12] South Somerset District Council (2008) South Somerset Local *Biodiversity Action Plan* [online] available at: https://www.southsomerset.gov.uk/media/333016/biodiversity_action_plan_2008.pdf (last accessed April 2018).

South Somerset District Council Local Plan 2006 – 2028

8.3.18 *South Somerset District Council's Local Plan*[13] contains the following policies which are relevant to biodiversity:

8.3.19 "*Policy EQ4: Biodiversity: All proposals for development, including those which would affect sites of regional and local biodiversity, nationally and internationally protected sites and sites of geological interest, would:*

- *Protect the biodiversity value of land and buildings, minimise fragmentation of habitats and promote coherent ecological networks.*
- *Maximise opportunities for restoration, enhancement, and connection of natural habitats.*
- *Incorporate beneficial biodiversity conservation features where appropriate.*
- *Protect and assist recovery* of *identified priority species; and*
- *Ensure that Habitat Features, Priority Habitats, and Geological Features that are used by bats and other wildlife are protected and that the design including proposals for lighting does not cause severance or is a barrier to movement.*

8.3.20 *Where there is a reasonable likelihood of the presence of protected and priority species development design should be informed by, and applications should be accompanied by, a survey and impact assessment assessing their presence. If present, a sequential approach to the design of the proposal should be taken that aims first to avoid harm, then to lessen the impact, and lastly makes compensatory provision for their needs.*

8.3.21 *Development would not be allowed to proceed unless it can be demonstrated that it would not result in any adverse impact on the integrity of national and international wildlife and landscape designations, including features outside the site boundaries that ecologically support the conservation of the designated site."*

8.3.22 "*Policy EQ6: Woodland and Forests: South Somerset District Council would support the implementation of the South West Woodland and Forestry Framework, ensuring the environmental, social and economic value and character of the district's trees, woods and forests are protected and enhanced in a sustainable way. Woodland areas, including ancient and semi-natural woodland should be maintained at least at 2005 levels and expanded where possible to provide a buffer to core areas of woodland.*

[13] South Somerset District Council (2015) *South Somerset Local Plan (2006 – 2028)* [online] available at: https://www.southsomerset.gov.uk/media/707200/south_somerset_local_plan_2006-2028_adoption_version_march_2015.pdf (last accessed April 2018).

8.3.23 *The loss of ancient woodland as well as ancient or veteran trees should be protected against loss wherever possible. Where secondary woodland is unavoidably lost through development it should be replaced with appropriate new woodland on at least the same scale*."

Somerset Ecological Network

8.3.24 *Somerset's Ecological Network*[14] is a response to Government targets for the halting of biodiversity loss and safeguarding of ecosystems goods and services and is a means of identifying the basic ecological infrastructure required to achieve this. *Somerset's Ecological Network* identifies the remaining areas of priority habitat, areas for biodiversity enhancement, and the connections that need to be made to link these areas up across the landscape.

Somerset Highways Biodiversity Manual 2015 – 2020

8.3.25 The *Somerset Highways Biodiversity Manual*[15] determines how land around roads is managed because verges provide valuable corridors and homes for wildlife. Where opportunities arise and resources allow, it tries to reduce wildlife roadside casualties in dangerous locations, for example by creating tunnels under new roads so that wildlife can cross safely.

Highways England policy

Highways England Biodiversity Action Plan

8.3.26 Highways England's BAP[16] identifies their approach to meeting the key performance indicator identified within *the Roads Investment Strategy* of "*no net loss of biodiversity by 2020*". Biodiversity is required to be fully considered during the building of any new roads and opportunities sought to work with stakeholders and enhance the network for wildlife.

8.4 Assessment methodology

8.4.1 This section describes the methodology which has been used for the assessment of biodiversity which may be affected by the construction and operation of the scheme.

[14] Somerset County Council (2016) *Somerset Ecological Networks Report* [online] available at: http://www.somerset.gov.uk/policies-and-plans/policies/ecological-networks/ (last accessed April 2018).
[15] Somerset County Council (2015) Somerset Highways Biodiversity Manual [online] available at: http://www.somerset.gov.uk/policies-and-plans/strategies/biodiversity/ (last accessed July 2018).
[16] Highways England (2015) *Our plan to protect and increase biodiversity* [online] available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/441300/N150146_-_Highways_England_Biodiversity_Plan3lo.pdf (last accessed June 2018).

8.4.2 The scope of the biodiversity assessment was presented in Chapter 9 Biodiversity of the ***Environmental Impact Assessment (EIA) Scoping Report* (*document reference: HE551507-MMSJV-EGN-000-RP-LP-0014*)** submitted to the Planning Inspectorate in November 2017. The Scoping Opinion is contained within Appendix 4.1 of Volume 6.3. A schedule of responses detailing how each of the Scoping Opinion comments have been considered as part of this chapter is contained within Appendix 4.2 of Volume 6.3. No amendments to the methodology as presented within the EIA Scoping Report have been necessary, however the following amendments to the scope of the assessment have been undertaken:

- Changes in hydrology (ground and surface water) during construction and operation.
- Changes in air quality.

8.4.3 The assessment has been undertaken in accordance with the principles set out in Chapter 4 Environmental Assessment Methodology in Volume 6.1. The approach for biodiversity follows the guidance presented in the DMRB Volume 11, Section 3 Part 4[17] and IAN 130/10[18] to a Detailed level.

Establishing baseline

8.4.4 The baseline conditions have been established using a combination of desk study and field surveys. The baseline data has been collected in order to meet the requirements of a number of different assessments:

- assessment of likely significant effects on ecological resources
- compliance with legislation relating to species protection
- compliance with legislation relating to European Sites

Significance criteria

8.4.5 The assessment process requires ecological receptors to be valued using both professional judgment, based on available guidance and information, together with advice from experts who know the area in which the study area sits, and information on the distribution and status of the features that are being considered. In accordance with these guidelines, the significance of effect on an ecological receptor is arrived at by considering the

[17] Highways England (1993) Design Manual for Roads and Bridges (DMRB), Volume 11 Environmental Assessment, Section 3 Part 4 *Ecology and Nature Conservation* [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/11s3p04.pdf (last accessed April 2018)

[18] Highways England (2010) Interim Advice Note 130/10 *Ecology and Nature Conservation: Criteria for Impact Assessment* [online] available at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian130.pdf (last accessed June 2018).

environmental sensitivity or value of the receptor or resource and the magnitude of impact.

Determining value

8.4.6 The DMRB guidelines recommend that the determination of the value of the ecological receptors is based on a geographic frame of reference, as shown in Table 8.1.

Table 8.1: Typical descriptors of environmental value or sensitivity

International or European - Very high
Very high importance and rarity, international scale, very limited potential for substitution. Includes: • Ramsar and European designated sites, or sites that meet the published selection criteria but not designated as such. • Sites with resident or regularly occurring population/s of species at International or European level where loss would affect the conservation status or distribution at this geographic scale, or where the population forms a critical part of a wider population at this scale, or is at a critical phase of its life cycle at this scale.
UK or National – High
High importance and rarity, national scale, and limited potential for substitution. Includes: • Sites of Special Scientific Interest, National Nature Reserves and sites that meet published criteria for selection. • Key / priority habitats. • Sites with resident or regularly occurring population/s of species at International, European, UK or National level where loss would affect the conservation status or distribution at this geographic scale. • Where the population forms a critical part of a wider population at this scale, or is at a critical phase of its life cycle at this scale.
Regional (England) – High / Medium
High or medium importance and rarity, regional scale, limited potential for substitution. Includes: • Key / priority habitats identified in the Natural Area Profile or Highways *Biodiversity Action Plan*. • Resident or regularly occurring populations of species which may be considered at an International, European, UK, National levels, or key / priority species where loss of these species would affect the conservation status or distribution at this geographic scale, or the population forms a critical part of a wider population at this scale, or is at a critical phase of its life cycle at this scale.
County (Somerset) – Medium
High or medium importance and rarity, regional scale, limited potential for substitution. Includes: • Sites of Nature Conservation Importance (SNCIs); County Wildlife Sites (CWSs); and Local Nature Reserves (LNRs) designated in the county or unitary authority area context. • Key habitats identified in the Local *Biodiversity Action Plan* or Natural Area profile. • Resident or regularly occurring populations of species which may be considered at an International, European, UK or National level where loss would affect the conservation status or distribution at this geographic scale, or the population forms a critical part of a wider population at this scale, or is at a critical phase of its life cycle at this scale.
Local (Site only) – Low
Medium importance and rarity, regional scale, limited potential for substitution. Includes:

• LNRs designated in the local context. • Trees that are protected by Tree Preservation Orders (TPOs). • Areas of habitat; or populations / communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.
Local (Site only) – Negligible
• Sites of low or very low importance, rarity and local scale.

Source: IAN 130/10 *Ecology and Nature Conservation: Criteria for Impact Assessment*

8.4.7 Where a nature conservation resource has value at more than 1 level, its overriding value is that of the highest level. Effects on conservation status have only been assessed in detail for features of sufficient value (local or above). Effects on features below local value would be categorised as of neutral significance.

8.4.8 In order to describe changes or activities and impacts on the features, the following parameters have been used:

- Magnitude – if an impact is deemed to be significant then its magnitude, in quantitative terms, should be assessed.
- Extent – the area over which an impact occurs.
- Duration – the time for which an impact is expected to last.
- Reversibility – a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it; a temporary impact is one from which a spontaneous recovery is possible.
- Timing and frequency – whether impacts occur during critical life stages or seasons.
- Direct and indirect ecological impacts.

8.4.9 In this assessment, a direct impact is attributable to a defined action such as the physical loss of a habitat or the immediate mortality of an individual of a particular species.

8.4.10 Indirect impacts are attributable to an action, which affects ecological resources through effects on an intermediary ecosystem, process or receptor. An example of this would be an impact on sensitive terrestrial habitat due to an increase in atmospheric deposition.

8.4.11 The magnitude of impact is the degree of change as a result of the proposed scheme on an ecological receptor. The descriptions for assigning the magnitude of impact to the receptors is based on the DMRB criteria[19]

[19] Highways England (2008) Design Manual for Roads and Bridges (DMRB), Volume 11, Section 2 Part 5 *Assessment and Management of Environmental Effects* [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section2/ha20508.pdf (last accessed April 2018).

defined in Table 8.2 below. The impacts may be adverse or beneficial to the receptor.

Table 8.2: Criteria for determining the magnitude of impacts

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

8.4.12 Using the combination of the conservation value of the receptor, and the magnitude of change, the significance of the effect upon biodiversity features as a result of the scheme can be assigned, as outlined within the matrix shown in Table 8.3 below. The significance of effect is assigned after allowing for the positive contribution of all mitigation that would be delivered. The effectiveness of the mitigation must be made clear, as well as the certainty of their adoption.

Table 8.3: Determining the significance of effect categories

Environmental value (sensitivity)	Magnitude of effect (degree of change)				
	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

8.4.13 Having determined the significance of effect using the matrix above, the categories of significance effects can be described as follows:

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

8.4.14 For the purposes of this assessment an effect is considered to be significant if it is moderate or greater.

8.4.15 Confidence in predictions to consider likelihood that the change would occur have been described in accordance with CIEEM guidelines[20], as a qualitative

[20] CIEEM (2006) *Guidelines For Ecological Impact Assessment In The United Kingdom* [online] available at: https://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/EcIA_Guidelines/TGS EcIA-EcIA_Guidelines-Terestrial_Freshwater_Coastal.pdf (last accessed April 2018).

methodology is not provided by the DMRB. The 4 point scale is described as follows:

- Certain / near-Certain: probability estimated at 95% chance or higher
- Probable: probability estimated above 50% but below 95%
- Unlikely: Probability above 5% but less than 50%
- Extremely unlikely: probability estimated at less than 5%.

8.4.16 Changes may be described in regard to a number of parameters: positive or negative; magnitude, extent, duration, reversibility, timing and frequency.

Consultation

8.4.17 An initial ecology consultation meeting was held with Natural England, the scheme's Lead Ecologist, the scheme's Environmental Co-ordinator and Highways England on 2 May 2017. The purpose of the meeting was to discuss the proposed survey methodology for bats, general protected species surveys, to develop mitigation ideas, and to confirm Natural England's current biodiversity principles. The meeting minutes are contained within Appendix 4.9, Volume 6.3.

8.4.18 Further consultation meetings have been held with Natural England as part of the Environmental Technical Working Group (TWG). Discussions have included the following topics:

- Protected species survey methodology.
- Phase 2 protected species survey results and mitigation measures.
- An outline of habitat losses and the draft Environmental Masterplan.
- Habitat Regulations Assessment.

8.4.19 The meeting minutes associated with these Environmental TWG discussions are contained within Appendix 4.9, Volume 6.3.

8.5 Assessment assumptions and limitations

8.5.1 The biodiversity assessment has been based on the description of the scheme detailed in Section 2.5 of Chapter 2 (Volume 6.1), including the horizontal and vertical limits of deviation.

8.5.2 Specific limitations relevant to each survey, such as access constraints, are detailed in the relevant ecology survey results contained within Appendices 8.2 to 8.13 of Volume 6.3. It is not considered that any of these survey specific constraints represent a significant limitation, barrier or data gap such that the baseline picture gathered is inadequate or insufficiently thorough. It is considered that the baseline that has been established is suitably robust such that the assessment it has informed is also adequately robust.

8.5.3 It should be noted that the absence of protected or rare species does not preclude their presence on a site. There is always the risk of protected or rare species being overlooked, owing to the timing of the survey, scarcity of the species at the site, or changes over time in habitat management.

8.5.4 The loss of any habitat of conservation value would be replaced like-for-like as a minimum requirement. Habitats of negligible conservation value would not require mitigation for nature conservation.

8.5.5 In accordance with DMRB Volume 11, Section 3, Part 1 *Air Quality*[21], designated sites that should be considered for assessment are those for which the designated features are sensitive to air pollutants, either directly or indirectly, and which could be adversely affected by the effect of local air quality on vegetation within the following nature conservation sites only: SACs, Sites of Community Importance (SCI)s or Candidate SACs (cSACs)), SPAs, potential SPAs (pSPAs), SSSIs and Ramsar sites. Therefore, no quantitative assessment of the effect of changes in air quality for LWS has been undertaken within either this biodiversity chapter or Chapter 5 Air Quality, Volume 6.1.

8.6 Study Area

8.6.1 The Zone of Influence (ZoI) is the area surrounding a scheme within which the environmental conditions could be affected. The ZoI would include the following areas:

- areas that would be lost to construction and operation
- areas that would be temporarily affected during construction
- areas likely to be impacted by hydrological disruption
- areas where there is a risk of pollution and noise disturbance during construction and / or operation

8.6.2 The ZoI for each ecological receptor has been determined on the basis of the scheme red line boundary, ecological characteristics of the receptor, and the connective habitat available. The extents are summarised in Table 8.4 and further justification is provided within the protected species technical appendices (Appendices 8.2 to 8.13, Volume 6.3).

[21] Highways England (2007) Design Manual for Roads and Bridges, Volume 11 Section 3 Part 1 HA 207/07 *Air Quality* [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf (last accessed July 20180).

Table 8.4: Extents of the ZoI for surveys of the ecological receptors

Sensitive receptor	ZoI
Hedgerows	Those directly impacted and within 50m of the scheme red line boundary
Macro-invertebrates	Watercourses within 50m of the scheme red line boundary
Common Reptiles	100m from the scheme red line boundary
National Vegetation Classification (NVC) surveys	200m from the scheme red line boundary
Terrestrial Invertebrates	200m from the scheme red line boundary
Sites with national or international designations for nature conservation affected by changes in air quality	200m from roads that are expected to be affected by the scheme for sites affected by changes in air quality. The local Affected Road Network (ARN) is considered to extend from Ilminster to West Knoyle (see section 5.4 of Chapter 5 Air Quality, Volume 6.1).
Bats, dormouse, breeding birds, water vole and otter	Up to 250m from the scheme red line boundary
GCN	500m from the scheme red line boundary
Badgers	500m from the scheme red line boundary
Phase 1 Habitat Survey	500m from the scheme red line boundary
Sites with local designations for nature conservation	Up to 1km from the scheme red line boundary
Barn Owl	1.5km from the scheme red line boundary
Sites with national or international designations for nature conservation	2km from the scheme red line boundary
Sites designated for bat populations	30km from the scheme red line boundary

8.6.3 The methodology for each of the surveys is outlined in Appendices 8.2 to 8.13, Volume 6.3.

8.7 Baseline conditions

Sources of information

8.7.1 Information regarding statutory and non-statutory sites was obtained from Natural England's MAGIC Interactive Map[22], with further information utilised from Natural England[23] and the Joint Nature Conservation Committee (JNCC)[24].

8.7.2 Information on the Local Wildlife Sites (LWS) within the study area has been obtained from a data supplied by Somerset Environment Records Centre (SERC) in April 2015 and further updated information supplied in June 2017. Information relating to habitats and species have been obtained from ecological surveys that have been undertaken on behalf of Highways England since February 2016 until present.

[22] Defra (2018) MAGIC Interactive Map [online] available at: http://magic.defra.gov.uk/ (last accessed April 2018).
[23] Natural England (2018) Natural England website [online] available at: https://www.gov.uk/government/organisations/natural-england (last accessed April 2018).
[24] JNCC (2018) JNCC website [online] available at: http://jncc.defra.gov.uk/ (last accessed April 2018).

Designated sites

International

8.7.3 No internationally designated sites are present within 2 kilometres of the scheme, but the following internationally designated sites, designated for bats, are located within 30 kilometres of the scheme:

- The Mells Valley SAC is located approximately 22 kilometres north of the scheme. Its primary reason for designation is due to the presence of the greater horseshoe bat *Rhinolophus ferrumequinum*. The qualifying features include habitats such as semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*).
- North Somerset & Mendip Bats SAC is located approximately 29 kilometres north of the scheme. Its primary reason for designation is due to the presence of greater horseshoe bats *Rhinolophus ferrumequinum* and lesser horseshoe bats *Rhinolophus hipposideros*. The qualifying features include habitats such as semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) and *Tilio-Acerion* forests of slopes, screes and ravines.
- Bracket's Coppice SAC is located approximately 17 kilometres south of the scheme. Its primary reason for designation is due to the presence of Bechstein's bat *Myotis bechsteinii*. The qualifying features include habitats such as Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*).

8.7.4 Changes to water levels and water quality could affect sites in hydrological connectivity with the scheme and so, in addition, searches were undertaken for European sites where the scheme crosses / is adjacent to, upstream of, or downstream of European sites. The following were identified as having hydrological connectivity to the scheme:

- Somerset Levels and Moors SPA and Ramsar is located 7.3 kilometres west of the scheme. It is one of the largest and richest areas of traditionally managed wet grassland and fen habitats in lowland UK. The site attracts important numbers of water birds (swans, ducks and waders) in winter.

Nationally designated sites

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

primroses *Primula vulgaris* which are recognised to be of international significance.

8.7.6 There is 1 designated site within 200 metres of the Affected Road Network (ARN) for the scheme (as defined in Chapter 5 Air Quality of Volume 6.1). Whitesheet Hill SSSI has been designated for the presence of chalk grassland which supports many notable, and in some cases rare, species of flora, some of which may be sensitive to nitrogen oxides (NO_x) and nitrogen deposition.

Regional

8.7.7 LWS within 1 kilometre of the scheme are as follows:

- Hazlegrove Park LWS is within the scheme red line boundary
- Camel Hill Transmitter Site LWS is located adjacent to the scheme red line boundary
- Gason Lane Field LWS is located 30 metres south
- Ridge Copse LWS is located 50 metres south
- Downhead Manor Farm LWS is located 150 metres north
- Parsons Steeple LWS is located 250 metres north
- Lindsay House Quarry LWS is located 310 metres north
- Cogberry Plantation LWS is located 350 metres north
- Sparkford Hill Copse LWS is located 350 metres southeast
- Annis Hill LWS is located 360 metres northwest
- Vale Farm Field LWS is located 450 metres north
- Bower Plantation LWS is located 760 metres north
- Yarcombe Wood LWS is located 960 metres north

Habitats

8.7.8 The 500 metre study area comprised a mosaic of arable, poor semi-improved grassland, improved grassland interspersed with hedgerows and pockets of broadleaved woodland. Priority habitats within the scheme's ZoI consisted of ditches, parkland, calcareous grassland, ponds, hedgerows, and broadleaved semi-natural woodland, which are described within this section.

8.7.9 Walkovers of the area were undertaken in 2016 and 2017 to identify the presence of any ecologically valuable habitats with the potential to support protected and notable species. Habitats within the study area were identified, classified and mapped in accordance with the Handbook for Phase 1 Habitat

Survey[25]. The habitats identified are summarised in Table 8.5 and are presented within the Phase 1 Habitat drawings (Figure 8.1, Volume 6.2).

8.7.10 National vegetation classification (NVC) surveys recorded habitats of principal importance such as 2 areas of lowland meadow and 9 areas of deciduous mixed woodland. Three rare or notable plant species were recorded including the near threatened quaking-grass *Briza media*, field scabious *Knautia arvensis* and devil's-bit scabious *Succisa pratensis*. Further information is contained within Appendix 8.2 National Vegetation Classification Technical Report, Volume 6.3.

8.7.11 Hedgerow surveys identified the presence of 43 species rich hedgerows, of which 28 hedgerows qualify as 'important' under the *Hedgerow Regulations* 1997. Further information is contained within Appendix 8.3 Hedgerow Technical Report, Volume 6.3.

8.7.12 As part of the Phase 1 Habitat Survey, no invasive species have been identified within the scheme red line boundary.

Table 8.5: Habitat descriptions

Site name / floral or faunal group	Description
Hedgerows	• A total of 76 hedgerows were recorded within the survey area; 43 hedgerows were found to be species-rich, 30 species-poor, 2 species-poor defunct and 1 hedgerow was not surveyed, due to access restrictions. • 28 qualified as 'important' under the *Hedgerow Regulations* 1997. • **There is 14,451 metres of hedgerow habitat within the scheme boundary.**
Broadleaved Semi-Natural Woodland	• There are 9 areas of broadleaved semi-natural woodland within 500 metres of the scheme. Woodlands of key importance due to their high biodiversity value include Ridge Copse, located to the east of the scheme, which is a LWS, designated as an area of semi-natural broadleaved woodland and quarry workings. Species include ash *Fraxinus excelsior*, cherry laurel *Prunus laurocerasus*, English oak *Quercus robur*, field maple *Acer campestre*, hazel *Corylus avellana*, hornbeam *Carpinus betulus*, sycamore *Acer pseudoplatanus* and wild privet *Ligustrum vulgare*. Ground flora species include cleavers *Galium aparine*, enchanter's nightshade *Circaea lutetiana*, hart's tongue *Phyllitis scolopendrium*, ivy *Hedera helix*, lesser celandine, Lords-and-ladies and wood avens *Geum urbanum*. • Parsons Steeple and Steart Wood are located towards the centre of the scheme on a ridge, forming a continuous belt of escarpment woodland connecting into a smaller woodland known as Rewber Brake. Both woodlands have ancient status and are also a LWS. The habitat is predominantly ash, beech *Fagus sylvatica*, blackthorn *Prunus spinosa*, elder *Sambucus nigra*, English elm *Ulmus procera*, English oak, hornbeam, and horse chestnut *Aesculus hippocastanum*. This

[25] JNCC, (2010), Handbook for Phase 1 habitat survey - a technique for environmental audit, ISBN 0 86139 636 7

Site name / floral or faunal group	Description
	woodland is bisected by a number of open rides, creating glades with a species rich ground flora. • Species include barren strawberry *Potentilla sterilis*, bluebell *Hyacinthoides non-scripta*, cowslip *Primula veris*, creeping cinquefoil *Potentilla reptans*, dog's mercury, lords-and-ladies, wild Garlic *Allium ursinum* and herb robert. • Lindsay House Quarry, located further to the west is a small LWS and contains an area of broadleaved woodland with scrub and calcareous grassland. Dominant species include ash, dog rose *Rosa canina*, dogwood, elder, English elm, field maple, hawthorn and hazel. Ground flora species include lesser celandine, lords-and-ladies and rough-stalked feather-moss *Brachythecium rutabulum*. • There is also an undesignated area of broadleaved woodland, located directly to the south of the Hazlegrove House Registered Park and Garden (RPG). It is a relatively small triangular area, with open rides and is actively managed through coppicing and thinning. It lacks an understorey and has a canopy dominated by ash, elder, English elm and field maple. Ground flora species include bugle *Ajuga reptans*, curled dock *Rumex crispus*, dog's mercury, enchanter's nightshade, ivy-leaved speedwell *Veronica hederifolia,* lesser celandine, lords-and-ladies and pendulous sedge *Carex pendula*. • There are 4 other small woodland copses present across the scheme and they are between 0.5 hectares and 0.7 hectares in size approximately. • **Within the scheme boundary, there is 3.06 hectares of this habitat type which represents 3.3% of the overall scheme extent.**
Broadleaved and Mixed Plantation Woodland	• Adjacent to Sparkford roundabout are linear belts of broadleaved woodland plantation, providing screening of the A303. Dominant species include hazel, hawthorn, and ash. • **There is 0.98 hectares of plantation woodland within the scheme boundary. This represents 1.1% of the overall scheme extent.**
Parkland	• Towards the east near Sparkford is an area of RPG associated with the Grade II Listed Hazlegrove House which comprises of veteran English oak, sweet chestnut and ash. The grassland is heavily grazed and appears to be poor semi-improved neutral grassland. • **There is 0.8 hectares of broadleaved parkland scattered trees within the scheme boundary. This represents 0.86% of the overall scheme extent. One veteran tree would be lost as a result of the scheme**.
Calcareous grassland	• There are 2 areas of semi-improved calcareous grassland. One area of grassland is located adjacent to the A303, known as Camel Hill Transmitter Site, which is designated a LWS. This then extends away from the A303 into a LWS known as Gason Lane Field LWS. • The sward is species-rich and comprises dominant species such as red fescue *Festuca rubra*, quaking grass *Briza media*, and abundant cock's-foot *Dactylis glomerata*. The forbs composition is also species-rich and comprised of rough hawkbit *Leontodon hispidus*, yarrow *Achillea millefolium*, lady's bedstraw *Galium verum*, ribwort plantain *Plantago lanceolata*, self-heal *Prunella vulgaris*, greater plantain *Plantago major* and pyramidal orchid *Anacamptis pyramidalis*. • The other is located north of the A303 within the mosaic of habitats known as Lindsay House Quarry LWS. This grassland comprises of a coarse sward with frequent false oat-grass and red fescue, occasional cock's-foot and creeping bent and locally dominant Yorkshire fog. The composition of forbs species is species-poor and sparse with frequent cut-leaved crane's-bill *Geranium dissectum*, common vetch *Vicia sativa*

Site name / floral or faunal group	Description
	segetalis and primrose *Primula vulgaris*. Common bird's-foot-trefoil *Lotus corniculatus* is also rare but is locally abundant towards the eastern extent of the field. • **There is 0.06 hectares of calcareous grassland within the scheme boundary. This represents 0.06% of the overall scheme extent.**
Poor semi-improved neutral grassland	• Poor semi-improved neutral grassland was identified on both sides of the A303 and tended to be grazed by sheep or cattle. The habitat is principally dominated by cock's foot *Dactylis glomerata*, common bent *Agrostis capillaris*, and crested dog's tail *Cynosurus cristatus*. • **There is 22.42 hectares of semi-improved neutral grassland within the scheme boundary**. **This represents 24.1% of the overall scheme extent.**
Improved Grassland	• Areas of improved grassland were present across the scheme RLB and were either grazed or frequently mown. • **There is 22.86 hectares of improved grassland within the scheme red line boundary. This represents 24.5% of the overall scheme extent.**
Arable	• Arable land was the dominant habitat within the surveyed area. The fields were subject to a regular management regime and had few field margins. **There is 40.40 hectares of arable fields within the scheme red line boundary**. **This represents 43.4% of the overall scheme extent**.
Amenity Grassland	• Areas of intensively managed amenity grassland were recorded surrounding residential and commercial properties throughout the surveyed area. **There is 1.1 hectares of amenity grassland within the scheme red line boundary**. **This represents 1.2% of the overall scheme extent.**
Ponds	• 62 ponds were identified within 500 metres of the surveyed area. They are present across the scheme red line boundary, but are predominantly located to the north of the A303 and concentrated within the arable and improved grassland fields.
Wet Ditch	• There are 5 ditches within and adjacent to the scheme red line boundary. These are generally dry or with shallow water levels. They have limited aquatic vegetation and some marginal vegetation overgrowing into the ditches. They are predominantly field drains, bordered by hedgerows and poor semi-improved grassland. • **There is 1,375 metres of ditch habitat within and adjacent to the scheme red line boundary.**

Protected species

8.7.13 Phase 2 ecological surveys were undertaken in 2016, 2017 and 2018 to gather baseline data. The results of these surveys are detailed in the Protected Species Technical Reports (Appendix 8.2 to 8.13, Volume 6.3) and summarised below.

Badgers

8.7.14 Field surveys identified [redacted]

8.7.15 [redacted]

8.7.16 Further information is contained within the Confidential Badger Technical Report, Volume 6.3.

Bats

8.7.17 To determine which bat species were present within the study area and how habitats within them were used by these species, the following surveys were undertaken in 2017 and 2018:

- Tree inspections from ground level and external building inspections, to identify potential roosting features.
- Climb and inspect tree surveys and internal building inspections, to provide further information on potential roosting features and assess for evidence of roosting bats.
- Emergence and re-entry surveys to assess the presence of roosts in buildings and trees.
- Walked transects, to assess the activity levels and identify important commuting routes and foraging grounds of bats along defined routes within the survey area.
- Static bat recorded assessment, to assess activity levels and species present at designated points along walked transect routes.
- Crossing point surveys, to assess the impact of linear feature severance at points with the potential to be impacted by the scheme.
- Hibernation surveys, to assess the potential for buildings and trees for hibernating bats, and locate any hibernation roosts.

8.7.18 Surveys identified the presence of 12 species of bat within 250 metres of the scheme. A total of 31 bat roosts, were identified, belonging to 9 species of bat. The majority of these were small roosts belonging to common species of bat, including brown long-eared bat *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus*, noctule *Nyctalus noctula*, serotine *Eptesicus serotinus* and soprano pipistrelle *Pipistrellus pygmaeus*. However notable finds included a dead lesser horseshoe bat within 1 roost (although this had likely been there for a long time), and a Myotis species tree roost containing 38 bats, which was a suspected maternity roost.

8.7.19 Numerous important commuting corridors were identified, mainly to the north of the existing A303, with more limited numbers south of the existing road. A potential important crossing point was identified south of Steart Wood, approximately 220 metres west of Canegore Corner, recorded as utilised by

common and rare species of bat, including barbastelle, greater horseshoe bat and lesser horseshoe bat.

8.7.20 High levels of foraging activity were noted in the fields and woodland edges at the entrance of Hazlegrove Preparatory School, with an array of common species recorded.

8.7.21 Further information is contained within Appendix 8.4 Bat Technical Report, Volume 6.3.

Barn owls

8.7.22 During 2017, surveys were undertaken in 3 stages to identify barn owl roost sites and habitat suitability. These included Stage 1: Onsite Scoping, Stage 2: Investigative Field Survey, and Stage 3: Nest Site Verification Survey.

8.7.23 The habitat most widespread within the study area is categorised as of moderate quality for barn owl foraging (Type 2) habitat. Type 3, which is of negligible or low quality for barn owl foraging, was the next most common habitat type (either highly maintained grassland or non-grassland habitats). The highest value habitat type (Type 1) was of limited extent and mostly consisted of narrow strips of habitat along linear features such as roads and hedges.

8.7.24 Two occupied breeding sites and 4 active roost sites were identified during the surveys indicating that there is a maximum of 4 or 5 breeding pairs in the study area.

8.7.25 Further information is contained within Appendix 8.5 Barn Owl Technical Report, Volume 6.3.

Breeding birds

8.7.26 Field surveys and subsequent mapping of species richness and abundance for breeding birds were undertaken across 3 visits during 2017.

8.7.27 A total of 47 species were recorded during the surveys, 9 of which are listed in Section 41 of the *NERC Act 2006*. Two noteworthy species were confirmed to be breeding within the study area but outside the scheme red line boundary, including the hobby *Falco subbuteo* (listed on Schedule 1 of the *WCA 1981 as amended*) and the song thrush *Turdus philomelos*. Both of these species are of county conservation importance.

8.7.28 Five noteworthy species thought to be breeding within the study area were bullfinch *Pyrrhula pyrrhula*, dunnock *Prunella modularis*, house sparrow *Passer domesticus*, linnet *Linaria cannabina* and yellowhammer *Emberiza*

citrinella. House sparrow, dunnock and bullfinch were all observed either as pairs in suitable nesting habitat or actively nest building within the scheme boundary and are associated with breeding in trees, hedgerows and scrub.

8.7.29 The highest areas of species richness and abundance corresponded with hedgerow, scrub and woodland with notable areas at Parson's Steeple, Steart Wood, Annis Hill, and Camel Hill.

8.7.30 Further information is contained within Appendix 8.6 Breeding Bird Technical Report, Volume 6.3.

Common reptiles

8.7.31 A habitat suitability assessment was undertaken, which identified all suitable reptile habitat within 100 metres of the scheme. During this survey, 13 sites were identified as offering potential habitat for supporting common reptile species and as such further surveys were undertaken during 2017.

8.7.32 Slow worms were identified across the majority of the areas surveyed, with both low and good populations found. One grass snake was also found within an area of rough grassland adjacent to the A303. Common lizards and adders were absent from the surveyed areas.

8.7.33 Further information is contained within Appendix 8.7 Reptile Technical Report, Volume 6.3.

Hazel dormouse

8.7.34 A habitat suitability assessment was undertaken in March 2017 which identified 8 areas of dormouse habitat within 250 metres of the scheme as requiring a dormouse nest tube survey. These 8 sites were named as survey areas C, D, E, G, H, I and L, and J and K. The nest tube surveys were carried out between April and November 2017. Surveys concluded the likely absence of dormice within 250 metres of the scheme.

8.7.35 Further information is contained within Appendix 8.8 Hazel Dormouse Technical Report, Volume 6.3.

Great crested newts

8.7.36 A desk study identified 62 ponds, 2 wet ditches and a trough within the study area. Of these, a total of 32 ponds were assessed as 'Below Average' or above, and were considered suitable enough for GCN to require further surveys.

8.7.37 GCN were found to be present in ponds 3, 4, 5, 6, 10, 20, 21, 22, 23, 32, 42, 46, 51 and ditch 1.

8.7.38 Presence / absence surveys have been undertaken, with GCN assessed as likely absent from ponds 8, 9, 12, 13, 14, 15, 16, 17, 18, 25, 27, 30, 31, 34, 41, 48, 49, 60, 61, and the trough, as no evidence of GCN was found during the surveys of these ponds.

8.7.39 The individual populations have been divided into 3 meta-populations. Each meta-population is associated with areas in the landscape where GCN ponds have no more than 250 metres or significant barriers between ponds.

8.7.40 Meta-population A, located at Downhead, includes ponds 20, 21, 22, 23, 42 and ditch 1. Meta-population B located at Yarcombe, includes ponds 10 and 46. Meta-population C located at Hazlegrove includes ponds 3, 4, 5, 6, and 51.

8.7.41 Pond 32 is over 500 metres from the other positive GCN ponds and is also isolated from meta-population A by the existing A303 and B3151 roads. A single GCN was recorded in this pond on 1 occasion and the pond was dry during the fourth survey visit in May. This pond is therefore not considered to be a breeding pond.

8.7.42 The population size class of meta-population B is small and meta-populations A and C are both of a medium population size class.

8.7.43 Further information is contained within Appendix 8.9 Great Crested Newts Technical Report, Volume 6.3.

Otter

8.7.44 Otter surveys were undertaken at Dyke Brook and a tributary that fed into Dyke Brook. Dyke Brook is a small watercourse connected to a network of drainage ditches. The brook is in a deep ditch with steep banks, with the depth of the water ranging from 10 to 50 centimetres. The brook is crossed by a road at Steart Bridge and downstream the brook joins the River Carey.

8.7.45 Otter field signs were prevalent at the time of the survey. Signs were found along Dyke Brook, with the majority of activity identified to the west of Steart Bridge. To the west of Steart Bridge, 5 spraints were found, 1 secretion of anal jelly and footprints were also noted.

8.7.46 Further information is contained within Appendix 8.10 Water Vole and Otter Technical Report, Volume 6.3.

Water vole

8.7.47 Water vole presence was confirmed in survey areas A, C and D. Although potential burrows were found at area B, no feeding signs were found.

8.7.48 Surveys of area A (Dyke Brook) recorded water voles on both visits but the distribution of the animals changed over the year. At the time of the first visits the signs were limited to east of where Steart Hill Overbridge would be once the scheme is constructed (refer to chapter 2 for the description of development) and to the southern stretch of the watercourse. Later in the year the signs were found over a wider area including to the west of Steart Hill Overbridge.

8.7.49 A potential burrow was identified at area B (western extent of the Scheme), but without latrines, the presence of water voles cannot be confirmed. The connectivity of area B also means it is less likely to be colonised by new individuals.

8.7.50 Area C is connected to Dyke Brook (area A) by 2 ditches. Although area C was located further up the catchment with lower water levels, the area had a good distribution of aquatic plants. Water vole latrines, burrows and feeding signs were confirmed on each visit.

8.7.51 Area D (within Hazlegrove House RPG) was not confirmed as having water voles during the first survey. However multiple latrines, burrows and feeding signs were found during the second survey. A water vole was also heard entering the water.

8.7.52 Further information is contained within Appendix 8.10 Water Vole and Otter Technical Report, Volume 6.3.

Terrestrial invertebrates

8.7.53 Generally, a low number of rare and scarce invertebrate species were recorded across the sites during the 2017 and 2018 surveys. However, the brown hair streak butterfly was frequently recorded across the scheme red line boundary and were present in 49% of the hedgerows surveyed.

8.7.54 Notable species identified include:

- White-letter hairstreak *Satyrium w-album* (UK BAP)
- Soldierfly *Chorisops nagatomii* (Nationally Scarce)
- Thick-headed fly *Leopoldius signatus* (Nationally Scarce)
- Picture-winged fly *Acanthiophilus helianthi* (Nationally Scarce)
- Mining bee *Lasioglossum pauxillum* (Nationally Scarce)
- Brown Hairstreak *Thecla betulae* (UK BAP)

8.7.55 Further information is contained within Appendix 8.11 Invertebrates Technical Report and Appendix 8.12 Brown Hairstreak Technical Report.

Aquatic invertebrates

8.7.56 Surveys were carried out in both spring and autumn at 5 sites (2 on Dyke Brook and 3 on tributaries to Dyke Brook). No protected, notable or rare macroinvertebrate species were identified. The macroinvertebrates present are common and the community present is of low conservation value.

8.7.57 Further information is contained within Appendix 8.13 Macroinvertebrates, Volume 6.3.

Summary

8.7.58 These findings provide a baseline of ecological features present. However, not all of the features would be considered to be Valued Ecological Receptors (VERs) for the purposes of assessment due to the value that would be afforded following the criteria described in Table 8.1. The value assigned to the different receptors is presented in Tables 8.6 to 8.8.

Receptors scoped out of baseline surveys

Overwintering birds

8.7.59 The habitats within the scheme red line boundary and adjacent to it, provide low potential habitat for overwintering bird species. There are also no internationally designated sites within 2 kilometres that include overwintering bird species as qualifying features. Therefore, overwintering birds have not been considered further in this assessment.

White-clawed crayfish

8.7.60 There are no historic records of white-clawed crayfish *Austropotamobius pallipes* in either the Lower Cam or the River Cary catchments. White-clawed crayfish usually occur in water between 75 to 125 centimetres although can be found in shallower and deeper water. A habitat suitability assessment for white-clawed crayfish was undertaken in spring 2017. The ditches adjacent to the scheme were extremely shallow (less than 5 centimetres), were dominated by silt substrate, and there were very few locations which could provide refuge for crayfish. Although the banks were soft enough for burrowing, no burrows were found. It is therefore highly unlikely that crayfish are present and this species is not considered further in this assessment.

Protected fish species

8.7.61 There is a network of drainage ditches and field drains, some of which are spring fed and some are partially culverted where they flow under the existing A303. This network forms tributaries of the Cam - Lower waterbody

to the south of the scheme, Park Brook to the west and Dyke Brook to the north. A habitat suitability assessment was undertaken of the ditches (as part of aquatic species habitat suitability surveys) and concluded that they were generally very shallow or dry, and considered to be of low suitability for protected fish species, for example salmon. Also, with the implementation of best practice mitigation measures, it is not anticipated that the scheme would directly affect any surface watercourses or groundwater. Therefore, protected fish species are not considered further in this assessment.

Assessment of value for ecological receptors

Designated sites

8.7.62 Statutory and non-statutory designated sites of nature conservation importance that occur within 2 kilometres and 30 kilometres of the scheme boundary, and the value of these sites, is given in Table 8.6 below.

Table 8.6: Valuation of designated sites

Designated site name	Value
Mells Valley SAC	Very High
North Somerset & Mendip Bats SAC	Very High
Bracket's Coppice SAC	Very High
Somerset Levels and Moors SPA and Ramsar	Very High
SSSI	High
LWSs	Medium

8.7.63 Following the valuation assigned to the habitats identified within the scheme red line boundary, 7 habitats have been considered to be VERs (see Table 8.7 below). Habitats of negligible ecological value have not been assessed within this chapter, and are as follows:

- Amenity grassland
- Arable
- Bare ground
- Hard standing
- Buildings
- Scrub
- Poor semi-improved grassland
- Improved grassland

8.7.64 It should be noted that some of these habitats may be considered within the species assessment, if they are integral habitat to the species under assessment.

Table 8.7: Valuation of habitats

Floral group	Rationale	Value
Species-rich or important hedgerows (according to the *Hedgerow Regulations* 1997)	Hedgerows are listed as a UK Priority Habitat (Section 41 NERC Act 2006), and are included on the Somerset BAP[26]. Loss of qualifying hedgerows would reduce the availability of this habitat type and affect the achievement of national targets.	High
Species-poor hedgerows	These hedgerows provide ecosystem functions, such as wind breaks and connective habitat. However, they are of low ecological interest, supporting limited species assemblages and are set within or around arable fields or poor semi-improved grassland of low ecological interest.	Medium
Broadleaved semi-natural woodland	Woodland habitats are listed as a UK Priority Habitat (Section 41 NERC Act 2006).	Medium
Broadleaved plantation woodland	Woodland habitats are listed as a UK Priority Habitat (Section 41 NERC Act 2006).	Medium
Parkland	Parkland habitats are listed as a UK Priority Habitat (Section 41 NERC Act 2006) and Somerset BAP broad and priority habitats.	Medium
Calcareous grassland	Calcareous grasslands are listed as a UK Priority Habitat (Section 41 NERC Act 2006).	Medium
Ponds	Ponds are listed as a UK Priority Habitat (Section 41 NERC Act 2006) and are included on the Somerset BAP.	Medium
Ditches	Ditches are included on the Somerset BAP.	Medium

8.7.65 Table 8.8 below outlines the valuation assigned to the species found during the surveys and explains the rationale for the valuations. The species listed are considered to be VERs and have therefore been included within the assessment.

[26] The Wildlife Trusts (2018) *Somerset Action Plans* [online] available at: http://www.somersetwildlife.org/the_somerset_biodiversity_action_plans_.html (last accessed June 2018).

Table 8.8: Valuation of species

Site name / floral or faunal group	Rationale	Value
Badger	Badgers are categorised as a species of Least Conservation concern on the IUCN red list[27] and are widespread in the UK. Badgers are protected under the Badger Act 1992 from a welfare perspective.	Low
Bats	Species identified during the surveys are all categorised as of 'Least Concern' on the IUCN red list. Bats are listed as a Somerset BAP species. Barbastelle bats were identified during activity and foraging surveys and are categorised as 'Near Threatened' on the IUCN red list and are a Species of Principal Importance (Section 41 NERC Act 2006).	High
Breeding birds	In terms of species richness, the breeding bird community conservation importance of the site has been classified as 'Local'. On the basis of the breeding bird community quality calculation the local area has been classified as being of 'Regional' importance. Therefore, to ensure a conservative assessment, the higher value has been adopted.	Medium
Barn owl	Barn owls are categorised as a species of Least Concern on the IUCN red list. The population within the study area consists of 2 known active barn owl pairs. It is likely though that the pairs of barn owls using the survey area is between 4 and 5 at most. This potentially constitutes around 1% of the Somerset population; therefore, is considered to be of high conservation value.	High
Great crested newt	GCN are categorised as a species of Least Concern on the IUCN red list but are a Species of Principal Importance (Section 41 NERC Act 2006).	High
Reptiles (slow worm, grass snake)	The slow worm and grass snake species confirmed on site are categorised as being of Least Concern (IUCN). Grass snake are a Species of Principal Importance (Section 41 NERC Act 2006).	Medium
Riparian mammals	Water vole are categorised as being of Least Concern on the IUCN red list but are a UK priority species.	Medium
Riparian mammals	Otters are afforded protection under Schedule 5 and 6 of the WCA and the Conservation of Habitats and Species Regulations 2010. Otter are a Species of Principal Importance (Section 41 NERC Act 2006) and listed as a Somerset BAP species.	High
Invertebrates	Invertebrates can be listed under Section 41 of the NERC Act, and in Schedule 5 of the WCA 1981 (as amended) and are afforded limited protection under Section 9 of this Act (for sale only), and as a UK BAP priority species.	Medium
Macroinvertebrates	Macro-invertebrates can be listed under Section 41 of the NERC Act, and in Schedule 5 of the WCA 1981 (as amended) and are afforded limited protection under Section	Low

[27] IUCN (2017) The IUCN Red List of Threatened Species [online] available at: http://www.iucnredlist.org/ (last accessed June 2018).

Site name / floral or faunal group	Rationale	Value
	9 of this Act (for sale only), and as a UK BAP priority species. No protected, notable or rare macroinvertebrate species were identified during the surveys.	

8.8 Potential impacts

Construction

8.8.1 The following impacts are predicted for the scheme during construction.

- Vegetation clearance during the construction phase resulting in temporary loss of habitats, with subsequent impacts on protected species using these habitats.
- Direct mortality of protected species during the construction phase.
- Changes in light levels during construction. Ecological resources sensitive to lighting include crepuscular and nocturnal species.
- Noise and vibration during the construction phase resulting in potential disturbance to protected species.

Operation

8.8.2 The following impacts are predicted for the scheme during construction.

- Changes in air quality as a result of vehicular emissions during the operational phase with the potential to result in habitat degradation at statutory designated sites and sensitive habitats of high value.
- Permanent land take resulting in habitat loss from designated sites, and important and supporting habitats, with subsequent impacts on protected species using these habitats.
- Changes in light levels during operation. Ecological resources sensitive to lighting include crepuscular and nocturnal species.
- Noise and vibration during operation resulting in potential disturbance to protected species.

8.9 Design, mitigation and enhancement measures

8.9.1 The Protected Species Technical Reports (Appendix 8.1 to Appendix 8.13, Volume 6.3) provide a detailed account of the measures that would be used to avoid or minimise impacts during the scheme construction and operation. These measures include provisions for any European or UK Protected Species and associated specific mitigation strategies regarding habitats. A summary is provided below.

Design measures

8.9.2 The scheme design has sought to avoid and minimise habitat loss wherever possible. This has included designing infrastructure features around key habitats to avoid loss, for example, by positioning the attenuation pond to maximise retention of mature trees and hedgerows.

8.9.3 Habitat planting and reinstatement would replace the 77.4 hectares of habitats temporarily damaged and compensate for the 13.7 hectares of habitat that would be permanently lost as hard standing (as a result of the scheme). The replanting would achieve a net biodiversity gain for all priority habitats to ensure greater long term (5 years) resilience against adverse events. The habitat replanting would result in the following:

- A net gain of 2.19 hectares of broadleaved woodland
- The creation of 7.61 hectares of species-rich grassland to compensate for the 0.06 hectares loss of calcareous grassland
- 10.443 kilometres of species-rich hedgerows to ensure no net loss
- Creation of 1.81 hectares of wet grassland, 0.18 hectares of marginal planting and 2 wet ponds
- Additional gain of 19.76 hectares of native trees and shrubs.

8.9.4 Refer to Table 8.10, which provides a summary of the habitat replacement and compensation proposed.

8.9.5 Of the 13.7 hectares that would be permanently lost, 0.36 hectares would be from Hazlegrove Park LWS due to the road footprint. This would be mitigated by the provision of 1.33 hectares of woodland, 3.07 hectares of native trees and shrubs, 6.51 hectares of wildflower and species rich grassland, a pond with marginal planting and 40 individual trees, to be provided immediately adjacent to the area that would be lost (refer to Figure 2.8 Environmental Masterplan, Volume 6.2).

8.9.6 Maintenance activities have been considered during the design of the scheme so that the activities could be undertaken with minimal damage. This has included the provision of access roads to attenuation ponds.

8.9.7 The scheme drainage design would reduce the likelihood and severity of potential pollution incidents and flooding affecting the local ditch network (see Appendix 4.7 Drainage Strategy Report, Volume 6.3). This includes the provisions of attenuation ponds, drains and catchpits. This would reduce or eliminate adverse effects for aquatic and riparian species and habitats.

Protected species

Badger

8.9.8 Where badgers are affected the most at Hazlegrove House RPG, habitat creation would be undertaken to provide foraging habitats of higher quality than the existing. These would include the new attenuation and wildlife ponds and surrounds, woodland, trees and species-rich grassland. The landscape would also provide opportunities for badger sett creation.

8.9.9 Badgers would be deterred from crossing the A303 by the installation of badger fencing in selected areas along the highway boundary. Where evidence of badgers crossing the existing A303 has been identified, one badger tunnel would be constructed to allow them safe passage under the carriageway. Although it is not possible to guarantee exclusion due to the tenacious nature of badger, the fencing in combination with the badger tunnels and availability of high quality foraging should discourage their use of highway verges, and minimise contact with live traffic.

Bats

8.9.10 Habitat creation and replacement would provide more foraging habitat within the landscape, and the planting of trees and hedgerows would provide connectivity for bats to commute between foraging grounds (refer to Figure 2.8 Environmental Masterplan, Volume 6.2). Three attenuation ponds would be built as part of the scheme, and these would also provide foraging opportunities for bats.

8.9.11 In order to ensure that the proposed scheme has a positive contribution towards local bat populations, a minimum of 220 bat boxes would be installed within suitable habitats adjacent to the proposed scheme, including boxes suitable for breeding and hibernation purposes.

8.9.12 A permanent hop over would be incorporated within the scheme design where the new road is likely to sever important commuting roosts. This is required for the hedgerow approximately 220 metres east of Canegore Corner, which links to the northern soil bund vegetated with trees and hedges, which leads to Steart Wood. This hop over would be formed with permanent mature tree planting, designed into the soft landscaping strategy, ensuring that the height of the hop over builds gradually to encourage bats to fly up and over the A303. In addition to this, a dense shrub layer would be planted along the verge to discourage bats from crossing the road low down, forcing them up and over the road, away from traffic.

8.9.13 The design has sought to minimise potential impacts with directed luminaires and back plates to reduce spill. The lighting would comprise LED luminaires

that would be less attractive to flying insects, so that bats are not attracted to forage on insects that can be attracted to traditional lighting, particularly ultraviolet spectrums.

8.9.14 To reduce the impact of noise on sensitive foraging, commuting and roosting habitats, once established, the planting and earthworks would act as natural acoustic barriers, between the road and these habitats. This would reduce the potential for roost abandonment, and also limit the degradation of habitat suitability for foraging, roosting and commuting use adjacent to the sites.

Breeding birds

8.9.15 Habitat creation and replacement would provide a greater extent of habitat suitable for breeding birds. The planted habitats would be of a higher quality than the existing habitats available at baseline, and connectivity would be improved (see Figure 2.8 Environmental Masterplan, Volume 6.2). The 3 attenuation ponds would also provide new habitat for birds.

8.9.16 Loss of suitable nesting bird habitat would be mitigated by replacement planting of hedgerows and woodland, and the installation of 100 bird boxes.

Barn owls

8.9.17 To potentially reduce the number of barn owls killed by vehicles, barn owls should be encouraged to fly over the road at a height of at least 3 metres. This would be achieved by planting continuous hedges and shrubs and trees greater than 3 metres high adjacent to the carriageway along both sides of the road as screening. This would encourage barn owls to fly up and over the passing vehicles.

8.9.18 Areas of rough species-rich grassland would be created away from the road verge to provide barn owls with foraging habitat. Thirteen additional nest boxes would be provided at least every 1 kilometre. Boxes should be installed where there is suitable roosting and foraging habitat. It is recommended that these are placed no closer than 1 kilometre, ideally 3 kilometres[28], from the scheme and in pairs within 500 metres of each other at a density of about 1 pair per kilometre.

8.9.19 As barn owls are nocturnal, light emissions from the road would be minimised by using directed luminaires and back plates to reduce spill.

[28] Ramsden, D.J. (2003). *Barn Owls and Major Roads: results and recommendations form a 15-year research project*. The Barn Owl Trust, Ashburton.

Great crested newts

8.9.20 To minimise the risk of killing and injury of GCN due to them becoming trapped in drainage gully pots associated with the new road, no kerbs would be installed around the gully pots which are within 500 metres of meta-population A and C. Additionally, gulley pots within 500 metres of the meta-populations would be fitted with Amphibian Gully Pot Ladders[29] to allow a means of escape for any amphibians which become trapped.

8.9.21 In order to mitigate for the permanent loss of terrestrial habitat and 2 ephemeral ponds within 500 metres of GCN breeding ponds, habitat restoration and creation would be undertaken. The GCN mitigation strategy would ensure that there is sufficient terrestrial habitat to maintain the favourable conservation status of the affected GCN populations. The strategy includes the reinstatement of areas of temporary construction losses, re-seeding with native species-rich grassland mixes and planting with native trees and shrubs. To mitigate for the permanent habitat losses, the landscape design would enhance areas of retained and restored habitat through the creation of diverse species-rich grasslands, 2 wildlife ponds and diverse areas of native woodland, scrub and shrub habitats. These habitats would be subject to a habitat management plan to ensure that they remain suitable for GCN in the long term.

Reptiles and invertebrates

8.9.22 The environmental design includes the replacement and creation of habitats of value to reptiles, such as grassland, scrub, ponds, woodland glades and the provision of log and brash piles, and a variety of habitats for all invertebrate species to use, including the provision of replacement scrub and hedgerows, the planting of wildflower grassland and the creation of log piles to be placed in a range of sunny and shady locations (refer to Figure 2.8 Environmental Masterplan, Volume 6.2).

8.9.23 Once the vegetation along the highways verge has established, this would provide a wildlife corridor which reptiles can utilise for basking, foraging and shelter.

Brown hairstreak

8.9.24 New hedgerows would be planted at an amount equivalent to hedgerow loss. The new hedgerows would incorporate native broadleaved trees with frequent or occasional blackthorn. Where possible, the new hedgerow planting would be undertaken prior to vegetation clearance to allow brown

[29] McInroy, C. & Rose, T.A. (2015) *Trialling amphibian ladders within roadside gullypots in Angus, Scotland: 2014 impact study*. Herpetological Bulletin 132. pp 15-19

hairstreak to colonise new planting. The hedgerows would connect to existing hedgerows to retain the connectivity of the habitat and prevent habitat fragmentation.

Mitigation measures

Construction

8.9.25 An ***Outline Environmental Management Plan (OEMP) (document reference TR010036/APP/6.7*)** has been prepared for the scheme, to manage any environmental effects of the scheme and to demonstrate compliance with environmental legislation.

8.9.26 Mitigation during construction would include fencing in accordance with BSI 5837:2012[30] to protect trees that do not require removal (see Appendix 7.3 Arboricultural Implications Assessment, Volume 6.3).

8.9.27 During construction, measures to mitigate the impact of dust on ecological receptors would include the use of screens. Cutting, grinding or sawing equipment would be fitted with, or be used in conjunction with, suitable dust suppression techniques such as water sprays or local extraction (for example suitable local exhaust ventilation systems). Materials that have the potential to produce dust would be removed from site as soon as possible, unless being re-used on site. Stockpiles being re-used would be seeded or fenced to prevent wind whipping. All vehicles would be required to switch off engines when stationary to mitigate air pollution, noise and vibration disturbance during construction. Measures are detailed within Section 5.9 of Chapter 5 Air Quality, Volume 6.1.

8.9.28 To minimise adverse impacts on watercourses and associated species, and ensure compliance with the Water Resources Act 1991, measures would be taken to prevent or minimise any sediments entering the freshwater, using control measures as outlined in CIRIA C532 Control of Water Pollution from Construction Sites[31]. The woodland within Hazlegrove House RPG has been classified as a habitat of principal importance and was assigned the NVC community of W8e *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, *Geranium robertianum* sub-community.

8.9.29 To minimise the loss of this habitat type, soil would be translocated to new areas of woodland creation, notably the area either side of Pepper Hill

[30] BSI (2012) Trees in relation to design, demolition and construction. Recommendations [online] available at: https://shop.bsigroup.com/ProductDetail/?pid=000000000030213642 (last accessed July 2018).
[31] CIRIA (2001) Control of Water Pollution from Construction Sites [online] available at: http://www.orkneywind.co.uk/advice/SEPA%20Pollution%20Advice/ciria%20c532.pdf (last accessed July 2018).

Copse. The soil would be an established fungal dominated soil type, with inter alia bulbs and micro-organisms to enable successful establishment within the newly created woodlands.

8.9.30 As the scheme requires the removal of important hedgerows, consultation with South Somerset District Council would be required and a notice made in writing would need to be submitted and approved by South Somerset District Council before the removal of any hedgerows is undertaken.

Protected species

8.9.31 Vegetation clearance and earthworks would be supervised by a suitably experienced ecologist in areas confirmed to have protected species present or habitat considered to have high potential for protected species. Toolbox talks would be prepared and delivered onsite to all personnel prior to any works by a suitably experienced ecologist.

8.9.32 Specific mitigation measures for each of the protected species are detailed below.

Badgers

8.9.33 Due to the presence of setts within the scheme red line boundary, it would be necessary to permanently exclude badgers under licence from Natural England. The setts would need to be destroyed prior to construction, and outside of the badger breeding season (30 November until 30 June). As the setts have been classified as subsidiary, annex or outlier setts, no artificial setts would be required. Mitigation to prevent injury to badger during works would include the provision of ramps into any open excavations to allow any badger that has fallen in to escape.

Bats

8.9.34 Surveys undertaken during 2017 confirmed that there was no current evidence of roosting bats within any of the trees or built structure that would need to be demolished. The risk to bats of killing or injury during habitat removal is therefore low. However, as bats often use numerous roosts interchangeably, and as roost suitability can change over time, it is still possible that bats could be encountered in trees or buildings to be removed.

8.9.35 The building to be demolished is known to have previously been used as a roost. To ensure legislative compliance and best practice, an internal inspection of the building would be scheduled a year prior to the planned demolition to inspect internal voids for evidence of recent roosting activity. It is also recommended that emergence and re-entry surveys are undertaken, spread through the survey season prior to demolition and in line with Bat

Conservation Trust (BCT) Best Practice Guidelines[32]. Results from these surveys would be used to determine whether roosts within the building have become active again, and the need for a European Protected Species (EPS) mitigation licence**.**

8.9.36 In order to mitigate for the loss of the roosting resource provided by the building, the installation of a bat house within suitable habitat is recommended. Please refer to section 4.1.5 of Appendix 8.4 Bat Technical Report for further details. A bat house would aim to replace the potential roost lost and enhance the site for species such as lesser horseshoe and serotine which have been recorded.

8.9.37 To reduce the potential of severing commuting routes, gaps in hedgerows required for removal for access during construction would be limited to the smallest length possible, and would be no more than 10 metres wide. Temporary mitigation to reduce the severance effect of hedgerow removal is also recommended in the form of dead hedging. Piles of branches and twigs would be arranged to form a barrier across any gaps in the hedgerow. These can be created using materials from vegetation clearance, and can be used across gaps as replanting is establishing. In addition to this, these materials can be made into solid structures, and placed across gaps in the hedgerow at night to ensure hedgerows remain connected for bats throughout construction.

8.9.38 In order to reduce any impact from increased levels of disturbance from light, noise and vibration throughout construction of the proposed scheme, it is recommended that a 10 metre buffer zone is observed around hedgerows and woodland, and where roosts have been identified. This is particularly the case around the Myotis species roost in tree F008 at land parcel WS75059, and its connecting treeline (shown on Figure E.7 Confirmed Roost Map and Roost Type found within the Bat Technical Appendix 8.4, Volume 6.3). In this case a 10 metre buffer zone would be regarded as the absolute minimum buffer area, extending this wherever possible.

8.9.39 All lighting would be directed to minimise light spill and intrusion of dark skies, to avoid negatively impacting bat foraging behaviour. Boarded fencing would be installed if necessary to prevent light spill into key habitats, so that dark corridors would be maintained.

Breeding birds

8.9.40 During bird nesting season (generally taken as March to August inclusive), sensitive working methods, to minimise the impacts on nesting birds would

[32] Bat Conservation Trust (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition)

be implemented. If works commence in the bird breeding season a suitably experienced Ecologist would carry out a nesting bird check on any vegetation to be cleared, or vegetation to be retained, but which is directly adjacent to major works, no more than 24 hours prior to works commencing. All vegetation clearance carried out outside the nesting bird season would be supervised by a suitably experienced ecologist.

Barn owls

8.9.41 Prior to the start of the works the 2 recorded Occupied Breeding Sites (OBS) and all previously identified Potential Nesting Sites (PNS) must be rechecked within 1 kilometre of the works to ensure that barn owls have not started using these locations for breeding and are therefore not at risk of disturbance. In order to confirm if a barn owl is nesting at a PNS, a Natural England licenced surveyor is required.

8.9.42 Closure of OBS1 would need to take place outside of the breeding season by a licenced Ecologist to facilitate the construction of the haul route. Three new nest boxes would be installed to mitigate for this loss. Barn owls would not be encouraged to nest within 1 kilometre of a major road as these individuals are highly likely to be killed[33] and therefore the placement of compensatory boxes should be greater than 1 kilometre from the road.

8.9.43 No works would take place within 20 metres of an active barn owl nest. If an active nest is identified during the works, a suitably qualified Ecologist would assess the potential impacts and recommend mitigation. Before work can recommence a licensed person would check that the chicks have fledged and are no longer dependent upon the adults.

Great crested newts

8.9.44 Surveys identified 2 distinct meta-populations. Meta-population A located at Downhead and meta-population C located at Hazlegrove, have medium populations. A Natural England EPS Mitigation licence would be required to undertake the proposed works. This would include the installation of exclusion and drift fencing and relocation of individuals from areas of suitable terrestrial habitat impacted by the scheme into 2 receptor sites within the existing meta-population areas.

Reptiles

8.9.45 Activities during the site clearance and construction phase may result in harm to reptiles and would therefore need to be mitigated to avoid a legal

[33] Ramsden, D.J. (2003) *Barn Owls and Major Roads: results and recommendations form a 15-year research projec*t. The Barn Owl Trust, Ashburton.

offence. In areas of high reptile suitability (such as grassland habitats), reptiles would be persuaded to move away from the works area, with any remaining animals captured and relocated prior to construction. The persuasion strategy entails phased cutting to encourage reptiles into adjacent areas of suitable habitat. However, some areas within the scheme red line boundary would be subject to a capture and translocation programme only, since persuasion would not be effective given the adjacent habitat types (such as arable or grazed poor semi-improved grassland).

8.9.46 Capture and translocation requires the installation of an exclusion fence around suitable reptile habitats, with internal drift fencing to compartmentalise the area. Artificial Cover Objects (ACOs) would be laid as refugia to attract reptiles so that they may be caught. Given large areas of the scheme footprint are unsuitable for reptiles (such as the arable fields), it is not considered necessary for exclusion fencing to be installed around the entirety of the works as it would be materially wasteful and disproportionate. Exclusion fencing around the higher quality habitat would effectively prevent reptiles from accessing the works area.

8.9.47 Following the capture programme, the grassland would be strimmed and supervised destructive searches and a top soil strip would be undertaken.

8.9.48 The receptor site for captured individuals is located greater than 400 metres to the north of the A303. To increase the current reptile carrying capacity, the receptor site would need to be made more suitable for reptiles prior to translocation. This can be achieved by enhancing both the northern and southern sections of the receptor sites through the installation of 2 hibernacula, 1 to the north and 1 to the south, fencing off the northern area from sheep to decrease disturbance and grazing pressure and allowing the grass structure to develop, and maintaining an area to the south where mowing would be sensitive to reptiles and cut on a rotation.

Brown hairstreak butterfly

8.9.49 Hedgerow removal would be carried out in the winter months. Brown hairstreak ovum would be translocated by a suitably experienced Ecologist into new hedgerow planting or within retained hedgerows subject to landowner agreement. This would allow brown hairstreak to become established and prevent the loss of brown hairstreak during vegetation clearance.

Riparian mammals

8.9.50 Where water voles have been identified within the ditch within Hazlegrove House RPG, a minimum of a 5 metre buffer from the top of the ditch would

be created. This buffer would be fenced to prevent any plant or operatives entering and disturbing the area.

Operation

8.9.51 A 3 year aftercare period would follow completion of the works. During this time, maintenance activities would be undertaken to ensure the successful establishment of planting and provision of new functioning habitats. Maintenance and monitoring tasks would be prescribed in the LEMP (as described in Annex B.7 of the ***OEMP*****, *document reference TR010036/APP/6.7***), to be developed by the Contractor. This would include the replacement of failed or defective plants.

8.9.52 Long term maintenance objectives and activities would be provided in the HEMP which would be issued at the end of the Aftercare period. The HEMP would detail maintenance and monitoring for Years 5 to 20 and would be consistent with the wider landscape and habitat management routine of the surrounding highway network. This document would ensure the ongoing success of habitat reinstatement to maturity.

8.10 Assessment of likely significant effects

Construction

Designated sites

8.10.1 The scheme is located within 30 kilometres of Mells Valley, North Somerset & Mendip Bats and Bracket's Coppice SACs which are designated for bat conservation. However, due to the substantial distance between the SACs and the works footprint, no direct or indirect adverse impacts such as habitat loss, noise and air pollution are anticipated on Annex II bat species, which are the qualifying features of the SACs as a result of the works. The effect of the scheme on these SACs is considered to be Neutral during construction.

8.10.2 The scheme is located over 7 kilometres from the Somerset Levels and Moors SPA and Ramsar and is 15.5 kilometres upstream of the designations. Due to the substantial distance between the scheme and the SPA/ Ramsar, any pollutants entering the surrounding drainage network during construction would be greatly diluted if and by the time they reached the SPA. In addition, the SPA is made up on numerous separate component areas, located apart from each other preventing the SPA as a whole being subject to pollution effects in the event that a spillage occurs on site. it is not considered that construction activities would have a direct effect on the designated sites. Therefore, the effect is considered to be Neutral.

8.10.3 Sparkford Wood SSSI is located over 1 kilometres from the scheme, which is sufficiently far that it would not be subject to air quality impacts as a result of the works. Additionally, the SSSI is not hydraulically linked to the scheme and therefore, there is no impact pathway for water quality effects during the construction phase. Sparkford Wood SSSI would not be affected by the works, either directly or indirectly. The effect on the SSSI is assessed as Neutral.

8.10.4 Part of Hazlegrove Park LWS is located within the footprint of the scheme. There would be a partial loss (<1%) of the LWS from its periphery to accommodate the new access roads. The habitats lost are predominantly arable, poor semi-improved grassland and the northern tip of the woodland which fall within the LWS boundary. One veteran tree, for which the site is designated for, would be removed during construction (further information is contained within Appendix 7.1 Arboricultural Constraints Report and Appendix 7.3 Arboricultural Impact Assessment, Volume 6.3). Therefore, a Slight Adverse effect is anticipated.

8.10.5 To facilitate the new turning point and PRoW within Gason Field Lane LWS, a small partial loss from the edge of the field would be required to construct this. Construction activities would require a working area of 0.06 hectares, which comprises 3% of the 1.84 hectares of the LWS. Due to the minimal scale and location of the works area at the periphery of the LWS, there would be no loss of function to the habitats, and no specific mitigation is required. This would result in a Slight Adverse effect.

8.10.6 The scheme is adjacent to Camel Hill Transmitter Site LWS and a small section of Downhead Manor Farm LWS, where the new access road would connect with the existing road leading into Downhead. Construction activities would have the potential to increase the risk of a pollution incident occurring, which could have an effect on the LWS. With measures included in section 8.9, the scheme is anticipated to have a Neutral during construction.

8.10.7 Gason Lane Field LWS and Ridge Copse LWS are approximately 30 metres and 50 metres respectively from the scheme, located on top of the ridge. Downhead Manor Farm LWS is located, at its closest point, 150 metres from the main construction of the scheme. The scheme would not result in habitat loss of any of these sites. However, during construction there is potential for there to be noise and light disturbance as well as potential air quality effects. The scheme is anticipated to have a Slight Adverse effect during construction.

8.10.8 The remaining LWSs are located over 200 metres from the scheme and considered to be at a sufficient distance to not be directly or indirectly

impacted by the scheme. The effects of the scheme on these designated sites would be Neutral.

Priority habitats

8.10.9 The priority habitats (indicated with an asterisk) that would be affected during construction are detailed in Table 8.9. These include areas required to facilitate construction of the road and temporary working areas such as top soil storage, compounds and access routes.

8.10.10 Habitats which are not considered to be VERs have been included in the table only to ensure the overall loss of habitats is transparent. As discussed in section 8.7.63, these would not be assessed individually.

Table 8.9: Type and area of habitat affected during construction

Habitat type	Habitat loss
Hedgerows*	Native species rich intact: 7,108.8 linear metres
	Native species poor intact: 2,988.16 linear metres
	Native species poor defunct: 454.23 linear metres
Broadleaved Semi-Natural Woodland*	1.63 ha
Broadleaved and Mixed Plantation Woodland*	0.85 ha
Parkland*	0.8 ha
Calcareous grassland*	0.06 ha
Ponds*	2 dry ponds
Arable	41.40 ha
Poor semi-improved grassland	22.42 ha
Improved grassland	23 ha
Amenity grassland	1.1 ha
Scrub	0.99 ha

* *priority habitats*

Hedgerows

8.10.11 The construction works would result in the loss of, or partial loss, of hedgerows, including those identified as species-rich and ‘important’. The potential impacts on hedgerows resulting during construction include:

- loss of hedgerows
- fragmentation of connectivity between hedgerows
- severance of wildlife corridor routes

8.10.12 The construction of the road would require the removal of hedgerows to allow the future operation of the road. The majority of the hedgerows surveyed either lie along the verge of the existing A303, or connect to these hedgerows; therefore, many of the hedgerows within 50 metres of the scheme would require removal of some form and this could not be avoided to accommodate the scheme footprint.

8.10.13 In total approximately 10.55 kilometres of hedgerows require removal. Of this, approximately 2.8 kilometres would be a permanent loss and 7.75 kilometres would be a temporary loss to be reinstated following construction.

8.10.14 Of the 10.55 kilometres of hedgerow required to be removed, approximately 7.1 kilometres is species-rich, with 4.59 kilometres of this species-rich hedgerow considered as 'important' under the *Hedgerow Regulations*. A Moderate Adverse effect is considered likely during construction.

Broadleaved semi-natural and plantation woodland

8.10.15 The largest area of broadleaved woodland to be directly impacted by the scheme is located to the south of Hazlegrove House RPG. Approximately 1.33 hectares of woodland in this location would be removed to facilitate the scheme's construction.

8.10.16 Other areas of smaller woodland loss include the linear belt of plantation woodland verge along the existing eastbound A303 carriageway (0.31 hectares), the linear belt of plantation verge along the westbound A303 carriageway (0.33 hectares) and scattered losses of small areas of broadleaved woodland to the north of the existing A303. The significance of effect for woodland is assessed as being Slight Adverse.

Parkland

8.10.17 To facilitate the new access road into Hazlegrove Preparatory School, construction activities would result in the loss of 0.8 hectares of parkland. This area of habitat loss consists of grazed, poor semi-improved grassland. The scheme has been designed to minimise direct or indirect impacts on the veteran trees. However, 1 veteran tree would be removed to facilitate construction.

8.10.18 Works in close proximity to retained trees have the potential to adversely affect them through ground compaction, thereby causing damage to the root system. A Slight Adverse effect is anticipated during construction.

Calcareous grassland

8.10.19 The scheme is partially located within Gason Field Lane LWS, which is designated for its calcareous grassland habitat. A small partial loss from the edge of the field would be required to construct the new turning access. A PRoW is proposed along the periphery to the west of the LWS. This would result in the small loss of 0.03 hectares of calcareous grassland.

8.10.20 The construction works are also located adjacent to an area of calcareous grassland known as Camel Hill Transmitter Site LWS. Possible impacts on

this habitat are associated with pollution from mobilised suspended solids and spillages of materials associated with routine run-off and increased levels of airborne pollutants during the construction phase. The scheme is therefore anticipated to have a Slight Adverse effect during construction.

Ponds and ditches

8.10.21 There would be no direct loss of ponds and ditches from within the scheme boundary. However, 2 small ephemeral ponds (seasonally dry and 1 permanently dry) would be lost due to the construction of the scheme. Works in close proximity to retained ponds and ditches have the potential for contaminated soil or contaminated run-off to enter these water bodies. However, all works would be kept a minimum of 5 metres from existing waterbodies. A Neutral effect is considered likely for ponds and ditches during construction.

Protected species

Badgers

8.10.22 The proposed scheme would result in the loss of 1 annex sett (sett 1a), 2 subsidiary setts (sett 19 and sett 30) and 3 outlier setts (sett 1b, 1c and 64). Three subsidiary setts (sett 5, sett 18 and sett 63) would be subject to disturbance and would therefore require temporary closure. The setts would need to be closed to the badgers under licence from Natural England.

8.10.23 Ninety-one hectares of habitat clearance would be undertaken in total, of which 77.4 hectares would be temporary and 13.7 hectares would be permanent. Therefore, the availability of foraging habitat would be reduced. Access to the wider area would not be restricted during the construction phase, and badgers would be able to move into adjacent areas. Therefore, alternative habitat suitable for foraging and sett creation would be available for badgers in retained setts.

8.10.24 Disturbance from construction is envisaged in the form of noise and vibration from increased levels of activity. Badgers appear to be able to withstand significant amounts of noise or activity near to their setts without apparently being disturbed and as a general guide any setts located more than 30 metres away are unlikely to be disturbed by normal construction activities.

8.10.25 Badger mortality could occur as a result of falling into excavations or coming into contact with dangerous objects or chemicals during the construction period. It is anticipated that the scheme would result in a Slight Adverse effect on badgers during construction.

Bats

8.10.26 Although no bat roosts would be directly affected during construction, disturbance from construction works has the potential to cause roost abandonment resulting from increased light, noise and vibration levels.

8.10.27 Tree felling and hedgerow removal proposed as part of the construction works including the construction of the haul route, has the potential to disrupt commuting routes and reduce foraging resources, in addition to resulting in permanent loss of habitat on site. Vegetation clearance, including grassland habitats would also result in permanent loss of habitat, and reduce the foraging resources on site.

8.10.28 In order to facilitate the widening of the existing A303, large areas of hedgerow adjacent to the road running east to west are to be removed. Sections of these hedgerows have been shown to be of importance to commuting bats, both through their support of rarer bat species and the high levels of activity noted by more common bat species in the area. These hedgerows have therefore been noted as being important links between bat roosts and foraging grounds. The loss of this habitat has the potential to result in fragmentation of habitat, severing the links that commuting routes serve between roosts and foraging grounds. In addition to this, where linear features are lost, and replaced directly with new road infrastructure, there is likely to be an increase in collision risk of bats with vehicles.

8.10.29 Increased levels of disturbance, particularly from light and noise associated with construction works, in particular night works, also has the potential to alter commuting and foraging behaviour of bats. With slower flying species such as lesser horseshoe known to avoid lit areas, while others such as common pipistrelle are known to change their foraging behaviour in lit areas, concentrating their foraging effort on smaller lit areas. The potential effects on bat species have been minimised where possible during the construction phase through retaining habitat where feasible; implementing buffers of at least 10m between works and important roosting or foraging habitats; installation of additional bat roosting features and planting of compensatory habitat. However, due to large extents of hedgerow habitat being present adjacent to the existing A303 carriageway, it was not possible to avoid removal of large extents of hedgerow habitat to accommodate the scheme. The significance of effect on bats during construction has been assessed as Moderate Adverse.

Breeding birds

8.10.30 Construction activities have the potential to damage and / or destroy active birds' nests through vegetation removal. This would also result in the reduction of nesting, foraging and roosting habitats for breeding birds.

8.10.31 The loss and fragmentation of breeding bird habitat would have a wide-ranging impact with about a third of all the species recorded utilising this habitat within the study area. The importance of hedgerows is especially pertinent considering the wider arable landscape. Farmland birds, such as yellowhammer and song thrush, would be affected by the loss of their hedgerow breeding and summer foraging habitat.

8.10.32 Disturbance from construction is envisaged in the form of noise and vibration from increased levels of activity. It is not known exactly what the impacts of noise are likely to be on the local breeding bird population but as the majority of the species recorded during the survey are song-birds, the potential for noise impacts is wide ranging. Therefore, the significance of effect on breeding birds is anticipated as being Slight Adverse.

Barn owls

8.10.33 During construction, there would be a loss of high quality foraging habitat. Barn owls tend to concentrate their hunting on small patches of high quality long grass areas.

8.10.34 Two locations have been identified as OBSs. The location of the northern haulage road would pass over OBS1, therefore losing this nesting location. OBS2 is located 267 metres from the red line boundary and foraging activities may be impacted.

8.10.35 Lighting of construction areas and access routes during times when the barn owls are active may cause the owls to avoid areas and further cause a barrier to dispersal.

8.10.36 An increase in noise disturbance to nest locations close to the scheme above that of the current activity levels may cause abandonment of the nesting location. Initial nest location selection, egg laying and incubation are particularly sensitive to nest desertion and breeding failure. Human and construction activities can cause barn owls to abandon the nest. Prolonged disturbance would prevent the adults from returning to the nest causing breeding failure. Different types of activities can have differing levels of disturbance to barn owls. Heavy construction works such as ground levelling and pile-driving can cause disturbance as far away as 175 metres. Vehicular movement has a much lower disturbance distance at around 40 metres, however, this is dependent on the base levels of activity such as normal farm

vehicle activity. Mitigation measures have been incorporated within the scheme to minimise potential impacts to barn owls. These include the closure of OBS1 by a licensed ecologist; retaining a 20 metre buffer around active barn owl nests to reduce potential disturbance effects and minimising light spill through a sensitive lighting design. However, due to the scale of the project, it is anticipated that there would be a Moderate Adverse effect on barn owls during construction.

Great crested newts

8.10.37 The construction works would result in the loss of terrestrial habitat for GCN, including semi-natural broadleaved woodland, scrub, hedgerows and field margins and areas of improved and semi-improved species-poor grassland. No aquatic habitats which have been found to support GCN would be directly impacted. However, 2 ephemeral ponds would be permanently lost.

8.10.38 Vegetation clearance and topsoil stripping during construction within habitat suitable for GCN has the potential to adversely affect this species as a result of disturbance or direct injury, potentially leading to death.

8.10.39 In addition, the works have the potential to cause noise, vibration and light (during night works) disturbance during construction and increase the risk of siltation and run-off which could impact retained GCN ponds.

8.10.40 The total habitat lost during construction within 500 metres of the Downhead meta-population is approximately 15% of the habitat available. This is predominantly low-quality habitats such as grazed poor semi-improved grassland and arable fields. However, sufficient high quality terrestrial habitat would be unaffected in the wider area within 500 metres of this meta-population, including an extensive hedgerow network.

8.10.41 There would be no habitat loss within the core habitat (0-50 metres) and intermediate habitat (50-250 metres) of the Hazlegrove population. A total of 3.48 hectares would be impacted between 250 metres and 500 metres (distant zone) of the meta-population. This 3.48 hectares consists of 0.47 hectares of permanent habitat loss and 3.01 hectares of temporary loss of habitats. The habitats affected are predominantly grazed poor semi improved grassland (74%). Other habitats affected include improved grassland, arable field and small areas of broadleaved and plantation woodland. The total habitat lost during construction within 500 metres of the Hazlegrove meta-population is approximately 5% of the habitat available. Therefore, a Slight Adverse effect on GCN is considered likely during construction.

Reptiles

8.10.42 The construction works would result in the loss of terrestrial habitat for reptiles, including field margins, roadside verges, areas of improved and semi-improved species-poor grassland and hedgerows. This would result in reduced areas for foraging, shelter and basking opportunities.

8.10.43 Vegetation clearance and topsoil stripping during construction within habitat suitable for reptiles has the potential to adversely affect this species as a result of disturbance or direct injury, potentially leading to death. Therefore, a Slight Adverse effect on reptiles during construction is anticipated.

Invertebrates

8.10.44 Vegetation clearance during construction would result in the loss of suitable brown hairstreak ovum laying habitat such as hedgerows containing blackthorn. Construction activities also have the potential to cause harm and / or disturbance to invertebrates and in particular, the brown hairstreak butterfly themselves. The scheme is considered to have a Slight Adverse effect on invertebrates during construction.

Riparian mammals

8.10.45 The scheme is not anticipated to directly affect any watercourses used by otters or water vole or result in fragment or isolation of habitats that these species may use.

8.10.46 The scheme would utilise the field directly adjacent to Area D for an attenuation pond and topsoil storage. Please refer to drawing HE551507-MMSJV-EBD-000-DR0LB-0084 located within Appendix 8.10 Water Vole and Otter Technical Report, Volume 6.3. This activity has the potential to damage burrows, cause disturbance during the works, change the drainage of the land and reduce the water quality. Owing to the proximity of soil storage to the ditch, this would also result in the release of silt into the ditch reducing the quality of the habitat, and therefore limiting the availability of suitable habitat for water voles. The ditch closest to the works is considered to be of local and seasonal importance. To minimise the risk, a 5 metre buffer would be specified from the ditch, as described in section 8.9.49. A Neutral effect is considered likely for riparian mammals during construction.

Operation

Designated sites

8.10.47 As the scheme follows a similar alignment to the existing A303 and is considered unlikely to affect bat roosts, cause fragmentation of habitats or affect foraging or commuting routes, no impact on any of the bat SACs is considered likely and a Neutral effect is anticipated during operation.

8.10.48 As the Somerset Levels and Moors SPA and Ramsar is located 7.3 kilometres west of the scheme, it is considered to be at a sufficient distance that it would not be impacted by air quality impacts during operation. The SPA / Ramsar is 15.5 kilometres hydrologically downstream of the scheme. Due to this distance, in the event that pollutant run-off from the scheme enters the surrounding drainage network, it would be diluted to such an extent that pollution entering the SPA and Ramsar would be greatly reduced from the source of the pollution. Additionally, as the SPA / Ramsar comprises numerous components, separate from each other, any potential pollution event would not affect the designated sites as a whole and wading bird and invertebrate species that are qualifying features of the designations would not be subject to significant effects. Therefore, it is not considered that the SPA and Ramsar would be directly or indirectly impacted once the scheme is operational and the significance of effect is considered to be Neutral.

8.10.49 Once operational, the new dual carriageway would result in traffic travelling at higher speeds compared to the existing A303, which may result in changes to air quality for designated sites. However, Sparkford Wood SSSI is located over 1 kilometre from the scheme and is considerably outside the ZoI for air quality impacts (greater than 200 metres), therefore it is considered that Sparkford Wood SSSI is at a sufficient distance for it to not be directly or indirectly affected by the scheme and a Neutral effect is anticipated.

8.10.50 In the opening year of the scheme, annual mean NO_x concentrations for Whitesheet Hill SSSI at the closest point to the ARN (and therefore where concentrations would be greatest) are well below the annual mean NO_x objective (30 µg/m^3). This site is expected to experience an increase in NO_x of 0.1 µg/m^3 as a result of the scheme. Therefore, the changes in air quality once the scheme is operational, are not anticipated to be significant and a Neutral effect has been concluded.

8.10.51 Once operational, the scheme is not anticipated to adversely affect Gason Lane Field LWS and Ridge Copse LWS. The new road alignment would be located approximately 40 metres and 50 metres respectively (at the furthest

point) away from both LWS, when compared to the existing A303. Therefore, the change in alignment is considered to be beneficial in reducing air quality impacts associated with changes in NO_x levels on these locally designated sites. For LWSs such as Downhead Farm LWS, the changes in NO_x are not anticipated to exceed the 30 µg/m^3 threshold. Therefore, there would be no significant adverse effects in relation to changes in air quality.

8.10.52 For Camel Hill Transmitter Site LWS and Hazlegrove Park LWS, it is anticipated that there would be increases in NO_x concentrations once the scheme is operational. The increases would affect the periphery of the LWSs and this has the potential to result in a small area of habitat degradation. However, the sites are already subject to the existing A303 and exposed to car emissions to varying degrees. The changes in air quality are not anticipated to result in a significant adverse effect as the overall function of the LWSs would still be maintained.

8.10.53 Once operational, there would be a permanent but very small loss of Hazlegrove Park LWS due to the new access roads. The habitats lost include broadleaved woodland and grazed poor semi-improved grassland. This loss represents <1% of the total LWS and is located along its periphery. Therefore, the integrity of the LWS is still maintained and there would be no significant adverse effects.

8.10.54 The turning point and PRoW within Gason Lane Field LWS would result in the small loss (3%) on the edge of the field to accommodate the access point. However, as this is located on the periphery and represents a very small loss of the overall LWS, it is not considered that the impact would be significant in maintaining the integrity of the LWS.

8.10.55 For all the above LWS, it is anticipated that there would be a Slight Adverse effect once the scheme is operational.

Priority habitats

8.10.56 Habitat reinstatement and planting would replace the 77.41 hectares of habitats temporarily damaged during construction and compensate for the 13.68 hectares of habitat that would be permanently lost as hard standing (such as the new A303). For habitats of negligible conservation value, approximately 22 hectares of habitat would be reinstated (such as arable, semi-improved grassland) and 20 hectares of amenity grassland created along the A303 verge.

8.10.57 The habitat replanting would achieve a net biodiversity gain for all priority habitats such as woodland, parkland, hedgerows, ponds and calcareous

grassland and result in the additional creation of 19.76 hectares of trees and shrubs, resulting in a Slight Beneficial effect once fully established.

8.10.58 The higher biodiversity value planting would ensure greater long term (5 years) resilience against adverse events. This is presented in Table 8.10.

Table 8.10: Habitat replacement and compensation for priority habitats during operation

Type of habitat	Overall habitat lost	Reinstatement or compensation planting	Net gain achieved
Native species-rich hedgerows	7.11 kilometres.	No net loss. Reinstated and replanted with native species-rich hedgerows.	3.33 kilometres of species rich hedgerow.
Native species-poor and defunct hedgerows	2.99 kilometres of species-poor hedgerow. 0.45 kilometres of defunct species-poor hedgerow. Total hedgerows removed (native species rich, native species poor and defunct combined): 10.55 kilometres	Reinstated and replanted with native species-rich hedgerows. Total species rich hedgerow replanted 10.44 kilometres	
Broadleaved semi-natural woodland	1.63 hectares	No net loss. Replanted with native woodland species. 4.68 hectares of broadleaved woodland replanted.	2.19 hectares of broadleaved woodland. 19.76 hectares of native trees and shrubs. 11 individual trees
Broadleaved plantation woodland	0.85 hectares		
Parkland	0.8 hectares	No net loss. Creation of parkland with 6.51 hectares of species-rich grassland. 40 individual trees	5.71 hectares of parkland creation
Calcareous grassland	0.06 hectares	Compensated for by creation of alternative habitat	7.61 hectares of species-rich grassland
Ponds	2 dry ponds	Two wet ponds created.	2 wet ponds 0.03 hectares

Type of habitat	Overall habitat lost	Reinstatement or compensation planting	Net gain achieved
			0.18 hectares marginal planting 1.81 hectares wet grassland

Protected species

Badger

8.10.59 One badger tunnel would be installed at a location where badgers have been identified crossing the existing A303. Hedgerows, trees and shrubs and areas of woodland would be created along the length of the new road and would provide connectivity between foraging areas and sett habitat. Habitats planted to replace those damaged or as compensation for habitats lost would be of higher ecological function and of greater extent than those currently available. It is anticipated that the scheme would result in a Neutral effect during operation on badgers.

Bats

8.10.60 Due to the presence of additional lighting at the Hazlegrove Junction, the operation of the A303 would have minor adverse impacts on some species of bats.

8.10.61 Permanent habitat loss, notably hedgerows along the existing A303 are used for foraging and commuting. Where these areas of lost habitat would not be replanted, with the operational road taking their place, there is likely to be adverse effects due to the permanent severance of these commuting routes.

8.10.62 However, the 2 wet ponds, woodland, hedgerows and species-rich grassland that would be planted along the road verge to replace habitat damaged or as compensation for loss, would provide higher quality habitat than at baseline and ensure that areas of foraging are provided and important commuting routes are maintained. Additionally, 220 bat boxes and 1 bat house would provide year-round roosting opportunities. The significance of effect on bats during operation has been assessed as Slight Adverse.

Breeding birds

8.10.63 It is anticipated that the habitat planting (as previously described in section 8.10.56), installation of 100 nest boxes, and the implementation of design features, such as directed lighting, would ensure any adverse effects are

mitigated. Therefore, the significance of effect on breeding birds is anticipated as being Neutral.

Barn owls

8.10.64 Due to the increased widening of the road, there is the potential for the road to act as a barrier to dispersal through loss of forging corridors. The increase in size of the road and speed may also lead to mortality due to vehicle collisions once the road is operational. To reduce the number of barn owls killed by vehicles, barn owls would be encouraged to fly over the road at a height of at least 3 metres by planting continuous hedges, trees and shrubs adjacent to the carriageway along both sides of the road, which would act as a natural screening once established.

8.10.65 The presence of additional lighting at the Hazlegrove Junction may cause owls to avoid areas and further cause a barrier to migration and movement between foraging areas. However, the lighting is restricted and localised to 1 area, and the design of the lanterns would ensure directional lighting is used to minimise light spill onto adjacent habitats. Additionally, 13 barn owl boxes would be installed in areas of suitable roosting and foraging habitat. It is anticipated that there would be a Slight Adverse effect on barn owls during operation.

Great crested newt

8.10.66 There would be a permanent loss of terrestrial habitat during the operational phase in the vicinity of both GCN populations as a result of the scheme. However, the remaining terrestrial habitat would be of a higher quality following planting to replace habitat damaged during the construction phase. Additionally, there would be the creation of 2 new ponds to supplement the existing pond network. With well-considered design of the drainage infrastructure and attenuation ponds, risks to individual GCN during the operational phase would be minimal. A Slight Adverse effect on GCN is considered likely during operation.

Reptiles

8.10.67 During the operational phase, there would be a permanent loss of predominantly arable, poor semi-improved grassland and small areas of rank roadside verge. Habitat replanting would include areas of hedgerow and shrubs to provide shelter and commuting habitat for reptiles to utilise. The embankments would provide areas for basking and the creation of the species-rich grassland and woodland and pond mosaic would provide suitable foraging habitat for a number of reptile species. Habitat connectivity would be facilitated once the planting along the verges has established and

would provide connective corridors across the wider landscape. Therefore, a Neutral effect is anticipated.

Invertebrates

8.10.68 Once the scheme is operational and the planting has established, annual flailing of roadside hedgerows may result in the loss of suitable brown hairstreak ovum laying habitat and may cause harm and / or disturbance to brown hairstreak if present within the blackthorn hedgerows. The scheme is considered to have a Slight Adverse effect during operation.

Riparian mammals

8.10.69 The operational phase would not affect the connectivity of habitat for water vole or otter, and due to habitat creation within the wider landscape (as previously described in section 8.10.56), foraging habitat availability would be better than the habitat currently present. Additional noise from the new A303 or its access roads is also not predicted to affect these species. A Slight Beneficial effect is considered likely for riparian mammals once operational.

8.10.70 The effects for the scheme are summarised in Table 8.11 below.

Table 8.11: Summary of assessment of significance of effect

Receptor		Summary of effects	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with mitigation
Receptors and impacts relevant to the scheme					
Natura 2000 Sites	Mells Valley SAC North Somerset & Mendip Bats SAC Bracket's Coppice SAC	No adverse effects anticipated either directly or indirectly on the qualifying species or habitats.	Very High	**Construction Phase** No change **Operational Phase** No change	Neutral (Not Significant) (construction and operation)
	Somerset Levels and Moors SPA and Ramsar	Changes in water quality of the SPA/ Ramsar are considered unlikely. In the event that this did occur a significant effect on the designations' qualifying features would not occur.	Very High	**Construction Phase** No change **Operational Phase** No change	Neutral (Not Significant) (construction and operation)
Nationally Designated Site	Sparkford Wood Site of Special Scientific Interest	Potential for increased level of airbourne pollutants.	High	**Construction Phase:** No change **Operational Phase:** No change	Neutral (Not Significant) (construction and operation)
Nationally Designated Site	Whitesheet Hill SSSI	Potential for increased level of airbourne pollutants as it is located within 200 metres of the ARN.	High	**Construction Phase:** No change **Operational Phase:** No change	Neutral (Not Significant) (construction and operation)
Locally Designated Site	Hazlegrove Park LWS	Potential for pollution incidents and changes in airbourne pollutants. Loss of LWS (<1%).	Medium	**Construction Phase:** Minor adverse **Operational Phase:** Minor adverse	Slight Adverse (Not Significant) (construction and operation)
Locally Designated Site	Gason Lane Field LWS	Small loss of 0.06ha from periphery of Gason Lane Field to accommodate turning area and PRoW.	Medium	**Construction Phase:** Minor adverse **Operational Phase:** Minor adverse	Slight Adverse (Not Significant) (construction and operation)

Receptor		Summary of effects	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with mitigation
Locally Designated Site	Camel Hill Transmitter Site LWS, Ridge Copse LWS, Downhead Manor Farm LWS	Potential for pollution incidents and changes in airbourne pollutants during both construction and operation.	Medium	**Construction Phase:** Negligible **Operational Phase:** Minor adverse	Neutral (Not Significant) (construction) Slight adverse (Not Significant) (operation)
Priority Habitats	Hedgerows	Removal of hedgerows to facilitate construction works, loss of hedgerows to accommodate design.	Medium	**Construction:** Moderate Adverse **Operation:** Minor Adverse	Moderate Adverse (Significant) (construction) Slight Adverse (Not Significant) (operation)
	Broadleaved semi-natural woodland Broadleaved plantation woodland	Removal of small areas of woodland to facilitate construction works, loss of woodland to accommodate design.	Medium	**Construction:** Minor Adverse **Operation:** Negligible	Slight Adverse (Not Significant) (construction and operation)
	Parkland	Limited loss of this habitat to accommodate design. Removal of one veteran tree.	Medium	**Construction:** Minor Adverse **Operation:** Minor Adverse	Slight Adverse (Not Significant) (construction and operation)
	Calcareous grassland	Small loss of 0.06ha to facilitate the new turning area and PRoW.	Medium	**Construction:** Minor adverse **Operation:** Minor adverse	Slight Adverse (Not Significant) (construction and operation)
	Ponds and ditches	Limited loss of one ephemeral and one dry pond to facilitate construction works and to accommodate design.	Medium	**Construction Phase:** Negligible **Operational Phase:** Negligible	Neutral (Not Significant) (construction and operation)

Receptor		Summary of effects	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with mitigation
		Potential for increased surface run-off and pollution incidents into the local ditch network.			
Protected and Notable Species	Bats	Fragmentation of foraging and commuting routes, due to vegetation clearance, lighting and noise disturbance. Potential for disturbance, damage to or loss of bat roosts. Demolition of an existing building would result in the loss of a roost (currently not in use). EPS licence not required.	High	**Construction Phase:** Moderate Adverse **Operational Phase:** Minor Adverse	Moderate Adverse (Significant) (construction) Slight Adverse (Not Significant) (operational)
	Badger	Loss and severance of low to medium quality habitat. Vegetation clearance resulting in the disturbance or direct injury / death of badger. Noise, vibration and light (if night works) disturbance during construction and operation. Damage, or permanent exclusion from setts.	Medium	**Construction Phase:** Minor Adverse **Operational Phase:** Negligible	Slight Adverse (Not Significant) (construction) Neutral (Not Significant) (operation)
	Breeding birds	Loss of vegetation and disturbance reduces nesting potential within construction and operational area. Vegetation clearance could result in the destruction of nests and eggs, and killing / injuring of birds.	Medium	**Construction Phase:** Minor Adverse **Operational Phase:** Negligible	Slight Adverse (Not Significant) (construction and operation)
	Barn Owls	Loss of foraging habitat. Loss of nesting sites. Direct mortality through vehicle collisions.	High	**Construction Phase:** Moderate Adverse **Operational Phase:**	Moderate Adverse (Significant) (construction)

Receptor		Summary of effects	Sensitivity	Magnitude (with mitigation)	Overall significance of effect with mitigation
				Minor Adverse	Not significant (operation)
	GCN	Loss of terrestrial GCN habitat. Vegetation clearance resulting in the disturbance or direct injury / death of GCN. Noise, vibration and light (if night works) disturbance during construction and operation. Loss of 2 dry ponds.	High	**Construction Phase:** Minor Adverse **Operational Phase:** Negligible	Slight Adverse (Not Significant) (construction and operation)
	Reptiles	Habitat loss. Potential to kill and injure reptiles during earthworks and vegetation clearance. Potential to cause noise, vibration and light (if night works) disturbance during construction.	Medium	**Construction Phase:** Minor Adverse **Operational Phase:** Negligible	Slight Adverse (Not Significant) (construction and operation)
	Invertebrates	Loss of low quality terrestrial habitat. Loss of hedgerows containing brown hairstreak ovum. Potential to cause harm and / or disturbance to invertebrates.	Medium	**Construction Phase:** Minor Adverse **Operational Phase:** Negligible	Slight Adverse (Not Significant) (construction and operation)
	Riparian Mammals (notably water vole)	Potential to cause noise and vibration disturbance to water vole during construction. Potential for increased surface run-off and pollution incidents into the local ditch network.	Medium	**Construction Phase:** Negligible Adverse **Operational Phase:** Negligible	Neutral (Not Significant) (construction) Slight beneficial (Not Significant) (operation)

8.11 Monitoring requirements for residual significant adverse effects

8.11.1 The scheme is not anticipated to result in any residual significant effects once operational, and therefore no monitoring would be required.

Additional monitoring requirements for protected species

8.11.2 A monitoring plan to be detailed within the LEMP (as detailed in Annex B.7 of the ***OEMP***, ***document reference TR010036/APP/6.7***) would be put in place to assess whether the ecological receptors that would be subject to significant effects during construction have responded favourably to the mitigation, and to inform ongoing habitat management. If consistent methods are used pre- and post-development, population trends can be compared. The level of monitoring required depends on the population assessment and the impact of development. However, additional monitoring would be required for great crested newts under the European Protected Species Licence. Details of this monitoring has not been included below.:

Bats

8.11.3 Although there is no EPSM licence associated with the scheme, the scale and size of it means that best practice would recommend post development monitoring as follows:

- Part 3 HA80/99 of Volume 10 of the DMRB[34] recommends annual monitoring of bat boxes. It is recommended that bat boxes and the bat house are monitored for 3 years post construction (2021 – 2023), recording use and evidence of use and submitting records to the local record centre.
- Altringham *et al* (2015)[35] provides guidance for monitoring the potential impacts of bats from road schemes. In line with this it is recommended that repeats of crossing point surveys where habitat severance has occurred are completed 3 years post construction.
- In accordance with these guidelines, repeats of landscape scale transects are also recommended 3 years post construction.

Barn owls

8.11.4 Given that a significant effect on barn owls is anticipated, annual monitoring of nest boxes and verge planting for at least 5 years post construction is recommended. Evidence of road kill can be assessed during these monitoring

[34] Highways England (2001) Design Manual for Roads and Bridges Volume 10 Section 4 Part 3 HA 80/99 *Nature Conservation Advise in Relation to Bats* [online] available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol10/section4/ha8099.pdf (last accessed July 2018).

[35] The Bat Conservation Trust (2018) Roads [online] available at: http://www.bats.org.uk/pages/roads.html (last accessed July 2018).

visits. Timing and frequency of the monitoring surveys would follow the necessary guidance[36] with annual visits undertaken in July and August.

Additional monitoring requirements for habitats

8.11.5 A Moderate Adverse effect has been identified during construction for the loss of 'important' hedgerows as defined under the *Hedgerow Regulations 1997*. Habitat replanting would ensure that they are replaced with species rich hedgerows. To ensure the success of these hedgerows, and habitats replanted in general, mitigation planting areas would be maintained by Highways England for a period of 3 years from completion of the scheme. Audits would be carried out by a suitably qualified Landscape Architect to review the establishment and continued growth of new planting. This would be detailed within the LEMP, to be produced by the appointed Contractor.

8.12 Conclusions

8.12.1 The likely significant effects for each ecological receptor is reliant on the mitigation measures within Section 8.9 being implemented. The habitat strategy is based on the principles of no net loss and has also achieved a net gain in habitats of biodiversity value, which are of benefit to a wide range of protected species.

8.12.2 It is anticipated that the scheme would have a Neutral effect on the European Designated Sites during construction and operation.

8.12.3 The scheme is anticipated to have a Neutral effect on Sparkford Wood SSSI and Whitesheet Hill SSSI.

8.12.4 It is anticipated that there would be a Slight Adverse effect during construction and operation on Hazlegrove Park LWS, Camel Hill Transmitter Site LWS, Gason Lane Field LWS, Ridge Copse LWS and Downhead Manor Farm LWS.

8.12.5 The priority habitats of broadleaved semi-natural woodland, broadleaved plantation woodland, parkland and calcareous grassland were assessed as being affected at a significance of Slight Adverse at both construction and operation.

8.12.6 The scheme is anticipated to have a Moderate Adverse effect during construction on hedgerows, bats and barn owls and a Slight Adverse effect once operational.

[36] Shawyer, C. (2011) *Barn Owl Tyta alba Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Surveying and Reporting*. IEEM, Winchester.

8.12.7 A Neutral effect is anticipated for ponds and ditches during construction and Slight Beneficial for operation.

8.12.8 For GCN and invertebrates, a Slight Adverse effect is considered to be likely during the construction and operational phase.

8.12.9 The significance of effect for breeding birds, badgers and reptiles is assessed as being Slight Adverse during construction, reverting to Neutral during operation.

8.12.10 For riparian mammals, the effect is considered to be Neutral during construction and Slight Beneficial once operational.

8.12.11 The overall on-balance significance of effects on biodiversity as a result of the scheme is Slight Adverse for construction and Slight Adverse for operation.

8.12.12 The evidence provided in the ES supports the accordance statement provided in the ***Case for the Scheme (document reference TR010036/APP/7.1*)**.