HIF Banwell Bypass and Highways Improvements Project

Environmental Statement Chapter 8 - Biodiversity

BNWLBP-TACP-EBD-XXXX-RP-LE-000002

P06 | S4

18/07/22

Document Verification

Project Title	HIF Banwell Bypass and Highways Improvements Project
Document Title	Environmental Statement Chapter 8 - Biodiversity
Document Reference	BNWLBP-TACP-EBD-XXXX-RP-LE-000002
Project Stage	1B
Document Status	**P06 | S4 - FOR PLANNING APPLICATION**

Approvals

Revision	Status	Role	Name	Date
P06	**S4**	**Author**	Simon Dorken	15/07/22
		Checker	Jo Wall	18/07/22
		Approver	Amie Cowle	18/07/22
		Authoriser	Tom Edwards	18/07/22

Revision History

Revision	Date	Description	Author
P06	15/07/22	FINAL	SD
P05	13/07/22	FOR PLANNING APPLICATION SUBMISSION	SD
P04	06/07/22	FINAL ISSUE	SD
P03	01/06/22	ISSUE FOLLOWING COMMENTS	SD
P02	12/04/22	ISSUED FOLLOWING COMMENTS	SD
P01	10/02/22	FIRST DRAFT	SD

Contents

8 Biodiversity

8.1 Introduction

8.1.1 This chapter provides an assessment of the potential impacts and effects on biodiversity from the construction and operation of the Scheme. This chapter follows the methodology set out in Design Manual for Roads and Bridges (DMRB) LA108 Biodiversity[8.1] and is based on the findings of surveys undertaken in 2021 and 2022.

8.1.2 Biodiversity design and mitigation measures follow the principles outlined in *DMRB LD 108 – Biodiversity*[8.2] and appropriate enhancement measures and post-construction monitoring are set out.

8.1.3 This chapter includes overviews of the following:

a) A summary of regulatory and policy frameworks related to biodiversity, with the key nature conservation legislation and policy driving the assessment outlined,
b) Survey and methods of assessment (including limitations of said assessments),
c) The baseline conditions on the Scheme and wider area surrounding the Scheme in accordance with DMRB LA 104 – Environmental assessment and monitoring[8.3].
d) Identification of the Impacts of the Scheme on each key ecological feature,
e) Identification of mitigation measures
f) Assessment of residual impacts.

Scheme Overview

8.1.4 The following section provides a brief description and overview of the Banwell Bypass and Highways Improvements Project.

8.1.5 The Scheme comprises the following distinct elements:

a) a bypass of the village of Banwell (referred to as the "Banwell Bypass");

b) a route connecting the A371 at Castle Hill and the A368 at East Street (referred to as the "Southern Link"); and

c) Mitigation and enhancement measures, which broadly consist of the following:

- Environmental mitigation and enhancement measures in connection with the Banwell Bypass and the Southern Link, examples of which include (but are not limited to) flood compensation areas, planting and habitat creation, attenuation basins etc.

- Placemaking improvements within Banwell, comprising mitigation and enhancement measures to the public realm; and

- Traffic mitigation in connection with the Banwell Bypass and the Southern Link, including Improvements to the wider local road network.

8.1.6 Together, these elements comprise the "Scheme". Each element as listed is described in more detail below.

Banwell Bypass

8.1.7 The Banwell Bypass would be located within the administrative area of North Somerset. The village of Banwell is located approximately 8km east of Weston-super-Mare. The Banwell Bypass would primarily consist of:

a) signalisation and capacity improvements to the Summer Lane / Wells Lane junctions on the A371;

b) a 40mph single carriageway Banwell Bypass, connecting the existing A371 (east of Summer Lane) to A368 (west of Towerhead Farm);

c) a 3 metre wide shared use path provided along the majority of the Banwell Bypass providing a link from Weston-super-Mare to Sandford;

d) Banwell West Junction – a three arm roundabout located east of Knightcott Industrial Estate at the western end of Banwell;

e) Wolvershill Road Junction – a traffic signalised junction, providing access for all users to the west, east, and north. Access to the south would be restricted to public transport and walking, cycling and horse-riders, and limited agricultural access only;

f) Banwell River Bridge – an overbridge across Riverside and the River Banwell. There would not be a direct connection between Riverside and the Banwell Bypass;

g) Moor Road to Riverside Link – a side road connection between Riverside and Moor Road; and

h) Banwell East Junction – A three-arm traffic signalised junction, with dedicated turning lanes from the bypass towards the Southern Link.

Southern Link Road

8.1.8 The Southern Link would provide the new primary route south to Winscombe, as Castle Hill and Dark Lane are proposed to be stopped up. The Southern Link would be a 30mph single carriageway, connecting the A368 (East Street) to the A371 at Castle Hill. The Southern Link would be located within the Mendip Hills AONB. The Southern Link would link into the Banwell Bypass at the Banwell East Junction. A T-junction located along the Southern Link would provide access into the east of Banwell (at East Street).

Mitigation Measures

Environmental mitigation and enhancement measures in connection with the Banwell Bypass and the Southern Link.

8.1.9 The Scheme would include mitigation measures which are provided to offset the impact of the Banwell Bypass proposal. These include (but are not limited to):

a) flood mitigation to ensure that the Banwell Bypass does not increase flood risk for third-party properties;

b) land for essential mitigation, such as ecology and landscape mitigation;

c) sustainable urban drainage systems (e.g. attenuation basins and swales), and additional groundwater mitigation, to prevent adverse water quality impacts (including the Source Protection Zone); and

d) replacement land to mitigate the impact of the scheme on Banwell Football Club.

Placemaking improvements within Banwell

8.1.10 As a result of the Banwell Bypass, there would be a reduction in traffic through Banwell. The reduction in traffic (and resulting reduction in congestion) through the village could result in higher traffic speeds without mitigation.

8.1.11 A reduced 20mph speed limit through Banwell would discourage vehicles from travelling at higher speeds, whilst also discouraging the use of the road as a through route (instead of the Banwell Bypass).

8.1.12 The reduction of traffic through Banwell due to the provision of the Banwell Bypass provides the opportunity to make improvements to the existing road and public spaces within Banwell to enhance the historic and urban setting of the village. These improvements would include, but are not limited to:

a) Alteration to the road and footways including resurfacing, widening, and narrowing (which would encourage drivers to comply with the posted 20mph speed limit);
b) Incorporation of active travel measures;
c) Soft landscaping and ecological improvements; and
d) Street signage improvements.

Improvements to the wider local road network

8.1.13 Improvements to the local road network and junctions including the surrounding villages of Churchill, Sandford and Winscombe are proposed to mitigate increases in traffic as a result of the Banwell Bypass and Southern Link. These mitigation measures would consist of:

a) Lowered speed limits:
    - 20mph: A368 through Churchill, A368 through Sandford, A371 through Winscombe.
    - 30mph: A368 between Churchill and Sandford Villages.
b) Gateway Features when entering and exiting the villages of Sandford, Churchill and Winscombe;
c) Non-physical traffic calming measures through and between villages (e.g. road markings and speed signage);

d) Capacity improvements to the Churchill Junction (A38/ A371);

e) Provision of new/ improvements to existing pedestrian and cycling crossings;

f) Active travel measures along the A368, with improved footway/ cycleway access from Churchill and Langford to Churchill Academy;

g) Improvements to footways, shared pedestrian, and cycleway; and

h) Soft landscaping, native planting, rewilding, and ecological enhancements.

Context

8.1.14 North Somerset Council's (NSC) Housing Infrastructure Fund (HIF) proposal supports potential housing sites (subject to the emerging Local Plan 2038).

8.1.15 A business case was submitted to Homes England to secure funding for a package of infrastructure improvements in February 2019 and a successful funding announcement was made at the end of October 2019.

8.1.16 The Banwell Bypass would provide a highway connection to enable potential housing sites that may be allocated in the emerging Local Plan and alleviate the anticipated impact of further traffic growth upon the already congested Banwell village.

8.1.17 NSC appointed Alun Griffiths (Contractors) Ltd, with Arup and TACP (the 'AGC Team') as their technical and environmental advisors, to develop a solution including optioneering, design and planning support of the proposed HIF Banwell Bypass and Highways Improvements Project Stage 1 (the "Scheme"). Stage 1 of the project includes: optioneering; preliminary design; Environmental Impact Assessment (EIA); planning permission; Statutory Processes. Stage 2 of the project is the detailed design and construction phase, following planning determination and land acquisition.

Environmental Context

8.1.18 The Scheme crosses the North Somerset Levels which are characterised by flat open landscape of arable land divided by hedge lined ditches and rhynes. These have been inhabited and exploited for thousands of years. Much of the area lies within a designated flood zone.

8.1.19 Banwell lies to the immediate north of the Mendip Hills Area of Outstanding Natural Beauty (AONB). The Southern Link lies within the boundary of the AONB and within a groundwater Source Protection Zone. Whilst the Mendip Hills AONB is not a designated International Dark Sky Reserve (IDSR), it is well known for its dark sky environment.

8.1.20 There are five Scheduled Monuments in the vicinity of the Scheme, the closest of which is a Romano-British villa. There are numerous Grade I, II* and II listed buildings within Banwell and its vicinity. The centre and east of Banwell is designated as a Conservation Area.

8.1.21 The North Somerset and Mendip Bats Special Area of Conservation (SAC), which includes ancient woodland, lies adjacent to the A368 and the eastern junction of the Scheme. The Banwell Ochre Caves and Banwell Caves Sites of Special Scientific Interest (SSSI) are designated for their geology and overlap with the North Somerset and Mendip Bats SAC, providing hibernation sites for Greater Horseshoe bats. The wider area provides habitat for a variety of protected and notable species including dormouse, grass snakes, otter, badger, kingfisher and several species of bat.

8.1.22 The Scheme is dissected by the River Banwell which flows northwards along Riverside. It is classified as a main river and is the source of the River Banwell Estuary.

8.1.23 There is an extensive Public Right of Way (ProW) network in and around Banwell which includes well-used bridleways. To the east of Banwell, north of the A368 (Towerhead Road) lies a 7.2 MW photovoltaic power station (Banwell Solar Farm).

Scheme objectives

8.1.24 NSC's overall objectives for the Scheme are to deliver, within cost, quality, and programme targets:

a) Improve the local road network to deal with existing congestion issues.

b) Improve and enhance Banwell's public spaces by reducing traffic severance and improving the public realm.

c) Provide the opportunity to increase active and sustainable travel between local villages and Weston-super-Mare.

d) Deliver infrastructure that enables housing development (subject to Local Plan).

e) Ensure the development respects the local area and minimises visual impact upon the surrounding countryside and Mendip Hills Area of Outstanding Natural Beauty (AONB).

f) Innovative and efficient in reducing and offsetting carbon from the design and construction of the infrastructure.

g) Ensure the development provides the opportunity to increase Biodiversity Net Gain by at least 10%.

h) Proactively engage with stakeholders in a way that is both clear and transparent.

8.2 Competent Expert Evidence

8.2.1 The chapter lead author is a full Member of the Royal Society of Biology. They have a BSc (Hons.) in Psychology (focused on Animal Psychology) and an MSc (Merit) in Environmental Biology; Conservation and Resource Management. They are also currently a PhD candidate researching the Behavioural Ecology and Evolution of squamates (with special reference to native snake species). They have 11 years' experience working as a professional ecologist and have particular experience of the mitigation of the ecological impacts of large infrastructure rail and road projects. They are currently named ecologist on a GCN EPLS licence for a 17km road scheme and the project ecologist for a number of road widening projects.

8.3 Legislative and Policy Framework

8.3.1 A framework of national and local legislation and planning policy

guidance exists to protect and conserve wildlife and habitats.

8.3.2 The following relevant legislation exists to protect habitats and species of nature conservation importance are provided in Table 8.1, these are outlined in more detail in the survey factual reports, ES Volume 3 Appendices 8.D – 8.O.

Table 8.1: Table of Key Legislation.

Key Legislation	Relevant Habitat, Species
The Conservation of Habitats and Species Regulations (Habitats Regulations) 2017 (as amended)[8.4]	Designated sites, Bats, Hazel Dormouse, GCN, Otter, and Schedule 1 bird species.
Wildlife and Countryside (WCA) Act 1981 (as amended)[8.5]	Bats, Hazel Dormouse, Otter, Badger, reptiles, amphibians, birds, and other species such as European hedgehog and brown hare, invasive non-native species
Natural Environment and Rural Communities (NERC) Act 2006[8.6]	Bats, Hazel Dormouse, Otter, Badger, reptiles, amphibians, birds, and other species such as European hedgehog and brown hare, invasive non-native species
Protection of Badgers Act 1992[8.7]	Badger
Wild Mammals (Protection) Act 1996[8.8]	Any wild UK mammal
The Hedgerows Regulations 1997[8.9]	Important hedgerows
Salmon and Freshwater Fisheries Act 1975[8.10]	Fisheries
The Eels (England and Wales) Regulations 2009[8.11]	European Eel (*Anguilla anguilla*)
The Water Environment (Water Framework Directive) (WFD) (England and Wales) Regulations 2017[8.12]	Watercourses, groundwater, lakes, and transitional watercourse.

8.3.3 These legislative measures specify offences relating to protected species and, where necessary, for the requirements of licences to allow construction works to proceed that would otherwise result in an offence. Additionally, the Habitats Regulations 2017 set out the requirement for the consideration of the potential effects of a project on European designated sites. The legislation and policy relating to specific species are further detailed within the ecological baseline reports, provided within the appendices.

8.3.4 The following legislation is of relevance to the assessment of biodiversity and has informed the assessment methodology,

refer to ES Volume 1 Chapter 4 – Planning Framework:

Environment Act (2021)[8.13]

8.3.5 The Environment Act 2021 came into force on 9 November 2021. However, not all its provisions came into force automatically. The aim of the Act relates to a wide range of environmental issues, including mandatory Biodiversity Net Gain for TACP developments, site habitat and condition registers, amendments to the Habitat Regulations and strategies for conservation.

Environment Act (1995)8.14

8.3.6 The aim of the Act relates to a wide range of environmental issues, from provisions for contaminated land and abandoned mines, National Parks, the control of pollution, conservation of the environment, obligations relating to products and materials, and fisheries. Both the Environment Act 1995 and the Environment Act 2021 implement the requirements of the Air Quality Directive.

Natural Environment and Rural Communities Act 2006[8.15]

8.3.7 The Natural Environment and Rural Communities (NERC) Act, 2006 requires that any public body or statutory undertaker in England and Wales must have regard to the purpose of conservation of biological diversity in the exercise of their functions. This means the restoring or enhancing of species populations or habitats.

Town and Country Planning Act 1990[8.16]

8.3.8 The TCPA requires that planning permission is obtained for development. As identified as part of the survey reports.

National Policy

8.3.9 Relevant national policies include:

National Planning Policy Framework 2021[8.17]

8.3.10 The NPPF aims to ensure that planning policy guides development that contributes to protecting and enhancing our natural, built, and historic environment; and, as part of this, helps

to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change, including moving to a low carbon economy.

National Planning Practice Guidance (PPG)[8.18]

8.3.11 The guidance accompanying the NPPF and provides an additional layer of information to policies within the NPPF. It provides guidance for a range of topics, including:

a) Natural Environment - Explains key issues in implementing policy to protect biodiversity, including local requirements.

UK-Post 2010 Biodiversity Framework[8.19]

8.3.12 The Framework shows how the work of the four UK countries joins up with work at a UK level to achieve their biodiversity targets and the aims of the EU Biodiversity Strategy. It identifies the activities required to complement the country biodiversity strategies, and where work in the country strategies contributes to international obligations.

Biodiversity 2020: A Strategy for England's Wildlife and ecosystems services, Natural England (2011)[8.20]

8.3.13 Biodiversity strategy for England that built on the Natural Environment White Paper and provides a comprehensive picture of how England are implementing our international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea.

A Nature Recovery Network to create a Wilder Future, the Wildlife Trusts (2018)[8.21]

8.3.14 The Nature Recovery Network (NRN) is a major commitment in the government's 25 Year Environment Plan.

Regional Policy

8.3.15 Relevant regional planning policies include:

West of England Joint Green Infrastructure Strategy 2020-2030[2.22]

8.3.16 The Joint Green Infrastructure Strategy (JGIS) through providing a multi beneficial approach to strategy, policy and delivery will contribute to addressing:

b) inequalities in provision of green infrastructure and health;

c) achieve well designed, attractive, and healthy places that deliver economic benefits and community resilience; and

d) respond positively to the climate and ecological emergency.

Policy and Strategy

8.3.17 The local planning policies of relevance include:

a) North Somerset Council Core Strategy Considerations, 2017, (See Table 8.2 – Core Strategy Considerations)[8.23] (See Table 8.2);

b) Sites and Policies Plan Part 1: Development Management Policies (July 2016)[8.30] (See Table 8.3)

c) North Somerset Emerging Local Plan (2023 – 2038)[8.24]

d) North Somerset Council's Green Infrastructure Strategy (2021)[8.25]

e) North Somerset Council Supplementary Planning Document: Biodiversity and Trees (2005)[8.26]

f) North Somerset Council Supplementary Planning Document: North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development (2018)[8.27]

g) The Action for Nature North Somerset Biodiversity Action Plan (NSC, 2005)[8.28]

h) Mendip Hills AONB Management Plan (2019-2024)[8.29]

Table 8.2 NSC's Core strategy considerations

Policy Reference	Key Considerations
CS1: Addressing climate change and carbon reduction	Policy CS1 focuses on NSC's commitment to reducing carbon emissions and tackling climate change. Biodiversity should be protected and enhanced including species and habitats that are characteristic of the area, in order to support adaptation to climate change. This should be achieved through on and off-site measures, as well as the reduction or preferably elimination of any adverse impacts.
CS4: Nature Conservation	Biodiversity will be maintained and enhanced in North Somerset. New development will do this by: Seeking to meet local and national Biodiversity Action Plan targets taking account of climate change and the need for habitats and species to adapt to it. Maximising benefits to biodiversity, incorporating, safeguarding, and enhancing natural habitats and features and adding to them where possible. A net loss of biodiversity should be avoided, and a net gain achieved where possible. Protect, connect, and enhance important habitats, particularly designated sites, ancient woodlands, and veteran trees. Promoting the enhancement of existing and provision of new green infrastructure of value to wildlife. Promoting native tree planting and well targeted woodland creation and encouraging retention of trees. Natura 2000 sites are statutorily protected under the Habitats Regulations. Habitats Regulation Assessment (HRA) is required to investigate whether proposals, alone or in combination, are likely to have a significant effect on Natura 2000 sites. Ecological surveys will need to be carried out, and the planning application should include the submission of a biodiversity impact assessment.
CS7: Planning for waste	North Somerset Council supports the prevention and minimisation of waste and the sustainable management of waste, reducing reliance on landfill.

Policy Reference	Key Considerations
CS9: Green Infrastructure	Policy CS9 states that the existing network of green infrastructure will be safeguarded, improved, and enhanced by further provision. North Somerset Council will give priority to: The protection and planting of trees. The promotion of the north slopes of the Mendip Hills AONB as sub-regional corridors for biodiversity, recreation, and landscape retention. The promotion of the River Banwell as a local corridor for biodiversity and landscape enhancement. The connection of disjointed woodlands, particularly ancient and semi-natural woodland. The continued development of a network of green spaces, water bodies, paths and cycleways and bridleways in and around the urban areas. The management, maintenance, upgrading and extension of the public rights of way network.

Table 8.3 Summary of adopted policies from the Sites and Policies Plan Part 1: Development Management Policies (July 2016)[8.30]

Policy Reference	Key Considerations
DM8: Nature Conservation	Seeks to protect and enhance biodiversity, particularly on sites of recognised nature conservation interest. To protect trees, hedges and other landscape features of amenity value and to secure suitable replacements in instances where their loss is justified.
DM9: Trees and Woodlands	This policy seeks to incorporate existing trees and wooded areas into design proposals where practical and ensure that the planting of new trees is properly designed and adequately maintained in the longer term and recognise the place-making quality of trees.
DM10: Landscape	Includes provisions to ensure that development proposals will not adversely affect designated landscape character within the district including both nationally registered and unregistered Historic Parks and Gardens. Development will also be required to be carefully integrated into the environment, conserve and enhance vegetation characteristic, respect the historic landscape and include appropriate landscaping and boundary treatments
DM11: Mendip Hills Area of Outstanding Natural Beauty (AONB)	Seeks to conserve and, where possible, enhance the landscape and scenic beauty of the AONB. Development which would have an adverse impact on the landscape, setting and scenic beauty of the Mendip Hills AONB, including views into and out of the AONB, will not be permitted unless in exceptional circumstances and where it can be demonstrated that it is in the public interest. All development will be controlled and conditioned to ensure it would minimise the harm to the natural beauty of the AONB.

North Somerset Emerging Local Plan (2023 - 2038)

8.3.18 NSC is in the process of preparing a new Local Plan which will provide a positive vision for the future of North Somerset. The Local Plan will provide a framework for addressing housing needs, employment requirements and other priorities, and a mechanism through which local communities can help shape their surroundings.

North Somerset Council's Green Infrastructure Strategy (2021)

8.3.19 Seeks to provide Green Infrastructure for large-scale proposals in locations where there is a local of green infrastructure or opportunities to create or improve green networks, will be required to contribute to the quality of the environment, through the creation of high quality well designed and accessible green infrastructure.

North Somerset Council Supplementary Planning Document: Biodiversity and Trees (2005)

8.3.20 The SPD was prepared to guide planning applications by supplementing the policies and proposals relating to biodiversity

North Somerset Council Supplementary Planning Document: North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development (2018)

8.3.21 Contains guidance on development regarding impacts on the North Somerset and Mendip Bats Special Area of Conservation (SAC), one of four European sites (sites of international importance for wildlife) in North Somerset. It was designated because of its importance for Greater and Lesser Horseshoe Bats.

The Action for Nature North Somerset Biodiversity Action Plan (NSC, 2005)

8.3.22 The Biodiversity Action Plan for North Somerset highlights the value of a wide variety of wildlife habitats, including UK Biodiversity Action Plan (BAP) priority habitats. Developers should consult this document to see where development proposals can fulfil the actions of the plan.

Mendip Hills AONB Management Plan (2019-2024)[8.29]

8.3.23 The Mendip Hills AONB Management Plan identifies what is necessary to conserve and enhance this special landscape. The Mendip Hills AONB Partnership leads on the production and review of the Management Plan for the local authorities who adopt it.

8.4 Assessment Method

8.4.1 This assessment has been carried out in accordance with *DMRB LA 108 Biodiversity* and *DMRB LA 104 Environmental Assessment and Monitoring*. These outline a process for establishing the relative importance of biodiversity resource for sites, habitats, species population levels and/or assemblages of species, and characterisation of predicted scheme impacts before and after mitigation and the subsequent assessment of significance of effects.

8.4.2 The assessment method is supplemented where appropriate with guidance from the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018/9)[8.31].

8.4.3 A Habitats Regulations Assessment (HRA) (Volume 3 Appendix 8.C) was carried out in accordance Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) and *DMRB LA 115 Habitats Regulations Assessment*[8.32].

8.4.4 Due to the location of the Scheme, consideration was given to the North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document (SPD) adopted in 2018.

8.4.5 The assessment has been done in accordance with the EIA Combined Screening and Scoping Report and response (ES Volume 3 Appendix 1.B and 1.C) and the Ecological Scoping Report and LPA response (ES Appendix 1.E and 1.F).

8.4.6 The assessments have relied on professional judgement by individuals with relevant expertise, recognising Scheme specific circumstances and consultation with stakeholders including

Natural England (NE) and NSC Ecologists.

8.4.7 The assessment includes considering direct, indirect, short-term, medium-term, long-term; permanent or temporary; irreversible / reversible; secondary, tertiary aspects. Both positive and negative impacts on the ecological baseline of the site are assessed.

8.4.8 DMRB LA 108 recommends that the assessment shall identify and report on:

a) the Zone of Influence (ZoI) of the project and which important biodiversity resources could be significantly affected;
b) an initial understanding of baseline ecological conditions and the likely ecological constraints;
c) further assessments, including any additional surveys, and the associated methods and related evaluation or significance criteria required to inform the Ecological Impact Assessment (EcIA).
d) the potential for significant effects (including likely nature and scale) on biodiversity resources from the project;
e) any mitigation measures likely to be required, following the 'mitigation hierarchy' outlines in DMRB LA 104;
f) the opportunities for environmental enhancements including those that support environmental net gain, where applicable;

8.4.9 The assessment will also identify potential significant effects upon ecological receptors, namely is the Scheme likely to impact;

a) designated areas;
b) protected or priority habitats;
c) protected or priority species;
d) the function or quality of habitats;
e) the conservation status of habitats and species.

8.4.10 In accordance with DMRB LA 104 and LA 108, the importance of the biodiversity resource and the level of impact is used to determine the significance of an effect after avoidance and mitigation measures have been taken into account (the residual effect). Residual effects are categorised as Neutral, Slight, Moderate, Large, or Very Large as shown in Table 8.3. A significant residual effect is considered to be any effect within the

Moderate, Large, or Very Large categories.

8.4.11 As described in *DMRB LD 118 Biodiversity design*, where the use of the hierarchical system within DMRB LA 104 does not resolve all identified adverse residual effects, compensation measures shall be developed.

Value of ecological features

8.4.12 The overall ecological value of the area has been considered in the context of the pattern of habitat and interdependencies between habitats, as well as the relative legislative value of any protected species, habitats, or sites.

8.4.13 DMRB LA 108 recommends assigning values to ecological features according to the following scale, shown in Table 8.4

Table 8.4 Biodiversity resource importance (value) and examples.

Importance DMRB LA 108	Value	Examples
International/ European	Very High	a) Special Areas of Conservation (EU Habitats Directive) b) Special Protection Areas (EU Birds Directive) c) Significant populations of European protected species (such as Otters, bats etc.) d) Sites hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals 1979) e) Non-designated International features such as a large population of a bird that is rare on a European scale.
UK or national	High	a) Sites of Special Scientific Interest (Wildlife & Countryside Act 1981 as amended b) Geological Conservation Review (GCR) sites c) Significant populations of UK protected species (Wildlife & Countryside Act 1981 – as amended) d) Significant populations of species listed within Section 42 of the NERC Act.

Importance DMRB LA 108	Value	Examples
County	Medium	a) Regionally (West of England) important designations which can be reasonably substituted including: Local Nature Reserves (LNRs; National Parks and Access to the Countryside Act 1949) b) Important "inventory" sites (e.g., ancient semi-natural woodland and grassland inventories) c) Small populations of European or UK protected species d) Significant populations of UK 'Red List' of Birds of Conservation Concern, Species of Principal Importance for biodiversity under the NERC Act e) Sites of Importance to Nature Conservation (SINCs)/County Wildlife Series (CWSs)/ other local designations f) Sites with Local Biodiversity Action Plan (LBAP) habitats or species, g) Non-breeding individuals of European or UK protected species h) Small populations of UK or England 'Red List' Birds of Conservation Concern, Species of Principal Importance for Biodiversity under the NERC Act i) Tree preservation orders (TPO) to include ancient woodland.
Local	Low (or Lower)	Sites with no ecological designations, and at most only non-breeding individuals of LBAP species, and sites with no recognised nature conservation interest.
Negligible	Negligible	Very low importance and rarity, local scale.

Level of impact

8.4.14 Level of impact is assessed from the predicted scale of loss / damage to semi-natural vegetation, wildlife habitats, and protected species. In addition to assemblages of species of importance to the functioning of the ecosystem.

8.4.15 Significance of this is assigned by looking at the level of change to habitats and species of local and regional importance and

assigning higher significance to greater loss of regionally important habitats. This can be seen in Table 8.5 below.

8.4.16 Note - The degree to which a feature can be replaced / substituted has also been taken into consideration. CIEEM Guidance suggests that the loss of a feature of national value that is irreplaceable may be considered more significant than the loss of a feature that can be replaced or substituted.

Table 8.5 The matrix considered for the Significance of Impacts Assessment *(Taken from DMRB LA 108 Table 3.13)*

	Level of impact					
Resource Importance		**No Change**	**Negligible**	**Minor**	**Moderate**	**Major**
	International or European Importance	Neutral	Slight	Moderate or large	Large or very large	Very large
	UK or national importance	Neutral	Slight	Slight to moderate	Moderate to large	Large or very large
	Regional importance	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	County or equivalent authority importance	Neutral	Neutral or slight	Neutral or slight	Slight	Slight to moderate
	Local Importance	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

8.4.17 Any impact with a level of significance below Moderate is considered to be Not Significant.

Zone of Influence (ZoI)

8.4.18 The study area of the Scheme is identified by considering the actions with potential to result in changes to an ecological feature as a result of the Scheme. These impacts are considered the 'zone of influence' (ZoI) of the project (as well as the habitats and

ecological receptors of the site). Therefore, the ZoI is deemed as the area *surrounding* (often adjacent) to the scheme that might be affected by the proposed changes *within* the scheme.

a) The ZoI can vary between different ecological features / receptors subject to their sensitivity to environmental change and can be influenced by:

b) being functionally linked land (functionally linked land are areas of land / water occupied by the qualifying interests (species) of a European site that lie beyond the boundary of the site. Such areas support activities such as feeding, roosting and migration) (or within 2km) to a European site;

c) being within 30km of SACs where bats are noted as one of the qualifying interests;

d) crossing or being adjacent to, upstream of, or downstream of, a watercourse which is designated in part or wholly as a European site;

e) and / or having potential hydrological or hydrogeological linkage to a European site containing a groundwater dependent terrestrial ecosystem (GDTE – wetlands which critically depend on groundwater flows or chemistries) which triggers the assessment of European sites in accordance with LA 115 Habitats Regulation Assessment

8.4.19 The maximum extent of the study areas for different designations, species habitat types, and species / species groups was determined by best practice guidance, the predicted Zone of Influence (ZoI) of the Scheme, and consultation with statutory bodies.

8.4.20 Deviation from the guidance with regards to ZoI is led by on site conditions or restrictions therein. In the event of a surveys not assessing the full ZoI, justification is provided the pertinent ecological baseline report.

8.4.21 The maximum ZoI for internationally, nationally, and locally designated sites including ancient woodland and veteran trees relating to potential air quality impacts is established at 350m in accordance with DMRB LA105 Air Quality[8.32]. Further details are provided within ES Volume 1 Chapter 5 Air Quality.

8.4.22 The relevant ZoI for road traffic emissions is within 200m of roads included in the air quality affected road network (ARN). The relevant ZoI for construction dust is 50m from the construction

footprint boundary and / or 50m from routes used by construction vehicles up to 500m from the site entrance(s). See ES Volume 1 Chapter 5 Air Quality for affected road network and other definitions.

8.4.23 The ZoI for each species is defined below in Table 8.6 below:

Table 8.6 – Zone of Influence for each species.

Survey	Ecological Feature	Zone of Influence (Distance in km from the red line boundary)
Desk Study	European Site (SAC)	2 of functionally linked site, or; hydrological or hydrogeological linkage
	European Site where Bats are a qualifying feature	30
	Watercourse (which is designated in part or wholly as a European site)	Land crossing/adjacent
	Non-statutory designated sites	2
Field Survey	National Vegetation Classification (NVC)	0
	Hedgerow	0
	Macrophytes and River corridor	0
	Bat	5
	Hazel Dormouse	2
	Great Crested Newt	0.5
	Reptile/Herptile	0
	European Otter	2
	Water vole	2
	Wintering Birds	2
	Breeding Birds	2

Survey	Ecological Feature	Zone of Influence (Distance in km from the red line boundary)
	Kingfisher	2
	Barn Owl	0
	Badger	2
	Terrestrial Invertebrates	0

8.5 Assessment Assumptions and Limitations

8.5.1 The study area for each survey was based upon the latest iteration of the Scheme boundary at the time of survey. All route options were taken into consideration until the preferred route was decided. However, all surveys appropriately incorporated the final Scheme boundary. Specific study areas for each survey type are shown in the relevant ecological baseline reports.

8.5.2 Limitations upon ecological surveys can arise from the traits of species and habitats and by being affected by the vagaries of natural processes or anthropogenic intervention. Consequently, the presence of particular species or habitats may change over time but is impossible to detect during 'snapshot' surveys within a limited time period (regardless of the detail of those surveys).

8.5.3 Where possible, an indication of likely future baseline conditions for features described is provided. However, many species exhibit within-season variations meaning different times of the year have higher efficacy of detection (such as recording of higher plants during Phase 1 habitat surveys). This can also be pertinent between seasons.

8.5.4 Some species are affected by weather conditions and may not be recorded during adverse weather even if present at that time of year (e.g., amphibians not recorded during refugia surveys in dry conditions). Nevertheless, as far as possible, all surveys described in this Chapter were undertaken in conditions consistent with appropriate guidance and supported by professional judgement for recording the target species

(exceptions are stated below or in the relevant Baseline reports – refer to ES Volume 3 Appendices 8.D – 8.O).

8.5.5 Due to the limitations inherent in the recording and prediction of the presence of ecological features, any uncertainty has been combated by taking a precautionary approach in the assessment of impacts and subsequent mitigation design.

8.5.6 Given these limitations in reliable recording and prediction of the presence of ecological features, where there is any uncertainty, a precautionary approach has been taken in the assessment of impacts and subsequent mitigation design.

8.5.7 If 'reasonable worst-case' valuations have been necessary, these have been based on the information available at the time (to support any consideration against factors indicative of suitability for the particular habitat or species in question) by using information garnered from available desk study data (including aerial photography) and field surveys of similar habitat in close proximity of the wider local area.

8.5.8 The extent of the precaution incorporated into the assessment is synonymous to the degree of confidence in the data upon which the assessment is based.

8.5.9 The assessment of nitrogen deposition (NDEP) from oxides of nitrogen and ammonia from road traffic emissions is presented in Air Quality chapter (ES Volume 1 Chapter 5).

8.5.10 Further surveys will include Bat Hop Over and associated tree emergence surveys (from GLTA data), pre-construction fish surveys and ongoing badger sett monitoring / bait marking. These surveys will be carried throughout in 2022 and will inform detailed design and construction. It is considered that the large scale and long term landscape / static surveys and the radio tracking effort provides data with sufficient robustness to make this assessment and to make a reasonable assessment on the potential impacts of bats, with the acknowledgement that, where necessary, 'worst-case' is assumed.

8.5.11 The surveys were largely conducted during the optimal survey periods using the accepted guidelines and methods accepted by

Natural England and other statutory bodies. Any limitations or assumptions applicable to the specific survey efforts of the Scheme are outlined in the baseline ecological reports produced for these surveys (included as ES Volume 3 Appendices 8.D-8.O).

8.6 Consultations

8.6.1 Technical Working Groups (TWGs), Environmental Liaison Group meetings and other collaborative meetings with the team were regularly held. In addition to individual meetings with North Somerset Council (NSC), Natural England (NE) and other statutory and non-statutory stakeholders to review elements of the options appraisal through to design details. Further details on the consultation relating to biodiversity is provided in Table 8.7.

Table 8.7 Details of meetings with Natural England

Date	Description of items discussed
20/04/21	Overview of Ecological surveys and approach to Advanced Bat Survey Techniques
09/09/21	Meeting to discuss the ABST following Ecology Scoping Opinion – to understand objectives and methodology
02/12/21	Discussion with NSC and NE regarding mitigation proposals. Approach to assessing Ammonia contribution using National Highways Ammonia tool was agreed.
16/02/22	Biodiversity chapter overview, including HRA and remaining surveys. Further detail mitigation proposals

Date	Description of items discussed
18/05/22	Meeting to provide clarity on HRA and Bat SPD Calculations. Scheme and mitigation update provided.
19/06/2022	Biodiversity Chapter overview with NSC, their ecological representatives, and NE.

8.7 Baseline Conditions

8.7.1 A desk study was undertaken following the definition outlined by *DMRB LD 118 Biodiversity design*, and *DMRB LA 115 Habitats Regulations Assessment*. An initial record search was undertaken by WSP as part of the Screening and Scoping exercise in 2018. (Refer to ES Volume 3 Appendix 1.C). This was updated during the preparation of the ecological scoping report with further record searches undertaken in December 2021.

8.7.2 Records of statutory and non-statutory sites, protected or notable species, and notable habitats within 2km of the Scheme options were requested from the relevant record centre (Refer to Volume 3 Appendix 8.B). This search area was extended to 30km for SACs where bats are a qualifying species (and also included internationally designated sites which are hydrologically connected to watercourses potentially affected by the Scheme). These SACs form the basis of the consideration for the HRA (Volume 3 Appendix 8.C).

8.7.3 These searches were compiled in consultation with the following organisations and resources:

a) Bristol Regional Environmental Records Centre[8.34] (BRERC)
b) Multi-Agency Geographic Information for the Countryside (MAGIC) (Defra)[8.35]
c) Environment Agency – Ecology and Fish Data Explorer and the Catchment Data Explorer[8.36].

8.7.4 Surveys previously carried out by WSP, undertaken in 2021,

included Phase 1 ecological, winter and breeding bird (excluding barn owl and kingfisher) and bat hibernation studies. Further surveys of bat Landscape / static monitoring were carried out by the University of West England (UWE) during 2021 and 2022 following the winter bat surveys of 2020/21 and summer bat surveys of 2021.

8.7.5 In addition to the above, protected species / species assemblages and habitat surveys were undertaken by the AGC team from April 2021, on the main Scheme alignment with some surveys ongoing. Table 8.8 shows the surveys undertaken and the appendix numbers within Volume 3 of this Environmental Statement. Note – any incidental findings during the above surveys were also recorded.

Table 8.8 List of Ecological Surveys and Appendices

Survey Title	Appendix
National Vegetation Classification botanical survey	Appendix 8.D
Hedgerow survey	Appendix 8.E
River corridor, Aquatic Invertebrates and Aquatic Macrophytes Report	Appendix 8.F
Bat surveys, to include	
UWE – Static Acoustic Surveys	Appendix 8.G1
ABST – Radio Tracking and Swarming Surveys	Appendix 8.G2
Building inspection – Banwell Castle	Appendix 8.G3
Ground Level Tree Assessment	Appendix 8.G4
Bat Hibernation Survey Report	Appendix 8.G5
Dormouse survey	Appendix 8.H
Reptile surveys including Amphibians	Appendix 8.I
Great Crested Newt	Appendix 8.J
Otter survey	Appendix 8.K
Water vole surveys	Appendix 8.L
King fisher survey	Appendix 8.M
Barn owl Report	Appendix 8.N
Terrestrial Invertebrate survey	Appendix 8.O

Designated Sites

8.7.6 The designated sites included within or adjacent to the Scheme include:

d) North Somerset and Mendips Bat Special Areas of Conservation (SAC)

e) Banwell Ochre Caves Site of Special Scientific Interest (SSSI) to the south east – southeast,

f) Banwell Caves SSSI to the west – southwest.

8.7.7 Table 8.9 below outlines the designated sites considered for this assessment. The site of interest is detailed (such as qualifying features) along with aspects such as the distance from the Scheme and other related aspects, refer to ES Volume 3 Appendix 8.A – Citations.

8.7.8 No Locally designated sites lie within 0.5km of the site with Cheddar Valley Railway Walk Local Nature Reserve located at least 1km to the east of the site extent.

Table 8.9 Zone of Influence relevant International Sites

Site	Relationship to Scheme (ZoI)
North Somerset and Mendip Bats SAC	a) Within 2km Zone of Influence for direct and indirect impacts. b) <30km and bats are present as a primary reason for designation c) Relevant SAC components: Banwell (Bones) Caves SSSI (c600m from the western end of the bypass Scheme) and Banwell Ochre Caves SSSI (adjacent to the eastern end of the bypass Scheme, <50m)
Mendip Limestone Grasslands SAC	a) 2.5km from the Scheme (<30km) inland sections of the Carboniferous Limestone outcrops of the Mendips and bats present as a qualifying feature. b) Functionally linked to the North Somerset and Mendip Bats SAC. Bats move between the two sites[1].
Mells Valley SAC	a) c.27.5km (<30km) from the Scheme and bats present as a primary reason for designation. b) Functionally linked to the North Somerset and Mendip Bats SAC. Bats move between the two sites.
Bath and Bradford Upon Avon Bats SAC	a) c.45km from the Scheme. Bats are present as a primary reason for designation.

Site	Relationship to Scheme (ZoI)
	b) Although >30km away, the site is functionally linked to the North Somerset and Mendip Bats SAC. Bats move between the two sites. Therefore, consideration is given to this SAC
Exmoor and Quantock Oakwoods SAC	a) 29km (<30km) from the Scheme and bats are present as both primary reason for designation and qualifying feature
Severn Estuary SAC/SPA/Ramsar	b) Scheme is <15km upstream from sites designated wholly or in part as a watercourse (5.7km at the nearest point). c) Scheme is adjacent to/crosses habitats that may be functionally linked to the international sites – these habitats potentially offer off-site support of birds and migratory fish that are a cited as qualifying features of the sites.
Chew Valley Lake SPA	a) As birds are a qualifying feature, the SPA is identified as being potentially functionally linked to the habitats through which the Scheme would pass b) c.16km at nearest point
Somerset Levels and Moors SPA/Ramsar	a) As birds are a qualifying feature, both the SPA and Ramsar are identified as being potentially functionally linked to the habitats through which the Scheme would pass. b) c.12.5km at nearest point.

[1]European Site Conservation Objectives: Supplementary advice on conserving and restoring site features" for North Somerset and Mendip Bats Special Area of Conservation (SAC), published by Natural England (2019) identifies those additional SACs that are functionally linked.

8.7.9 Both Banwell Caves SSSI (Banwell Bone Caves) and Banwell Ochre Caves SSSI are designated for geological reasons. The Banwell Ochre Caves SSSI are c500m from the southwest end of the Scheme, while Banwell Ochre Caves SSSI is adjacent to the eastern end of the Scheme. The boundary of the Banwell Ochre Caves SSSI follows the A368 where the Scheme would tie in at its eastern end.

8.7.10 Both SSSI sites also form part of the North Somerset and Mendip Bats SAC (hereafter referred to as 'the SAC'). The qualifying features of the SAC present at the two sites are the caves themselves (European habitat type "Caves do not open to the public") and the two species of horseshoe bats that use the caves (Greater Horseshoe bats (*Rhinolophus ferrumequinum*) and

Lesser Horseshoe bats (*Rhinolophus hipposideros*)).

8.7.11 There is no planned land-take from the Banwell Ochre Caves SSSI and therefore the Scheme does not directly impact the Banwell Ochre Caves SSSI as the SSSI designated for geological reasons but has indirect impacts on the Banwell Ochre Cave site due to its consideration as part of North Somerset and Mendips Bat SAC.

Habitats

8.7.12 A total of 25 different habitat types were recorded during the Extended Phase 1 habitat survey presented in a Preliminary Ecological Appraisal (PEA) (ES Volume 3 Appendix 8.Q). The Scheme passes through some of the habitat types identifies including; coastal and floodplain grazing marsh, agricultural lays, improved grassland, and poor semi-improved grassland. Additionally, the Scheme comprises areas of amenity grassland, semi-improved grassland, scrub, scattered trees, and tree lines, species-poor/rich hedgerows, and nearby a semi natural broadleaved woodland.

8.7.13 The ancient woodland which forms part of Banwell wood would not be directly affected by the construction of the Scheme. However, there is potential for an increase in Nitrogen Oxide and Ammonia levels (see Air Quality, ES Volume 1 Chapter 5). There are no high quality veteran trees recorded along the Scheme, however there is a group Tree Protection Order covering Banwell wood and there are hybrid black poplar along the Scheme. Full results can be found in the Arboricultural Impact Assessment and Method Statement (ES Volume 3 Appendix 7.D).

8.7.14 The desk study identified coastal and floodplain grazing marsh as a Habitats of Principal Importance and an Ancient woodland inventory (Banwell Woods). Traditional orchard and wood pasture and parkland are also present within 1.2 miles (2 kilometres) of the Scheme.

Aquatic habitats

8.7.15 The site contains both mesotrophic and eutrophic water bodies, with the most notable of these being the River Banwell which

runs north to south through the centre of the Scheme.

8.7.16 The site also has a number of rhyne systems and some ephemeral ponds. The latter are most notably located in the fields adjacent to the Banwell Woods and to the north of the Scheme (in Court farm). A number of ponds are within the red line boundary of the Scheme but are not being impacted (however, they are being considered further in this assessment). One pond near to the River Banwell is to be impacted by the road directly. The most notable rhynes are central to the site (The Old Yeo rhyne) and East Mead rhyne network that is adjacent to Eastermead lane to the east.

8.7.17 The water bodies provide potential opportunities for aquatic invertebrates, riparian mammals, fish, amphibians in aquatic (breeding) phase, waterfowl and other birds that use water, and commuting species such as reptiles / terrestrial phase amphibian and dormouse. It is considered that the habitats, particularly in the middle of the alignment, are best envisaged as a network of agricultural lays fed, connected, and managed by an extensive and historic rhyne system.

Protected Species

Summary of protected species records

8.7.18 Desk based records were returned with a consideration of records from the last 10 years (2012 onwards) a full BRERC record search is located in the ES Volume 3 Appendix 8.B.

8.7.19 Summaries of species records are listed below.

8.7.20 **Bats** (order Chiroptera) – Numerous bat records were returned (listed below) with known roosts within 5km;

a) Common pipistrelle (*Pipistrellus pipistrellus*)
b) Soprano pipistrelle (*Pipistrellus pygmaeus*)
c) Barbastelle bat (*Barbastella barbastellus*)
d) Brown long-eared bat (*Plecotus auritus*)
e) Greater horseshoe bat (*Rhinolophus ferrumequinum*)
f) Lesser horseshoe bat (*Rhinolophus hipposideros*)
g) Noctule (*Nyctalus noctula*)

h) Leisler's bat (*Nyctalus leisleri*)

i) Serotine (*Eptesicus serotinus*)

8.7.21 A number of *Myotis* species records were returned with identification to genus level only.

8.7.22 WSP and UWE undertook hibernation and winter surveys respectively in 2021 providing records for species within vicinity of the site. These confirm the above species list.

8.7.23 **Hazel Dormouse** (*Muscardinus avellanarius*) records were returned for within 2km of the site. Most notably amongst these records are recent (2016) records to the south east of the site near Banwell Woods and a number of older records near Sandford quarry to the east of Banwell.

8.7.24 **Great Crested Newt (GCN)** (*Triturus cristatus*)- Records within 2km of the site were returned during the desk study. However, these were from 1985 and located in Winscombe to the east. There is a current European Protected Species (EPS) licence granted for areas in close proximity to the east of the site as part of the Hinkley Access Road (National Grid) with evidence of GCN found as part of the survey for those works in a pond located approximately 0.6km beyond the red line boundary of the Scheme.

8.7.25 **Reptiles** – Records returned included grass snake (*Natrix natrix*) and slow worm (*Anguis fragilis*) and adder (*Vipera berus*).

8.7.26 **Amphibians** – records include for Common frog (*Rana temporaria*), common toad (*Bufo bufo*), smooth newt (*Lissotriton vulgaris*) and palmate newt (*Lissotriton helveticus*).

8.7.27 **Otter** (*Lutra lutra*) – records were returned for otter, including in-rhyne sightings. These records are within the last ten years. However, they are primarily clustered to the north west beyond the red line boundary, most recently at ST3761 in 2015. It is acknowledged that with the main cluster of records centralised around the River Banwell it is likely that this watercourse provides connectivity and opportunities for this species. All reference to otter relates to European otter.

8.7.28 **Water vole** (*Arvicola amphibius*) – no records were returned within 2km of the Scheme. However, in distribution maps in

National Water Vole Database and Mapping Project (Wildlife Trusts) indicate this species is known to be present to the north east beyond this.

8.7.29 **Fish** – The Environment Agency's EA Ecology and Fish Data Explorer is an online tool used to access records of fish in the areas adjacent to the River Banwell. There are no other records available for the Schemes watercourses (ditches / rhynes). Additionally, species assemblages of aquatic macroinvertebrates and macrophytes were accessed. These are located below in Table 8.10 along with the date of the latest find and legal protection (if applicable). The tables from the record search for aquatic macroinvertebrates are included in ES Volume 3 Appendix 8.B – Biodiversity Record Search.

Table 8.10 Fish records for Banwell River from the Ecology and Fish Data Explorer (Environment Agency site code ID – 163560)

Binomial Name	Common Name	Date of Record	Grid Reference	Legal Protection	Biodiversity Action Plans
Esox lucius	Pike	22/08/2013	ST3991759308		
Barbatula barbatula	Stone Loach	22/08/2013	ST3991759308		
Anguilla anguilla	European Eels (Elvers)	22/08/2013	ST3991759308	S41 list EC No 1100/2007 Eels (England and Wales) Regs 2009	UKBAP SWBAP AvonBAP
Gasterosteus aculeatus	Three-spined Stickleback	22/08/2013	ST3991759308		
Cottus gobio	Bullhead	22/08/2013	ST3991759308	ECHD II	
Salmo trutta	Brown / Sea Trout	22/08/2013	ST3991759308		UKBAP AvonBAP

8.7.30 **Bird** – A large number of bird records within 2km of the Scheme were returned by BRERC as part of the desk study. These included the following notable species including Schedule 1 species such as redwing (*Turdus iliacusand*) and fieldfare (*Turdus pilaris*).

8.7.31 **Kingfisher** (*Alcedo atthis*) – records of this species were returned within 2km of the site. A number of anecdotal reports of presence within the site was reported.

8.7.32 **Barn Owl** (*Tyto alba*) – A number of records of this species were returned, though none in recent times and none within the Scheme.

8.7.33 **European Badger** (*Meles meles*) – Numerous records of badger within 2km of the Scheme were returned the most recent recorded in 2016.

8.7.34 **Terrestrial invertebrates** – A number of records for invertebrates was returned. These include locally and nationally importance species. The tables from the record search are included in ES Volume 3 Appendix 8.B – Biodiversity Record Search.

8.7.35 **Other notable species** – These include other Section 41 species not detailed above. A number of **hedgehog** (*Erinaceus europaeus*) records and **moss carder bee** (*Bombus muscorum)* within 2km of the site were returned by BRERC as part of the desk study as were records of **Brown Hare** (*Lepus europaeus*).

8.7.36 **Invasive Non-Native Species (INNS)** – Records returned within 2km of Banwell include for American mink (*Neovison vison*), Jenkin's spire snail (*Potamopyrgus antipodarum*), Buddleia (*Buddleja davidii*), cotoneaster species (*Cotoneaster horizontalis* and *C. simonsii*), Canadian waterweed (*Elodea canadensis*), Nuttall's waterweed (*Elodea nuttallii*), Russian vine (*Fallopia baldschuanica*), Variegated yellow archangel (*Lamium galeobdolon subsp. Argentatum*), least duckweed (*Lemna minuta*), Winter heliotrope (*Petasites fragrans*), Japanese knotweed (*Fallopia japonica*). The invasive Floating-pennywort (*Hydrocotyle ranunculoides*) is also widespread throughout the wider habitats and within the Scheme.

Surveys and Nature Conservation Value

8.7.37 Some surveys, dependent on time of commission, encapsulated a wider area to inform an options appraisal for the route. Three options were considered with the chosen route decided upon and announced in October 2021. All survey areas covered the chosen route and the pertinent Zone of Influence.

8.7.38 **Phase 1 Habitat Survey** (ES Volume 3 Appendix 8.Q) – A survey of the wider habitats was undertaken as part of the PEA in 2021 as part of the options appraisal of the 3 potential routes. The Phase1 Habitat Survey highlighted the Proposed Scheme has the potential to intersect with habitats such as Hedgerows, Hedgerow trees, Rivers, Rhynes, and Traditional orchard. Also

within close proximity of Low mixed deciduous woodland, ponds, roadside verges and less than 50m from land designated as ancient woodland. The remaining habitats identified (scrub, tall ruderal, amenity / improved grassland) are not considered to be protected or priority habitats, comprising common and widespread species. These habitats are synonymous with habitats in the wider area and are this considered to be of **Local Importance.**

8.7.39 **Habitat – Grassland National Vegetation Classification (NVC)** (ES Volume 3 Appendix 8.D) – All suitable areas of the Scheme were surveyed by suitably experienced ecologists / botanists in accordance and classified as an NVC community. A rapid assessment was undertaken to establish a baseline within the one season and prior to crop harvesting for the entire Scheme and all three route options. A coverage scale estimating the percentage coverage of a species was used to analyse the data using the NVC tables. Abundance scales used were *DOMIN* and DAFOR (Dominant, Abundant, Frequent, Occasional, Rare) and fed into Modular Analysis of Vegetation Information System (MAVIS) for further analysis.

8.7.40 The habitats on site comprised of MG7 (*Lolium perenne* leys and related grassland) communities corresponding to agricultural lays of semi / improved grassland. This community is considered as a ubiquitous reseeded habitat, present throughout the UK. As such the site is considered to be of **Local importance**.

8.7.41 A **pond** located at Ch. 1+900 has shading from surrounding vegetation of 50%, has waterfowl including swans present and detritus and suspected asbestos on the verge. It has opportunities for species, but this is limited by the quality of the pond. It is therefore considered to have **Local Importance**.

8.7.42 **Habitat – Hedgerow** (ES Volume 3 Appendix 8.E) – Hedgerows were surveyed by suitably experienced ecologists in accordance with PTES and CIEEM guidelines and in accordance with the Hedgerow Regulations (1997). A map of the site was established with a 250m buffer zone demarcated from the Scheme. Following this, all hedgerows within this buffer (or a proportion thereof) were numbered for survey. Surveyors then assessed these on site focusing on 30m central to the hedgerow per 100m of

hedgerow. If the hedgerow was longer than 100m additional 30m sections were assessed. Species, trees, and ground flora was recorded to inform the quality of the hedge.

8.7.43 Of the 86 hedgerows surveyed, 2 were considered to be very species rich and structurally important hedges (No.74 and No.83). A number of hedgerows were considered structurally diverse with 8 considered species rich and structurally important. However, current management procedures (heavy flailing) results in few hedgerows with species diversity or to be of poor structural quality. As such the site is considered to be of **Local importance**.

8.7.44 **Habitat – Woodland –** (Refer to the Arboricultural Impact Assessment ES Volume 3 Appendix 7.D) – A full survey was undertaken in December 2021 in accordance with the recommendations of British Standard 5837:2012 '*Trees in relation to design, demolition and construction – recommendations*'[8.37]. Where a tree was then classified into a 'Quality Category' of either A (High), B (Moderate), C (Low), or U (Unsuitable for retention – but can be considered as having ecological value in other respects). Root Protection Zone (RPZ), Veteran or Ancient tree Buffers (V/ATB) and Ancient Woodland Buffers are also considered.

8.7.45 The survey recorded trees of note including the high quality and moderate quality hybrid / black poplar (species will be confirmed when known from samples, taken in June 2022). These collectively form a notable stand of trees which would not be easily replaced. These represent the most significant arboricultural constraints (see Table 8.11 below) for reference of ecological assets of trees. Note the number of hedgerows is independent to hedgerows survey data due to differing survey criteria. As such the site is considered to be of **Local importance**.

Table 8.11 A synopsis of the Arboricultural survey results

	Total	A High quality trees whose retention is most desirable	B Moderate quality trees whose retention is desirable	C Low quality trees which could be retained but should not significantly constrain the proposal	U Very poor quality trees that should be removed unless they have high conservation value
Trees	**68**	3	58	7	-
Groups	**29**	1	20	7	1
Hedgerows	**94**	9	85	-	-
Total	**191**	**10**	**166**	**14**	**1**

8.7.46 **Habitat – Traditional Orchard** - A small traditional orchard is located to the centre of the Scheme on Riverside. It is held privately and has signs on management. The species of tree are an unidentified form of Cider apple and as such, this is considered to have **Local importance**.

8.7.47 **River corridor, Aquatic Invertebrates and Aquatic Macrophytes Survey** (ES Volume 3 Appendix 8.F) - were undertaken to provide a baseline understanding of the geomorphological conditions, macrophytes, and macroinvertebrates within the study area. Further Modular River Physical (MoRPh) River surveys were undertaken in 2022 to fulfil aspects River Condition assessment within Natural England's Biodiversity Metric 3.0[8.38].

8.7.48 Survey extents comprised:

a) River Corridor Survey – 500m;
b) Macrophyte Survey – 2 x 100m surveys upstream and downstream of proposed Scheme; and,
c) Macroinvertebrate Survey – Spot Survey along Scheme route.

8.7.49 The methodology of the River Corridor Survey follows that of the NRA Conservation Technical Handbook (1992)[8.39]. The River Banwell was surveyed following the standard LEAFPACS macrophyte methodology (Water Framework Directive UK Technical Advisory Group 2014)[8.40], and ditches were

investigates using the Common Standards Monitoring Guidance for Ditches (JNCC 2005)[8.41] methodology. The LEAFPACS methodology uses a species nutrient index, together with measures of diversity and abundance to assess the quality of the river using vegetation (macrophytes) and is used by the Environment Agency (2016) incorporating 100m long sections, recording species and cover values where appropriate. The data obtained was then analysed using LEAFPACS methodology to assign indices and interpret the data. These were designed for flowing rivers and therefore is only appropriate for the River Banwell, however the survey method was conducted on other watercourses for a comparison of species richness and cover.

8.7.50 Macroinvertebrate sampling was undertaken at each sampling site in accordance with standard methods used by the Environment Agency (2017). These comprise of watercourses such as the River Banwell in addition to notable rhynes and ditches. The whole sample was preserved on site with 90% industrial methylated spirit solution and returned to a laboratory for further analysis in accordance with standard methods used by the Environment Agency (2014). Samples were identified to species level.

8.7.51 Using the LEAFPACS methodology the River Banwell was found to be of moderate status. The remaining ditches are unfavourable mainly due to the presence of the non-native species *Elodea nuttallii* and the uniform bed and bank channel structure (a result of their heavily man made or modified nature).

8.7.52 The macroinvertebrate sampling recorded mainly common and widespread species with only one species present, that is currently restricted in distribution enough in the UK for it to be designated as Nationally Scarce. This species *Hydraena rufipes* (nationally rare species) is present, namely the East Mead rhyne near the football grounds (Ch. 2+340)

8.7.53 By applying the River Condition Assessment methodology to the pre-scheme scenario, it is possible to see that the scheme study area contains three moderate, six Fairly Poor MoRPh5 lengths and one Poor MoRPh5 length.

8.7.54 Table 8.12 shows that watercourses have been classified as

Moderate, Fairly Poor or Poor due to a combination of negative indicator scores, mostly associated with artificial/managed ground cover (roads or arable agricultural use) and artificial bank profiles (obviously re-sectioned). The majority of other indicator scores do not contribute to the overall score due to the lack of physical features within the drains. Table 8.12 also provides lengths of watercourses associated with each score which have been used in the Biodiversity Net Gain metric 3.0 assessment. (ES Volume 3 Appendix 8.P)

Table 8.12 Breakdown scores and lengths to be entered into Biodiversity Net Gain metric

Watercourse	Baseline Condition Class / Score (Final)	Length (km)
Wallymead Rhyne	Fairly Poor / 2	0.213
Old Yeo Rhyne	Fairly Poor / 2	0.652
	Poor / 1	0.040
Watercourse 2	Moderate / 3	0.149
River Banwell	Fairly Poor / 2	0.068
Watercourse 1	Moderate / 3	0.347
	Fairly Poor / 2	0.439

8.7.55 The habitats on site are considered to be of **Local Importance**.

8.7.56 **Fish** – No specific surveys were undertaken, scoped out in Ecology Scoping Report (ES Volume 3 Appendix 1.E), Pre-construction surveys will be carried out. Species are known to be present in the River Banwell. Although the section of river within the footprint of the Scheme is small, passage through the site is critical for fish species. Eels are also recorded within the Scheme. Despite little evidence during aquatic surveys or records of the importance of the rhyne system to fish, there are functional links between this and larger bodies of water, namely the River Banwell. The substrate of which was considered to be of low quality for fish spawning with acknowledgement that the recorded migratory species could still use the river during this time. The large pond at Ch. 1+900 could have fish present. As such, within the Scheme fish are considered to be of **Local Importance**.

8.7.57 **Bat** – Bat hibernation surveys were carried out by WSP in between December 2020 and April 2021 (refer to ES Volume 3

Appendix 8.G5). Surveys were undertaken in accordance with the guidelines in the Bat Conservation Trust's Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins J. (ed.), 2016)[8.42].

8.7.58 A Programme of Tree inspection, hibernation inspection - built structures and automated static detector surveys were undertaken.

8.7.59 No bats or evidence of bats was recorded in any of the trees that were inspected during aerial / ladder inspections or the buildings / built structures within 100m that were inspected during the hibernation period.

8.7.60 Of the six buildings / building complexes that were identified from online resources as potentially containing features suitable for hibernating lesser or greater horseshoe, Banwell Castle was not accessible and of the other five, only Banwell Church was brought forward for further hibernation inspections / automated static detector monitoring surveys. Evidence of bat use was recorded throughout the church indicative of common pipistrelle *Pipistrellus pipistrellus*, brown long-eared bat *Plecotus auratus* and both horseshoe species. No horseshoe species were recorded during the 30 days of static monitoring, only individual calls from common pipistrelle and brown long-eared bat were recorded at level that indicated opportunistic roosting during the hibernation period.

8.7.61 Further bat surveys were carried by the University of West England (UWE) in 2020 and 2021 (refer to ES Volume 3 Appendix 8.G1). Surveys were undertaken in accordance with the guidelines in the Bat Conservation Trust's Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins J. (ed.), 2016)[8.42].

8.7.62 A programme of automated monitoring surveys was undertaken across the Scheme using passive bat detectors (Model - Wildlife Acoustics SM-mini), deployed for 10 consecutive nights per month. The detectors were placed at predetermined locations across the Scheme to facilitate recording bat activity over a continuous period. The recordings from these devices were used

to identify species of bat within the Scheme extents and measure levels of bat activity throughout the night and the season.

8.7.63 Static detectors were deployed for a total of 55 days between November 2020 and March 2021 (10 nights of bat activity per a site per a month). A maximum of 58 detectors were deployed each month during the survey period, 8 of which are permanently deployed at cave entrance locations to collect ongoing bat activity at known cave roost sites.

8.7.64 Further to and developed from the above UWE surveys, radio tracking surveys were undertaken (ES Volume 3 Appendix 8.G2). These surveys comprised mist net trapping bats and attaching a small radio tag. These tags remain with the bat and provide a signal for radio tracking to understand bat use of the site (trapping efforts correspond to Bat Conservation Trust (BCT) guidelines).

8.7.65 Bat Swarming surveys were undertaken in 2021 (details included in ES Volume 3 Appendix 8.G2).

8.7.66 Bat Building Inspections - Banwell castle was undertaken in August 2021 (ES Volume 3 Appendix 8.G3). Despite no direct impact upon these structures the external aspects of the grounds were visited by suitably licenced ecologists to ascertain the presence of potential bat roost or resting features (note; internal inspections was not undertaken due to a lack of access being granted). Here, a powerful torch and an endoscope were used to inspect any crevices which could potentially be used by roosting bats. Evidence of roosting bats, such as (but not limited to) droppings, feeding remains, urine staining, grease marks, and live or dead bats was sought but none found. There is potential for use of the area by bats, but without internal examination, no specific conclusion could be made. (Note: This location would directly impacted by the Scheme).

8.7.67 Bat Tree / Climbing Inspections (ES Volume 3 Appendix 8.G4) - Following confirmation of the Scheme’s route in October 2021 and the culmination of the Arboricultural survey, a Ground Level Tree inspection of trees with potential bat roosting or resting features was undertaken by suitably experienced ecologists in April 2022. Climbing inspections will be carried out prior to

vegetation clearance, as required, to qualify any ground based classifications of trees features where safe to do so. These will be inspected visually for actual bats, bat carcasses and signs of bat use (such as, but not limited to, droppings, staining, scratch marks, polish marks, aromas, and flies around cavities). Further emergence or re-entry surveys on these features may be recommended prior to construction dependent on these survey results.

8.7.68 Bat Transect Surveys - As the preferred route was announced in October (outside of the core bat activity period) no transects have been conducted to date. However, given the level of information regarding bat activity obtained across the site though differing techniques, these are not critical to the assessment. Manual activity surveys for hop overs and transects will be conducted in summer 2022 in accordance with BCT (Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd ed) and DEFRA Local Scale guidelines[8.43].

8.7.69 UWE showed that bats use the site for commuting and activity especially along the River Banwell, and likely use the agricultural land that provide good insect biomass such as, fields with cattle and the rhyne network.

8.7.70 Radio tracking surveys noted use of the site, by Annex II species south of the proposed location for the Banwell Bypass with the Ochre caves as a roost. Predominant activities on site were commuting and foraging. Bats were recorded travelling south beyond the boundaries of the site and also north to known roosts in Brockley Hall.

8.7.71 Swarming surveys returned fewer records than expected and are recommended to be repeated. Particularly given the designation of the SAC for bat species.

8.7.72 It must be noted that the use of the site by a number of differing species through a single season ‘snapshot’ suite of surveys requires a worst-case scenario to be considered. Therefore, it is considered that the area is considered to be of **International/ European importance** for bats.

8.7.73 **Hazel Dormouse** (ES, Volume 3 Appendix 8.H) - Presence /

Absence Surveys for dormouse were undertaken between April 2021 and November 2021.

8.7.74 Surveys consisted of deploying a number of artificial nesting tubes and the recently developed footprint tubes in accordance with guidance.

8.7.75 Surveyors visited the tubes at least once a month and cautiously checked the contents or recorded the footprints present and for the latter replaced the paper and ink as required.

8.7.76 Surveyors also checked the area during surveys for field signs including characteristics feeding remains and (distinctively chewed hazel nuts).

8.7.77 Dormouse nests were predominantly recorded on site from the eastern half of the site, within the area proposed for the Southern Link, land adjacent to Towerhead Farm (Banwell Christmas Tree plantation) and further north beyond Banwell Playing fields. Isolated nests were found in the north western extent of the Scheme. However, no discernible footprint evidence or any other field signs were noted. The nests were recorded late in the season (October and November surveys) and some nests were characteristic of being created by juvenile or young dormouse (due to structural integrity).

8.7.78 Habitats within the Scheme include dormouse suitable plant species and ensure connectivity, due to the rhyne / hedgerow network, both within the Scheme boundaries and the wider habitats beyond. It is therefore considered that the Scheme is of **International / European importance** for dormouse.

8.7.79 **Great Crested Newt** (*Triturus cristatus*) (ES, Volume 3 Appendix 8.J) - Surveys to determine the presence or absence of Great Crested Newt (GCN) eDNA were undertaken in May / June 2021. These surveys test water samples from waterbodies in a laboratory setting for environmental DNA of the target species. Further surveys were carried out in May / June 2022 for ponds that were dry during the surveys in 2021. There was no evidence of GCN in any of the surveys undertaken.

8.7.80 Ponds were initially subject to a Habitat Suitability Index (HSI)

Assessment undertaken by WSP and any additional ponds or suitable waterbodies found on site by the AGC team were also subject to a HSI and sampled. A quality and potential matrix for each waterbody was used and a score assigned to classify the waterbodies as Excellent, Good, Average, Below Average, Poor, Negligible. A total of 23 water bodies were considered for further eDNA survey.

8.7.81 Under district level licensing, the traditional suite of GCN survey techniques is not necessary. Further, due to the timing of the awarding of the Scheme, there was little opportunity to undertake a full survey effort of multiple (up to 6) visits. Therefore, eDNA surveys were undertaken to gather a snapshot of the area. Surveys followed the correct guidelines and involved surveyors collecting a number of samples per pond prior to sending for laboratory analysis. No positive indicators of this species were returned following laboratory analysis.

8.7.82 Due to the lack of evidence the site is considered to have **Negligible importance** for GCN, though this does not preclude the possibility of presence and it is noted that EPS licences are present for areas in close proximity to the east of the site as part of the Hinkley Access Road (National Grid). Therefore, due to the proximity of records and the similarity and contiguity of habitat, District Level Licensing is recommended to be obtained from NE.

8.7.83 **Reptile** (ES, Volume 3 Appendix 8.I) - Surveys for reptiles were undertaken between April 2021 and October 2021. Due to the size of the Scheme, and the complex matrix of interconnected and estranged habitat; and following consultation with experts at the Amphibian and Reptile Conservation Trust and Swansea and Bangor University; it was considered that population surveys would provide an understanding of the population on distinct areas only. During construction phase, this would lead to a number of differing approaches. It is therefore considered that assuming presence as a basis for an overall site approach to these species would be appropriate. This would be supported by information from field signs such as feeding habits, prey assemblages sloughs or shedding of skin, or egg laying sites.

8.7.84 A habitat assessment informed surveys following guidelines described in the Survey protocols for the British herpetofauna

(Sewell et al., 2013)[8.44], Froglife Advice Sheet 10 (Froglife, 1999)[8.45] and DMRB LA 108.

8.7.85 The survey used the standard method of setting-out artificial cover objects (ACOs or refugia) in the survey area. ACOs comprised of 0.25m^2 hardened bitumen felt (Trade name - Onduline) with suitable thermal qualities (absorbing and trapping heat). ACOs were set out approximately 1 per 10m in areas of suitable habitat where possible throughout the Scheme (equating on average to greater than the 10 per hectare recommended by Froglife guidance). Specific locations for deployment of ACOs were chosen that were exposed to solar radiation for at least part of the day and adjacent to or partially concealed in suitable vegetation cover, such as, at scalloped edges of habitat. ACOs were left to bed in for at least 7 full days (on average 14 days) following deployment as per guidance and best practice. ACOs were then checked cautiously for reptiles (and other incidental) species basking beneath on top or nearby for a total of 7 visits per ACO. The minimum period before re-checking an ACO was 48hrs but on average longer and survey dates were spaced throughout the survey season to minimise disturbance to reptiles. This also spread the surveys through the season to address changes at different times of the year and also variations in life cycle throughout the season to ensure robust results.

8.7.86 Supplementary techniques were also used in conjunction with checking the ACOs including systematic searching of the survey area using direct observations with a slow walk-through of suitable habitat (transect). Natural refugia were also searched for where appropriate and field signs such as sloughed skins were sought.

8.7.87 Surveys were undertaken in suitable weather conditions of low wind speeds, temperatures between 10°c – 20°c, with sunshine or warm with hazy sunshine / cloud cover.

8.7.88 Species recorded on site during these surveys include grass snake and slow worm. Reptiles were identified at all locations across the Scheme namely, grass snakes, and slow worms (*Anguis fragilis*). Grass snakes were found in all aspects of the site at all life stages (save for egg sites) with yearling juvenile, neonate, and notably large adult females found. A maximum

adult count of 6 was found in one survey.

8.7.89 Further, ethological indicators such as sloughs and feeding evidence were recorded. Fewer slow worm were recorded which was in accordance with previous records with a maximum survey count of 5 adults. Numbers of grass snake found south of Court Farm were considerable, with all adjacent land having a number of records from the surveys including animals at all life stages (bar eggs) and undertaking activities such as feeding and sloughing. Further, juveniles recorded prior to the accepted hatching season were considered as last year's young, therefore displaying site fidelity and a consistent presence.

8.7.90 As such, given the wide distribution of grass snakes and the number recorded it is considered that the area is of **County Importance** to these species.

8.7.91 **Amphibian**; (ES, Volume 3 Appendix 8.I) Surveys for other amphibians were part of reptile surveys undertaken between April 2021 and October 2021. Results during protected species surveys particularly reptile surveys were returned of frog and toad site wide and one palmate newt was noted at Ch. 0+550. As identified in reptile report (ES, Volume 3 Appendix 8.I) the East Mead rhyne near the football ground contained high numbers of toad and frog tadpoles. As such the area is considered to be **County Importance** for these species.

8.7.92 **Otter** (ES, Volume 3 Appendix 8.K) - Surveys for the evidence of otter were undertaken by two suitably experienced ecologists in accordance with established standards and guidelines (CIEEM, 2013).

8.7.93 These surveys recorded no direct sightings of otter. However, field signs such as spraint, most notably on the Riverside on the River Banwell, and slides near Old Yeo Rhyne. Further potential resting sites were identified near the base of Court farm. The evidence for otter was concentrated within the central section of the Scheme, on Riverside or in rhynes in close proximity (notably at the Old Yeo Rhyne) with further investigations north (beyond 200m) confirming suitable habitat and potential (degraded) field signs, by way of a slide, near Towerhead Brook to the north east. Habitats within the Scheme are considered to be suitable for

foraging and lying up by otters, but no holts have been identified within the Scheme. Despite this the habitats within the Scheme are therefore considered to be of **County Importance** for otters

8.7.94 **Water Vole** (ES, Volume 3 Appendix 8.L) - Surveys for the evidence of water vole were undertaken in accordance with established standards and guidelines.

8.7.95 No signs of water vole were recorded, and no recent records were returned from the desk study within 2 km of the site. There is potential habitat for the species although some aspects of the rhynes and the River Banwell are not suitable for the species. Further, the widespread agricultural management may have limited the suitable food although it is acknowledged that water vole have a considerably varied diet. As such the area is considered to have **Negligible Importance** for this species. These have not been carried forward into the assessment.

8.7.96 **Bird** (ES, Volume 3 Appendix 8.R) - Bird surveys were undertaken by WSP in accordance with British Trust for Ornithology guidance[8.46]. Wintering bird surveys were undertaken to provide baseline data regarding the bird community on the Site in winter 2020/21. The objective of the survey was to provide information on legally protected or notable species by way of a number of transects with a focus on the Scheme. Breeding bird surveys were undertaken between March and June 2021.

8.7.97 Species noted during surveys included Kingfisher, Fieldfare (*Turdus pilaris*), Redwing (*Turdus iliacus*), and Cetti's Warbler (*Cettia cetti*).

8.7.98 Assemblage of common and widespread species were interspersed with a few notable species. However, none of these were in high numbers with the majority of the more notable species concentrated to the north of the Scheme. It is therefore considered that the site is of **Local Importance** to bird species.

8.7.99 **Kingfisher** (*Alcedo atthis*) (ES, Volume 3 Appendix 8.M) – A review of the local datasets were carried out but did not hold any records of kingfisher roosting. A survey was undertaken during 2021 with a ZoI of approximately 250m to the north and 250m to

the south of each of the three proposed route options to cover the likely zone of disturbance from the Scheme.

8.7.100 Surveys found a lack of suitable earth cliffs for nesting kingfisher and no evidence of nesting activity. Anecdotal evidence of sightings of commuting birds were relayed by local dog walkers. Particularly within the vicinity of the Old Yeo Rhyne. The main focus of anecdotal sightings of this species is in and around the central area of Riverside. The areas of anecdotal sightings provided few perching opportunities for hunting, particularly given the shallow depth of some suitable areas (such as the River Banwell section on Riverside). Despite this the species does use the site, for commuting. Therefore, it is considered that the area is at least **Local importance** for this species.

8.7.101 **Barn Owl** (*Tyto alba)* (ES, Volume 3 Appendix 8.N) - A staged survey of the Scheme was undertaken. Data sets held by the Avon Ornithological Group (AOG) and, for those small areas to the south that are outside the North Somerset boundary, the Somerset Ornithological Society (SOS) were used to provide current data. The data search did not reveal any evidence of barn owl using the area.

8.7.102 A full habitat survey was conducted in September 2021 following barn owl survey methodology and guidance in Shawyer (2011)[8.47]. No barn owls, or signs of barn owl, were recorded by during these surveys. Additionally, it is considered that the area of suitable habitat is less than that required to support a population of barn owl. While there are some opportunities for this species, due to the number of agricultural areas within the site, the site mainly comprises of short grassland, managed either by grazing or mown for silage. Most field boundaries are hedges but there are some open lengths of rhyne. None have extensive grass-dominated banks that might be used by Barn Owls as corridors or for foraging. The stretches of the verges of the M5 motorway that lie within the study area are dominated by scrub. To the south of Banwell the Mendip ridge is dominated by woodland. To the south of the woods the landscape is dominated by close-grazed pastures divided by hedges. All of the above do not provide a suitable habitat for Barn Owl.

8.7.103 In conclusion, there are areas of suitable foraging habitat for Barn

Owl, in the form of small parcels of unmanaged grassland and larger areas of lightly grazed grasslands, which retain a tussocky structure suitable for small mammals. However, Habitats across the Scheme comprise approximately 0.42ha of Type 1 habitat and 2.64ha of Type 2 habitat, although some of the latter was mown during the survey period, so that by the end of October it was Type 3 habitat (Type 1 – optimal, type 2 – sub-optimal, Type 3 – unsuitable).

8.7.104 These areas comprise of hectarage below the requirement for 17-26 hectares of suitable foraging habitat within 2km of a nesting or roosting site identified as required in the baseline survey report. This would indicate that this area should be considered that the area is **Negligible importance** for this species.

8.7.105 **European Badger** - A survey of land within and adjacent to the Scheme was undertaken by ecologists from WSP as part of the PEA. Where landscape surveys / potential sett classification and assessing field signs such as (but not limited to) latrines, feeding remains, snuffles, footprints, hairs and alive or dead badgers were undertaken. Further anecdotal sightings were recorded by the AGC team during species surveys.

8.7.106 Incidental evidence has also been recorded during other species surveys. A large sett (30no entrances with up to 17no with signs of activity) has been noted by the AGC team approximately 40m from the Scheme footprint. It is recommended that this is monitored for activity and, dependent on the results, a closure under licence (from NE) and an artificial sett would be required. Further evidence of badger was noted within the vicinity of the Scheme. As such the site is considered to have **Local importance** for this species. However, pre-construction surveys of sett monitoring and food bait marking which would update this baseline are ongoing.

8.7.107 **Terrestrial Invertebrates** (ES, Volume 3 Appendix 8.O) – A number of priority species are recorded in the vicinity of the site. No notable food sources were recorded on surveys. However, the NVC surveys noted a number of flowering species within the seed mix and the grazing regime would provide opportunities for invertebrates as would the dung of cattle. No legally protected

invertebrates have been recorded on-site although moss carder bee was recorded. The proximity of domestic houses also provides opportunities for pollinators. Therefore, it is considered that the area is of **County Importance** to terrestrial invertebrates.

Section 41 Species

8.7.108 **Hedgehog** – No specific surveys were undertaken for this species. However, various opportunities exist for hedgehog due to the hedgerow connectivity and occasional dryness of smaller rhynes. There are a number of domestic dwellings with traditional gardens (few with paving or decking) in the centre of the site in addition to livery yards and wider areas of suitable scrub. The site is considered likely to be of no greater value for hedgehogs than other habitats within the wider area. Therefore, the Site is considered to be of **Negligible importance** for hedgehog.

8.7.109 **Deer** – No species specific surveys were undertaken. However, anecdotal evidence and field signs noted during other surveys note various opportunities for Deer. Notable sightings were recorded on the area of the Southern Link adjacent to the Banwell Woods and to the north east of the site beyond the football grounds. The Site is considered likely to be of no greater value for deer species than other habitats within the wider area. Therefore, the site is considered to be of **Negligible importance** for deer.

Nature Conservation Importance

8.7.110 Table 8.13 below summarises the value of the ecological receptors detailed in section 8.5 above.

Table 8.13. Value of Ecological Receptors

Ecological receptors	Importance for Nature Conservation	Justification of further assessment
Designated sites	**International European / High**	a) potential indirect impact on North Somerset and Mendip Bat SAC and associated SSSIs
Habitats - NVC	**Local importance / Low**	a) Comprising of MG7 communities ubiquitous to the

Ecological receptors	Importance for Nature Conservation	Justification of further assessment
		area and wider ecological context. b) Assessment carried forward.
Habitats - Hedgerows	**Local importance / Low**	a) Few species rich examples, managed for agricultural rather than ecological reasons and present thorough the wider context. Nevertheless, a valuable ecological resource for the species present. b) Assessment carried forward
Habitats - woodland	**Local importance / Low**	a) Quality examples on site were limited to a stand of Back polar and desirable trees within hedgerows. b) Assessment carried forward
Aquatics – Banwell River	**Local importance / Low**	a) Moderate quality. Elodea nuttallii present throughout the site. b) Assessment carried forward
Aquatics - Macrophytes	**Local importance / Low**	a) Common species b) Hydraena rufipes in isolated areas. c) Assessment carried forward.
Fish	**Local importance / Low**	a) Limited opportunities for spawning on site. b) Rhynes suitable habitat c) River Banwell suitable habitat. However, relatively small section of river (close to source) on site. d) Assessment carried forward.
Bat	**International European / High**	a) Species, roosts, and location to designated sites. b) Assessment carried forward.
Hazel Dormouse	**International European / High**	a) Present on site. b) Assessment carried forward

Ecological receptors	Importance for Nature Conservation	Justification of further assessment
Great Crested Newt	**Negligible**	a) Negative eDNA results. b) However, presence north east beyond site. c) Assessment not carried forward
Reptile	**County importance / Medium value**	a) Predominantly Natrix helvetica. b) Present throughout the site. c) Assessment carried forward
Amphibian	**County importance / Medium value**	a) Present throughout the site. With high aggregations in some areas. b) Assessment carried forward
Otter	**County importance / Medium value**	a) Present on site b) Records to the north east of holts. c) Assessment carried forward
Water Vole	**Negligible**	a) No records returned for the site b) No evidence found c) Assessment not carried forward.
Bird	**Local importance / Low**	a) Common and widespread species on site b) Suitable opportunities site wide, though these are synonymous with the wider ecological context. c) Assessment carried forward
Kingfisher	**Local importance / Low**	a) Present on site. b) However, no rooting opportunities found c) Assessment carried forward.
Barn owl	**Negligible**	a) Suitable opportunities limited and habitat synonymous with wider ecological context b) No evidence found on site c) Assessment not carried forward although reference has

Ecological receptors	Importance for Nature Conservation	Justification of further assessment
		been made with kingfisher where appropriate
European Badger	**Local importance / Low**	a) Suitable opportunities site wide. b) Field signs in many areas c) Large main sett noted centrally to site d) Assessment carried forward.
Terrestrial Invertebrates	**County importance / Medium value**	a) Notable species with records. b) Opportunities site wide. c) However, site habitats synonymous with wider ecological context. d) Assessment carried forward.
Hedgehog	**Negligible**	a) Suitability higher in wider context due to management of site. b) Assessment not carried forward.
Deer	**Local importance / Low**	c) Suitability higher in wider context due to management of site. d) Assessment carried forward.

8.8 Predicted Environmental Effects

8.8.1 Environmental effects are aspects of the Scheme that can impact upon the species and habitats described in the baseline surveys. The assessment has been considered in conjunction with the Scheme description, lighting strategy, and construction strategy (ES Volume 1 Chapter 2), air quality (ES Volume 1 Chapter 5) landscape (ES Volume 1 Chapter 7), drainage and hydrological impacts (ES Volume 1 Chapter 13), and environmental management (ES Volume 1 Chapter 16).

8.8.2 This assessment has been undertaken with full consideration of the embedded mitigation referred to below (also see Planning Document - Environmental Masterplan (EMP) drawings (Sheets

1-6)).

Embedded Mitigation Measures

8.8.3 Embedded mitigation measures will be detailed in a specific method statement to incorporate the species known in the study area (and general reference to wider species). This is to be included as part of the Construction Environmental Management Plan (CEMP – Volume 3 Appendix 16.A). Table 8.14 Shows Embedded Mitigation and associated species. Refer to Environmental Masterplan (Planning Documents – Environmental Masterplans)

Table 8.14 Embedded Mitigation and pertinent species

Type of mitigation	Pertinent species
Culvert / Pipe (Various)	Hazel dormouse, commuting bat, otter, badger, reptile, amphibian, fish, bird
Attenuation Basin	bird, amphibian, reptile, invertebrate, otter
Boundary Fencing	badger, otter, deer
Low level lighting	bat, otter, badger, hazel dormouse
Riverside Bridge	fish, birds, bats, otter
Moor road Bridge	Hazel dormouse, commuting and foraging bat, otter, badger, reptile, amphibian, fish, bird (inc. king fisher)
Retaining vegetation including trees on Towerhead Rd.	Commuting bats, birds, dormouse
CEMP / LEMP / EPSL licences	All species (specific for EPSL / DLL)

8.8.4 EPS licences are to be applied for and granted by NE for the following species; Dormouse (site wide), Bat (if necessary), GCN (DLL) and a licence to close and remove a badger sett and build a replacement.

8.8.5 Trees to the eastern extend of the Scheme adjacent to Towerhead Rd support bats exiting from Banwell Woods. These bats exit at an elevation as dictated by roost height and the aspect of the woodland. Retaining these trees will continue to facilitate transitions from the SAC to the maternity roost beyond (north) of the Scheme.

8.8.6 11 no of culverts would be installed as part of the Scheme design,

these would encourage the connectivity for species that would otherwise have commuting routes severed by the Scheme. Table 8.15 below outlines the type of culvert and the embedded mitigation for biodiversity. Box culverts have been designed to allow connectivity, incorporating space for an otter ledge, provisions for dormouse, and incorporating a planting design to facilitate animal movement towards and through the culvert. For details on invert depths and drainage design refer to ES Volume 1 Chapter 13 – Road Drainage and the Water Environment. Refer to ES Volume 3 Appendix 13.A for the Water Framework Directive Assessment.

Table 8.15 Culvert Embedded Mitigation (natural bed to be confirmed)

Chainage (m) West to East	Name	Culvert type	Total Length (m)	Dimensions (m)	Mitigation
Ch. 0+550	Wallymead Rhyne Culvert (West)	Box	20.5	W = 5m H = 2.5m	Mammal ledge above spait flow, culvert for bats, natural bed. Opportunities for dormouse connectivity
Ch. 0+750	Wolvershill Rd Junction culvert	Pipe	25	1m dia	Mammal ledge for mammal connectivity
Ch. 1+110	South of Court Farm	Pipe	26.6	1.05m dia	For mammal connectivity
Ch. 1+385	Wallymead Rhyne Culvert (East)	Box	31	W = 5m H = 2.5m	Mammal ledge above spait flow, culvert for bats, natural bed. Opportunities for dormouse connectivity
Ch. 1+650	Unnamed watercourse Culvert 1	Pipe	26	1.05m dia	Mammal ledge for mammal connectivity
Ch. 1+760	Old Yeo Rhyne Culvert (Mainline)	Portal	29.6	W = 7.5m H = 2.5m	Mammal ledge above spait flow, culvert for bats, natural bed. Opportunities for dormouse connectivity

Chainage (m) West to East	Name	Culvert type	Total Length (m)	Dimensions (m)	Mitigation
Ch. 2+130	Unnamed Watercourse Culvert 3	Pipe	28.0	1.05m dia	Mammal ledge for mammal connectivity
Ch. 2+310	East Mead Rhyne Culvert	Box	17.75	W = 4.75m H = 2.25m	Mammal ledge above spait flow, culvert for bats, natural bed. Opportunities for dormouse connectivity
Ch. 2+590	Unnamed Watercourse Culvert 4	Pipe	30	1.05m dia	Mammal ledge for mammal connectivity
Ch. 2+725	Unnamed Watercourse Culvert 5	Pipe	31	1.05m dia	Mammal ledge for mammal connectivity
Southern Link	A368 Culvert	Pipe	21	1.05m dia	Mammal ledge for mammal connectivity

8.8.7 A single span bridge would be constructed to cross over Banwell river, Riverside and the adjacent rhyne. The natural bed of the river would be retained, and planting and screening would be installed to preserve commuting lines and connectivity for a number of species.

8.8.8 A bridge across the River Banwell to the north of the river Banwell bridge and a culvert on the adjacent rhyne would facilitate the Moor Road link access. Details will be completed during the detailed design phase. The bridge deck could cover up to 15m of the river, however this is subject to further design. A mammal ledge above river level (below 1 in 100 year spate event) would be installed. The bridge and adjacent access road would be unlit and the parapet of the bridge would be up to 1m in height. Note: Targeted pre-construction surveys for otter, bat and fish are programmed for the Moor Road bridge link.

8.8.9 The impact of lighting on protected species especially bats and dormouse have been considered as part of the development of the lighting design. Refer to ES Volume 1 Chapter 2 – Scheme Description for lighting Strategy. Detailed design will be governed by Guidance note 08/18 (ILP Bats and Artificial Lighting in the

UK)[8.48]. The eastern tie-in has been designed to reduce the impact on lighting near the SAC and AONB. The junction would not be lit, and the orientation has been designed to minimise any glare from headlights on the SAC and the Southern Link is not lit. Columns are estimated to be between 10m and 8m to light Knightcott Road and would be cowled to reduce light spill, and for lighting elsewhere to be warm white / 2700k as per guidance (as dictated by Highway safety measures).

8.8.10 Seven attenuation basins are proposed as part of sustainable urban drainage systems (SUDS) and additional groundwater mitigation, to prevent adverse water quality impacts (including the Source Protection Zone (SPZ)), see Table 8.16. The incorporation of attenuation ponds within the drainage strategy (ES Volume 1 Chapter 2 – Scheme Description and Chapter 13 – Road Drainage and Water Environment) will act to ensure that watercourse hydrology is not adversely affected.

Table 8.16 Location of attenuation basins

Attenuation Basin and Chainage	General location
1a – Ch. 0+500	South of road
1b – Ch. 0+600	South of Road
2 – Ch. 1+600	North of road
3 – Ch. 2+280	North of road
4 – Ch. 2+340	South of road
5 – Ch. 0+500	Southern Link
6 – Ch. 0+400	Southern Link - Banwell Village Link

8.8.11 Attenuation basins and associated planting combine essential drainage function and offer attractants to species including for seasonally divergent species such as amphibians and terrestrial invertebrates. This would be accompanied by adjacent planting. In addition to providing habitat for water plants and species, the quality of floodwater prior to reaching watercourses would be of benefit for fish and other species downstream, due to the removal / settling of sediment acting as a filter through the ground and back to watercourses or aquifer.

8.8.12 The loss of the pond at Ch. 1+900 would be mitigated for by the provision of a replacement pond adjacent to the attenuation basin at Ch. 1+800 (Planning Document - Environmental Master Plan

(EMP) drawings, Sheet 3). The pond to be lost is of limited diversity with notable pollutants and INNS species (of note a Trachemys sp. turtle that can be detrimental to native species through predation). This pond would be replaced at a ratio of 2:1 in *volume* in as close proximity as suitable.

8.8.13 The Scheme includes mitigation measures which are provided to offset the impact of the Scheme proposal. These would include (but are not limited to):

a) flood mitigation to ensure that the Scheme does not increase flood risk for third-party properties (see ES Volume 1 Chapter 13);

b) essential environmental mitigation, such as ecology and landscape mitigation (see ES Volume 1 Chapter 7); and

c) sustainable urban drainage systems (e.g., attenuation basins and swales), and additional groundwater mitigation, to prevent adverse water quality impacts (including the Source Protection Zone (SPZ) See ES Volume 1 Chapter 13).

8.8.14 As a result of the Scheme, there would be a reduction in traffic through Banwell. The reduction in traffic (and resulting reduction in congestion) through the village could result in higher traffic speeds. However, it is noted that the village does currently have traffic calming measures in place (West St A371).

8.8.15 A reduced 20mph speed limit through Banwell would discourage vehicles from travelling at higher speeds, whilst also discouraging the use of the road as a through route (instead of the Banwell Bypass and Southern Link).

8.8.16 The reduction of traffic through Banwell due to the provision of the Scheme provides the opportunity to make improvements to the existing road and public spaces within Banwell to enhance the historic and urban setting of the village. These improvements would include, but are not limited to:

a) Alteration to the road and footways including resurfacing, widening, and narrowing (which would encourage drivers to comply with the posted 20mph speed limit);

b) Incorporation of active travel measures;

c) Soft landscaping and ecological improvements; and

d) Street signage improvements.

Construction Impacts

8.8.17 The effects of construction activities upon the Key Ecological Features are outlined below and construction activities with the potential to cause impacts on designated sites, habitats, and species include:

a) Land-take due to working areas, access roads, lay down zones, and site compounds. These could include the temporary land-take of site working areas or longer term land-take due to operational infrastructure;

b) Severance of wildlife habitat and disruption of commuting and foraging routes for protected species;

c) Removal of vegetation that comprise of or is suitable for protected species to facilitate access and installation of infrastructure;

d) Excavation and storage of soils. Here, there is potential for dust settling on vegetation, sediments entering water courses, or the spread of invasive species;

e) Use of materials during construction such as oils, fuels, chemicals, or unset concrete. These have the potential for accidental spillage onto vegetation or into a watercourse;

f) Construction noise, vibration, and increased traffic, plant movement, and human activity;

g) Night working (though expected to be minimal) during the construction phase may lead to disturbance through lighting, noise, and vibration;

h) Use of temporary facilities on-site, including disposal of waste and wastewater.

8.8.18 Many of the potential impacts would be during the construction phase. The Construction phase is currently estimated to be until Spring 2024.

8.8.19 Assessment of impacts on designated sites and veteran trees within 200m of the Scheme has been completed using the outputs from air quality qualitative assessment as detailed in Volume 1 Chapter 5 Air Quality.

8.8.20 Groundwater-dependent terrestrial ecosystems (GDTE), could be affected by local hydrological changes as a result of the construction phase of the Scheme, especially during the creation of cuttings. Excavations and changes could impact levels and

extent of flow, affecting networks of springs found throughout the study areas.

Designated Sites

8.8.21 The Scheme is in close proximity to the North Somerset and Mendip Bats SAC, being adjacent to Towerhead Road to the east of the Scheme. However, no works would impact the SAC directly. Adjacent fields would be impacted and as such some forgoing areas and potentially commuting lines would be severed. Notably, evidence of the use of the study area by bats in the active season is to forage and predominantly commute to the east of the Scheme.

8.8.22 Construction dust impacts on ecological sites is considered in Volume 1 Chapter 5 Air Quality with the overall concluded impact is not significant.

8.8.23 Consideration has been made of the commuting routes and core sustenance zones which would not be severed as part of construction. Additionally, adjacent land or land functionally linked to the SAC has also been considered as part of the HRA (Volume 3 Appendix 8.C). Notably the main area of the study area is functionally linked with the SAC by way of large trees, which the line the A368 to the north of the SAC, providing hop-overs from the Ochre Caves in addition to the height of these features in comparison to the remainder of the site. These would not be removed as part of the Scheme.

8.8.24 To the west, works near Dark Lane could impact commuting opportunities west towards the Bones Caves. Notably, surveys did not show considerable movement such as this with bats migrating north east and south of the site. Further, the AONB is in close proximity to this area with lighting levels near the AONB being of impact. The Scheme area is considered to support an internationally important population of bats, the impact could therefore be considered to be *direct*, *temporary*, *negative*

Receptor	Value	Magnitude of Impact	Significance
Designated Site	High	Negligible	Slight adverse

Habitats

8.8.25 Grassland Communities - A total of 42ha of habitat would be lost comprising of semi / improved grassland (MG7 communities). Comprising of *Lolium perenne* leys (and related grasslands) the structural diversity is minimal. However, these losses are considered to be *negative, direct, and permanent.*

Receptor	Value	Magnitude of Impact	Significance
Habitats - grassland	Low	Moderate adverse	Slight adverse

8.8.26 The Scheme would impact 33 intact hedgerows of the 86 hedgerows surveyed. In total, approximately 5.09ha of hedgerows would be lost, comprising structurally less important species rich examples bar 0.95ha of Native Species Rich Hedgerow with trees. It is considered that the impacts of losing the hedgerows would be negative, direct, permanent. However, the quality of these hedgerows is mostly limited due to the management with annual flailing.

Receptor	Value	Magnitude of Impact	Significance
Habitats - hedgerow	Low	Minor adverse	Slight adverse

8.8.27 No woodland would be lost. However, a group of six hybrid / Black Poplar would be lost. No other category A trees would be lost and Black poplar (T36) located at Riverside would be protected and retained within the Scheme extents. The loss of moderate quality category B trees would be replaced through mitigation planting. The low quality category C trees are considered to not constrain development and would also be mitigated for by replacement planting within the design.

Receptor	Value	Magnitude of Impact	Significance
Habitats - woodland	Low	Minor / Moderate adverse	Neutral - Slight adverse

8.8.28 A northern proportion of the traditional orchard would be lost to the road embankment. While the majority of this habitat is being retained and the area to be lost comprises scrub with scattered

willow (*Salix* sp.) and not the orchard stock, these losses are considered to be *negative*, *direct*, and *permanent*. (Note; honeybees are also kept within the orchard and while kept species are not considered from a biodiversity value, they would contribute to the biodiversity of the area as pollinators. Additionally, they would require moving from their current position).

Receptor	Value	Magnitude of Impact	Significance
Habitats – Traditional Orchard	Low	Moderate adverse	Neutral - Slight adverse

Aquatic habitats and species

8.8.29 The environmental pond would be lost at Ch. 1+900. It is located on land in private ownership and appears to have limited management. There is limited floristic diversity and detritus such as asbestos panels were found. Reports of non-native turtle (Trachemys sp.) species being present were also returned during other surveys. This loss would be *negative, direct, and permanent*.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats - Environmental Pond	Low	Minor adverse	Slight adverse

8.8.30 Rhynes within the Scheme boundaries are not anticipated to be altered structurally save for the installation of culverts and the unnamed rhyne adjacent to the River Banwell at the site of the Moor road bridge. The construction of culverts would require diversion of the watercourses or over pumping for the duration of the installation of the culvert. Limited fish capture may also be required. This would be of short duration and in accordance with appropriate Method Statements. These impacts would result in a *negative, direct*, and *permanent* effect.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats - rhynes	Low	Minor adverse	Slight adverse

8.8.31 Watercourses and rhynes at risk from noise and vibration associated with heavy plant / machinery movement in the vicinity of the River Banwell, Wallymead Rhyne, Old Yeo Rhyne, East Mead Rhyne to the east and the rhyne network adjacent to the current public right of way crossing Wolvershill Road. These are currently subject to activities by farm and domestic vehicles. Effects would be considered as temporary, negative, and direct.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Macro invertebrates	Low	Minor adverse	Slight adverse

8.8.32 There is a risk that noise and visual disturbance to otters, bats, and potentially fish in relation to building the bridge over the River Banwell and placement of culverts in rhynes / ditches. This would depend on timing of works and seasonality. This would create a *negative, direct*, and *permanent* effect.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – R. Banwell	Low	Minor adverse	Slight adverse

The bridge currently being proposed at Moor Rd adjacent to Riverside would involve culverting the rhyne and associated diversion or over pumping. Bridging over the River Banwell would have associated impacts to the river banks. There could be impacts on fish and the river banks at this location. Whilst this may be designed out the worst case would be *direct*, *adverse*, and *permanent.*

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Moor Road	Low	Major adverse	Slight adverse

8.8.33 There is a risk that macrophytes and the River Banwell corridor could be impacted by the works, this would be considered to be *negative, indirect,* and *temporary* for macrophytes denigrative direct and temporary of the river corridor. Due to the low diversity and eutrophic nature of the river corridor this would be considered to be limited.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Macro invertebrates	Low	Moderate adverse	Slight adverse

8.8.34 The potential impacts on wider macroinvertebrate assemblages of the River Banwell or other aquatic habitats that would contain macroinvertebrates would be from the construction of the bridge and instillation of culverts. These works would be localised and subject to precautionary methods of works. It is therefore considered that while works would be *direct, negative, and temporary*.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Macro invertebrates	Low	Minor adverse	Slight adverse

8.8.35 Works impacting the area where *Hydraena rufipes* (nationally rare species) is present, namely the rhyne near the football grounds (Ch. 2+340) could potentially be Major Adverse. However, this would represent a small proportion of the habitat available to this species and therefore be unlikely to represent an impact other than Minor Adverse.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Macro invertebrates	Low	Minor adverse	Slight adverse

8.8.36 Works impacting the River Banwell and tributaries could impact eel migration movement through the site. It is acknowledged that the river begins as a series of springs near the Church of St Andrew in Banwell. Works disrupting migration would comprise of the bridge building and culvert works and considered to be *direct*, *negative*, and *temporary*. Works of this nature would be localised.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – eels	Low	Minor adverse	Slight adverse

8.8.37 Pollutants released into watercourses during construction, such as, spills from plant and associated pollutants from the working area or disturbance of fine sediments during construction, could

potentially affect macroinvertebrates, macrophytes, and habitat quality, through toxic effects. However, works within a waterbody are limited to installing culverts / pipes. This impact covers a very small amount of the River.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Macro invertebrates	Low	Minor adverse	Slight adverse

Fish

8.8.38 Works to create the single span bridge over the river Banwell and adjacent rhynes would create localised shading of macrophyte species in addition to disturbance to fish species during construction.

8.8.39 Pollutants released during construction could potentially enter nearby watercourses, including the River Banwell and the rhyne network could cause injury or mortality to fish within the watercourses, an impact which would be characterised as being *negative, indirect,* and *permanent*.

8.8.40 The movement of heavy plant and construction near waterbodies would generate noise and vibration which could adversely affect juvenile and adult fish. The effects of noise and vibration on fish is not well-understood and there are no guidelines on maximum noise levels in aquatic habitats. Sound pressure levels (SPL) of above 190dB are thought to injure fish, and there is evidence that 155dB can temporarily stun fish (NOAA Fisheries, 2003)[8.49]. Combining the sensitive periods for all fish species of conservation importance which occur within affected watercourses, any works carried out in the period October to June could have an impact on migrating fish, if such works result in the generation of large amounts of noise and vibration. Requirements for spawning (such as substrate type and depth) is limited within the waterbodies on the Site, and therefore it is unlikely to be functionally important to breeding fish. This impact is characterised as being *negative, indirect,* and *temporary*. It has the potential to have effects on fish populations throughout the site.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Fish	Low	Moderate adverse	Slight adverse

Bats

8.8.41 The Scheme would not directly impact any known roosts. However, there is a risk that these species could be killed or injured during site clearance if any resting places or roosts are disturbed. This impact is characterised as being *negative, direct, and permanent*. Works near the Banwell Woods or effecting the traditional Orchard (central to the Scheme at Riverside) have the greatest potential for this impact. If an animal is killed or injured, the level of this impact is determined in consideration with the low population densities at which they are found and the value as an ecological feature.

Receptor	Value	Magnitude of Impact	Significance
Bats	High	Moderate adverse	Large adverse

8.8.42 Movement of bat species may be disrupted during construction (for example, through noise and light disturbance deterring movement or through the erection of temporary fencing) and this impact is characterised as being *negative, temporary,* and *direct*. The level of this impact is determined in consideration with the low population densities at which they are found and the value as an ecological feature.

Receptor	Value	Magnitude of Impact	Significance
Bats	High	Moderate adverse	Large adverse

8.8.43 Severance of connectivity within a bat habitat and removal of linear features as part of construction could reduce the opportunities for bat species. The construction of a single span bridge at Riverside and associated with the Moor Road bridge could impact bat behaviour in this area. This impact would be characterised as being *negative, permanent,* and *direct* due in part to the habitual nature and slow progress of territory due to considerable site and roost fidelity of these species.

Receptor	Value	Magnitude of Impact	Significance
Bats	High	Moderate adverse	Large adverse

Hazel Dormouse

8.8.44 There is a risk that dormouse could be killed or injured during site clearance if any nests (hibernation or breeding) are disturbed. This impact is characterised as being *negative*, *direct*, and *permanent*. If an animal is killed or injured, the level of this impact is determined in consideration with the low population densities at which they are found and the value as an ecological feature.

Receptor	Value	Magnitude of Impact	Significance
Dormouse	High	Moderate adverse	Large adverse

8.8.45 Movement of dormouse may be disrupted during construction (for example, through noise and light disturbance deterring movement) and this impact is characterised as being *negative, temporary,* and *direct*.

Receptor	Value	Magnitude of Impact	Significance
Dormouse	High	Minor adverse	Moderate adverse

8.8.46 Severance of connectivity within a dormouse habitat and a total of 1.6ha of potential habitat would be lost would be characterised as being *negative, permanent,* and *direct* due in part to the territorial nature and slow progression of territory with this species.

Receptor	Value	Magnitude of Impact	Significance
Dormouse	High	Moderate adverse	Large adverse

Reptile

8.8.47 Potential reptile habitat would be affected through the construction of the Scheme. This comprises predominantly of agricultural grassland. This impact is characterised as being *negative, direct,* and *permanent*. However, a low proportion of

land would be lost when considered as part of the wider habitat being retained or beyond the Scheme (due to the linear nature of the Scheme). Therefore, important features offering opportunities for foraging or commuting animals using the hedgerow and the rhyne networks, water bodies, would be impacted but not in the entirety of the feature, particularly with the dominant species on site being transient in nature (grass snakes). Large aggregations of detritus or dung heaps suitable for egg laying may be lost due to works.

Receptor	Value	Magnitude of Impact	Significance
Reptile	Medium	Major adverse	Moderate adverse

8.8.48 Removal of vegetation and topsoil during site clearance may result in injury or mortalities to semi-fossorial species (namely Slow worm) and other features such as potential hibernacula, refuge, or egg laying sites. There would be an associated increase in noise and light levels during construction which could cause disturbance. This impact is characterised as being *negative, direct,* and *permanent*.

Receptor	Value	Magnitude of Impact	Significance
Reptile	Medium	Major adverse	Moderate adverse

Amphibian

8.8.49 Habitat loss has the potential for amphibians to be disturbed through loss of grassland and commuting potential (hedgerows over rhyne networks), the pond at Ch. 1+900 and the realignment of rhynes through the construction of culverts. The works could have other effects such as an increase sediment disturbance, changes to the vegetative structure of a water body, or by increase of predator species. Therefore, the impacts are considered to be *negative*, *direct*, and *temporary.*

Receptor	Value	Magnitude of Impact	Significance
Amphibian	Medium	Major adverse	Moderate adverse

8.8.50 Removal of vegetation and topsoil and the potential for silt and pollutants entering water bodies during site clearance may result in injury or mortalities to semi-fossorial species and other

features such as potential hibernacula, refuges, or egg laying sites. This impact is characterised as being *negative, direct,* and *permanent*.

Receptor	Value	Magnitude of Impact	Significance
Amphibian	Medium	Major adverse	Moderate adverse

Otter

8.8.51 There is a risk that otters could be killed or injured during site clearance if any resting sites or holts are disturbed. This impact is characterised as being *negative, direct,* and *permanent*. If an otter is killed or injured, the level of this impact is determined as Moderate Adverse due to the low population densities at which otters are found and due to the value of this ecological feature.

Receptor	Value	Magnitude of Impact	Significance
Otter	Medium	Moderate adverse	Slight adverse

8.8.52 Movement of otters along the River Banwell may be disrupted during construction (for example, through noise and light disturbance deterring otters from crossing the site, or through both the clear span bridge and Moor road bridge construction works forming a direct barrier to otter movement). This impact is characterised as being *negative, temporary,* and *direct*. In the absence of mitigation.

Receptor	Value	Magnitude of Impact	Significance
Otter	Medium	Major adverse	Moderate adverse

8.8.53 Pollutants released into watercourses during construction could potentially poison the otter's food supply downstream of the Scheme. This impact is characterised as being *negative, temporary,* and *direct*. Due to the small component of the River Banwell the level of this impact could potentially be Major Adverse.

Receptor	Value	Magnitude of Impact	Significance
Otter	Medium	Major adverse	Moderate adverse

Birds including Kingfisher

8.8.54 Bird nesting habitat (comprising of scrub and grassland) and foraging habitat (arable, semi-natural grassland and tall ruderal) would be lost to the Scheme. No evidence of Kingfisher was found however, this does not preclude the possibility of them being present, therefore the loss of habitat would be confined to commuting and to a lesser extent to foraging habitat (due to the lack of suitability of the main section of the River Banwell that is being impacted by the site). This impact is characterised as being *negative, direct, and permanent*.

Receptor	Value	Magnitude of Impact	Significance
Birds	Medium	Moderate adverse	Slight adverse

8.8.55 There is a risk of infant / fledgling mortality and / or loss of reproductive success if the site is cleared during the main bird breeding season (March to September, inclusive weather dependent), an impact which is characterised as being *negative*, *direct*, and *permanent*. Despite there being a number of optimal nest building habitats in areas adjacent to the Scheme there are limitations on carrying capacity.

Receptor	Value	Magnitude of Impact	Significance
Birds	Medium	Moderate adverse	Slight adverse

8.8.56 Wintering birds could be impacted during construction through noise disturbance as mentioned above but also through changes to habitat that have been historically stable or to the reduction of early / late season foodstuff. This impact would be *direct*, *negative*, and *temporary*.

Receptor	Value	Magnitude of Impact	Significance
Birds	Medium	Moderate adverse	Slight adverse

8.8.57 Increased noise levels during construction could potentially cause disturbance to birds, an impact which is characterised as being negative, temporary, and indirect. Birds are particularly sensitive to noise disturbance as many species use song to attract mates and calls to warn each other of predators. The

impact of increased noise levels is more likely to affect birds using nearby habitats such as those present along the River Banwell and the rhyne network, or in areas with lower levels of anthropogenic disturbance such as adjacent to Stonebridge Caravan Park. This would also be of note for wintering birds. Noise levels produced during construction are only likely to significantly exceed existing noise levels for short periods of time, and any construction noise is likely to be offset by reduced traffic speeds whilst works are taking place.

Receptor	Value	Magnitude of Impact	Significance
Birds	Medium	Minor adverse	Slight adverse

European Badger

8.8.58 There is a risk that badgers could be killed or injured during construction through collisions with vehicles or plant, an impact which is characterised as being *negative, direct, and permanent*.
.

Receptor	Value	Magnitude of Impact	Significance
Badger	Low	Major adverse	Slight adverse

8.8.59 Increased noise and light levels during construction could potentially cause disturbance to badgers, an effect which is characterised as being negative, indirect, and temporary. There may be disturbance to badgers remaining in Sett during the construction; if works were in close proximity to the sett (within 20m) at night, particularly during the peak period of cub births (February to April), it could have an impact on badgers by deterring the breeding female from emerging to forage. However, at other times of year, disturbance through noise is less likely to have an impact on badgers, given the background level of noise and lights generated by residential and agricultural areas nearby.

Receptor	Value	Magnitude of Impact	Significance
Badger	Low	Moderate adverse	Slight adverse

8.8.60 The hedgerow and rhyne network provide options for badgers to cross the site. If this access was blocked during works, then there would be an increase in the number of badgers attempting to cross through construction areas. If the fencing around the works area also inhibited free movement of badgers, there would be a greater risk of road traffic collisions in the short term. This impact is characterised as being *negative, direct,* and *temporary*.

Receptor	Value	Magnitude of Impact	Significance
Badger	Low	Minor adverse	Slight adverse

Terrestrial invertebrates

8.8.61 Works could limit the number of available feeding opportunities found on Site and diminish the areas suitable for burrowing insect species. Removal of habitat for larval webs would also be an impact. These would be *direct*, *negative*, and *permanent*.

Receptor	Value	Magnitude of Impact	Significance
Terrestrial invertebrates	Low	Minor adverse	Slight adverse

Section 41 species

8.8.62 The main consideration for these ecological receptors would be habitat severance. While the majority of the working area is not overly suitable for hedgehog and other species, there are foraging and other opportunities present. This would be considered *negative*, *indirect*, and *temporary*.

Receptor	Value	Magnitude of Impact	Significance
Section 41 species	Low	Minor adverse	Slight adverse

Invasive Non-Native Species

Two aquatic (*Lemna minuta* and *Elodea nuttalli*) INNS species were identified within river corridors and rhyne systems throughout the site and are considered present in some level in all waterbodies within the site, further anecdotal evidence highlighted the presence of floating penny-wort within the wider area and within the Scheme. The dispersal of these species during construction within the red line boundary would be

undertaken and the effect would be considered *negative, permanent,* and *direct*.

Receptor	Value	Magnitude of Impact	Significance
Invasive Non-Native Species	Low	Major adverse	Slight adverse

Operational Impacts

8.8.63 The operational phase of the Scheme is considered from when the Scheme is open to traffic. It is anticipated that where planting and land management would develop the biodiversity, commuting and foraging resources for species that these would provide beneficial effects on the biodiversity resource over time. Where appropriate, they have been identified in the residual impact with mitigation in place.

8.8.64 Operational activities with the potential to cause impacts on designated sites, habitats, and species include:

a) Wildlife road fatalities due to increased collisions with traffic on wider and faster travelling highway;
b) Severance of wildlife habitat and disruption of commuting and foraging routes;
c) Disturbance from traffic noise and vibration;
d) Increased levels of air pollution;
e) Increased levels of water pollution; and
f) Lighting and shading.

8.8.65 Species of particular risk are badger, bats, otter, and birds. Mitigation would be implemented through construction to include wildlife crossings, exclusion fencing, and strategic habitat creation to reinforce connectivity and food sources.

8.8.66 The potential impacts of the Scheme during this phase are likely to be as follows.

Designated Sites

8.8.67 The Scheme is in close proximity to the North Somerset and Mendip Bats SAC, being adjacent to Towerhead Road to the east of the Scheme. However, the Scheme would be further from the SAC than the current A368.

8.8.68 The critical load for Nitrogen deposition for the Mendip Hills and North Somerset Bat SAC (Banwell Ochre Caves site) is already significantly exceeded at the baseline level. The increase over the time period used in the Air Quality Chapter (ES, Volume 1 Chapter 5) exceeds the 1% suggested by DMRB guidelines as having the potential to cause a significant impact. With the Scheme the A368 has been moved further north away from the SAC. It is considered that the operational effects would be negligible and would improve in terms with expected changes in traffic usage.

8.8.69 With all relevant embedded mitigation measures in place it is considered that the operational effects would be Negligible.

Receptor	Value	Magnitude of Impact	Significance
Designated sites	High	Negligible	Slight adverse

Habitats

8.8.70 Habitat degradation may occur in proximity to the shared used paths or Public Rights of Ways following increased visitor pressure. An increase in numbers of dog walkers or horse riders may increase enrichment of low nutrient grasslands, affecting species composition in the Southern Link. This would be localised, slight adverse and therefore of **Neutral significance.**

Receptor	Value	Magnitude of Impact	Significance
Habitats - grassland	Low	Slight adverse	Neutral

8.8.71 Degradation may also occur following surface water run-off from the highway or from changes to air quality, specifically increases in nitrogen deposition. Vascular plants channel nitrogen through their roots and some can be absorbed above ground via stomata or the cuticle. Effects of nitrogen deposition on trees and woodlands includes faster growth causing destabilisation, nutrient imbalance, and crown imbalances. Altered composition in mycorrhiza (fungus which supply water and mineral nutrients to the tree) may also occur contributing or resulting in reduced growth and increased sensitivity to stressors. This would be localised.

Receptor	Value	Magnitude of Impact	Significance
Habitats - grassland	Low	Slight adverse	Neutral

8.8.72 During the operational phase there would be increased hedgerows, without planting and management there would be natural regeneration throughout the Scheme which would provide valuable food sources and nesting sites for a range of species. This would be localised.

Receptor	Value	Magnitude of Impact	Significance
Habitats - hedgerow	Low	Slight adverse	Neutral

8.8.73 During the operational phase there would be some regeneration of traditional orchard species but this would be negligible.

Receptor	Value	Magnitude of Impact	Significance
Habitats – traditional orchard	Low	Negligible	Neutral

Aquatic habitats

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats - pond	Low	Negligible	Neutral

8.8.74 Increased run off from the traffic along the Scheme could result in an effect on the water bodies within the Scheme. Given the attenuation and drainage implemented as part of the Scheme there is unlikely to be any degradation, unless during a specific pollution event.

8.8.75 During operation and with the embedded mitigation in place to include the drainage strategy and maintenance operations there would be no impact on the rhynes. There would be additional aquatic habitat through the provision of the flood compensation areas and associated wetland habitats.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats - rhynes	Low	Negligible	Neutral

8.8.76 The River Banwell would not be functionally affected by single span bridge that would not directly impact the river or adjacent rhynes and be extremely limited in shading. There is potential for an increase in waste being ejected from cars into the river, though this is likely to be comparable to levels currently.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – R Banwell	Low	Negligible	Neutral

8.8.77 The Moor Road bridge could introduce some localised shading. This would be reviewed through detailed design.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Moor road	Low	Moderate adverse	Slight adverse

8.8.78 Additional opportunities for aquatic habitats and macroinvertebrates would be provided through the provision of flood compensation areas, attenuation ponds, ditches and the wildlife pond.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – Macroinvertebrates	Low	Negligible	Neutral

Fish

8.8.79 The River Banwell and the rhynes are not anticipated to be functionally affected by bridges across the River Banwell or the culverting of the rhynes. For the main River Banwell bridge overshading would be minimal due to height and orientation. There may be some additional overshading for the Moor Road bridge which is still subject to detailed design, however this would be localised.

Receptor	Value	Magnitude of Impact	Significance
Aquatic habitats – fish	Low	Negligible	Neutral

Bats

8.8.80 Increased light levels associated with the traffic in the eastern

section of the Scheme could deter bats and alter their behaviour. However, measures incorporated into the Scheme such as cuttings, solid parapets on all overbridges, sensitive design (junctions over roundabouts low or no lighting including cowled warm-white / 2700k lighting), and planting regime aim to mitigate the impacts associated with increased light spill from vehicle lights onto surrounding habitat. This would result in permanent/irreversible without essential mitigation in place.

8.8.81 The location of the Scheme is further from the SAC than the existing road and there is no lighting at the eastern junction.

8.8.82 Wider lighting is currently proposed as *10m to 8m* columns with a warm white and 2700k lighting proposed at the western junction and Wolvershill road.

Receptor	Value	Magnitude of Impact	Significance
Bats	High	Negligible	Slight adverse

8.8.83 Roost loss: No operational impacts are anticipated on bat roosts with the road and associated features not in proximity to the known roosts. (Note; roosts may be discovered during construction and would be subject to mitigation in an applied for EPSL from NE).

Receptor	Value	Magnitude of Impact	Significance
Bats	High	Negligible	Slight adverse

8.8.84 Collision resulting in mortality of bats could occur in areas where bats would attempt to cross the highway when following existing or new linear features such as hedgerows, tree lines, and other features. This is particularly relevant to the woodland species present along the Scheme such as horseshoe bats, which are more reluctant to fly in the open and tend to commute along linear features in the landscape and woodland edges. Although agile and manoeuvrable in flight, most bat species fly at low speeds (< 20km/h) and many fly close to the ground particularly when crossing open spaces, (i.e., at heights that may bring them into the path of oncoming vehicles). Studies have highlighted three mortality peaks during the year (firstly, at the end of hibernation, due to intense foraging pressure due to calorific requirements;

secondly, at the end of summer, when young-of-the-year begin to fly and are in a species expansion / dispersal phase; and finally, from September to October, when bat populations are at their peak numbers, and behaviours focus on seeking to mate and / or achieving calorie surplus prior to hibernation). Juvenile bats are considered to be more vulnerable to collision mortality; as such, the close proximity of any maternity roost may heighten the risk of collision.

8.8.85 The presence of Towerhead Rd is also relevant as there is already potential for bat and vehicle collisions along this road, (albeit, for this document, at an unquantifiable rate), and it must be noted that the current planting adjacent to the road and the elevation of the known roosts suggest that this area does function similarly to a hop over in the current form. The impact of the Scheme would therefore not be any increased collision risk and mortality relative to the baseline situation here as the same principles apply.

8.8.86 The loss of the northern section of the traditional orchard would impact bat commuting lines. However, the road would be parallel to these lines and provisions for commuting perpendicular (south to north and vice versa) would be by way of Riverside and the new bridge would be present. The Moor Road bridge is subject to detailed design but could impact on commuting bats as they would be required to fly above the bridge until planting had established.

Receptor	Value	Magnitude of Impact	Significance
Bats	High	Minor adverse	Moderate adverse

Hazel Dormouse

8.8.87 No loss of dormouse habitat is anticipated during the operation stage. The works would be undertaken under a EPSL with appropriate mitigation implemented during construction. As the planting establishes and the management improves the retained hedges for dormouse there would be an increase in connectivity. Dormouse are slow to migrate and larger structures could become obstacles until the planting has established.

Receptor	Value	Magnitude of Impact	Significance
Dormouse	High	Minor adverse	Moderate adverse

Reptile

8.8.88 No operational impacts are predicted for reptiles, as they are unlikely to cross the Scheme due to the embankments, culverts, planting, scrapes, hibernacula and areas of improved management for reptiles.

Receptor	Value	Magnitude of Impact	Significance
Reptile	Medium	Negligible	Slight adverse

Amphibians

8.8.89 No operational impacts are predicted for amphibians, as they are unlikely to cross the Scheme due to the embankments, culverts, planting, scrapes and water features and areas of improved management for amphibians.

Receptor	Value	Magnitude of Impact	Significance
Amphibian	Medium	Negligible	Slight adverse

Otter

8.8.90 Otter have large territories and are territorial, therefore large structures can become obstacles, however the culverts, mammal ledges, associated planting and fencing would minimise this impact. The severance of hedgerows could remove commuting / hunting opportunities, and the road could represent an increased risk of road mortality, these impacts would be minimised through replacement planting, retain hedgerows and rhynes. The Moor Road bridge on the River Banwell would present an obstacle at time during higher water levels and otter may use Riverside increasing risk of mortality however these would be in flood situations when there would be very limited road traffic.

Receptor	Value	Magnitude of Impact	Significance
Otter	Medium	Minor adverse	Slight adverse

Birds including Kingfisher

8.8.91 Noise levels along the Scheme are likely increase during the operational phase of the Scheme than the current baseline. However, there is likely to be fewer congestion pinch points and the constant flow of traffic would become familiar and less of a disturbance to tolerant bird species. Given the existing roads and settlement within the area mainly more tolerant species have been observed within the Scheme footprint. A new road could result in an increase in mortality as birds attempt to fly across the road. As the number of birds using the habitats with the road verges at present appears to be relatively low.

8.8.92 Kingfisher are particularly sensitive to noise disturbance and severance to any commuting habitat may affect movement throughout the site and therefore exploitation of resources. However, no resting places or burrows were located within the Scheme (this does not preclude the possibility of them being present) therefore the loss of habitat would be confined to commuting and to a lesser extent to foraging habitat. There are sufficient opportunities for this species to persist in commuting in the areas with a higher number of sightings reported, mainly through the provision of a single span bridge at Riverside.

Receptor	Value	Magnitude of Impact	Significance
Birds inc kingfisher	Low	Minor adverse	Slight adverse

European Badger

8.8.93 Badgers are sensitive to noise and light disturbance. Severance of a territory can also pressure the clan and adversely affect expansion pressures. Connectivity would be provided with the implementation of mammal ledges through culverts and a mammal pipe. Fencing and planting would help direct badgers to these features and minimise the likelihood of vehicle collision. This would be enhanced as the planting establishes.

Receptor	Value	Magnitude of Impact	Significance
Badger	Low	Minor adverse	Slight adverse

Terrestrial Invertebrates

8.8.94 Increased levels of pollution and run off could impact the species on site. Given the attenuation and drainage implemented as part of the Scheme and the area is already considered to be high in nitrogen there is unlikely to be any degradation, unless during a specific pollution event. In addition, the management would reduce the nitrogen inputs in mitigation areas.

Receptor	Value	Magnitude of Impact	Significance
Terrestrial invertebrates	Low	Minor adverse	Neutral

Section 41 species

8.8.95 Given the increased planting and the management for biodiversity it is anticipated that the foraging and breeding opportunities for hedgehog and other species, would improve during operation.

Receptor	Value	Magnitude of Impact	Significance
Section 41 species	Low	Moderate beneficial	Slight beneficial

Invasive Non-Native Species

8.8.96 There is the potential for spread of INNS species during operation however this is anticipated to be limited with effective controls implemented during construction. This would be managed through the LEMP during the aftercare period and in the longer term through the MEMP.

Receptor	Value	Magnitude of Impact	Significance
INNS	Low	Minor adverse	Neutral

Deer

8.8.97 Widespread use of the site is currently considered unlikely, during the operational phase the use of the site by deer is unlikely to significantly alter. Additionally, the Scheme would have mammal fencing and deer fencing erected at the Southern Link where deer were noted, together with woodland and woodland

edge planting to connect with Banwell wood.

Receptor	Value	Magnitude of Impact	Significance
Deer	Low	Negligible	Neutral

8.9 Proposed Mitigation and Enhancement Measures

8.9.1 The mitigation hierarchy begins with seeking engineering strategies to avoid or otherwise eliminate potential impacts and unfavourable effects on pertinent aspects (biodiversity features) of the Scheme. Such as (but not limited to); avoidance through modifying alignments or reviewing junction strategies or structural aspects of the Scheme design. The implementation of these can be supported through changes in timing, developing a preferred method of works. These aspects are referred to as *embedded mitigation*. If these are unlikely to reduce the impact entirely, the design should seek essential mitigation or compensation to reduce the level of the impact as much as possible.

Essential Mitigation - Construction

8.9.2 Essential mitigation mitigates potential impacts arising during the construction phase that cannot be avoided by the design based *embedded* mitigation.

8.9.3 Essential mitigation includes limited night time working using minimal and well positioned lighting, sensitive working practices, buffer zones near dwelling places of protected or notable species (such as badger, dormouse, otter, nesting bird). Silt management and limited works near watercourses during times for migratory fish and eel passes as required. These would be managed through the CEMP (which is embedded mitigation for this Scheme) and overseen by the Environmental Clerk of Works (ECoW).

8.9.4 Retained habitat such as hedgerows would be protected and demarcated throughout the Scheme.

8.9.5 Lay down areas and compounds would be managed, protected from wildlife and following construction they would be reinstated and returned to agriculture.

8.9.6 The following presents the recommended mitigation for the Scheme.

Designated sites

8.9.7 Works adjacent to designated sites would be mitigated for by general construction measures and a preferred method of works as outlined in the CEMP (Volume 3 Appendix 16.A). Trees would be protected as appropriate, lighting would be minimised and directed away from designated sites. No direct impact to the SAC is anticipated.

Habitats

8.9.8 Damage to any retained areas of vegetation would be avoided by installing protective fencing and or signage around retained areas of habitat and ensuring that appropriate construction mitigation (e.g. dust compression) and pollution prevention measures are put in place during works.

Approximately 42.25ha (ES Volume 3 Appendix 8.P) is to be retained or enhanced under the Scheme proposals. The landscaping proposals developed for the Scheme involve the creation of approximately 4.5ha of wildflower meadow throughout, using a seed mix that is more species diverse than the current grassland (ES, Volume 1 Chapter 7). Green hay from local sites would be used where possible. Opportunities would be explored with the Avon Wildlife Trust.

8.9.9 Retained trees within the works would be fenced off and protected in accordance with British Standard BS 5837 2012: Trees in relation to design, demolition and construction – Recommendations. Appropriate construction mitigation such as dust suppression and pollution prevention measures would also be used to prevent damage to trees (further detail is provided in ES, Volume 1 Chapter 7). The root zones and canopies of hedgerows and hedgerows with trees, to be retained would be protected during construction. A buffer of at least 5m between temporary works and compound areas and hedgerows would be

implemented to protect the root zones of hedgerows and maintain valuable woodland edge habitat.

8.9.10 Retained hedgerows and grassland would be managed and improved for biodiversity whilst retaining a landscape integration function. The details for management would be contained in the Landscape and Ecological Management Plan (LEMP), refer to ES Volume 1 Appendix 16.C. This would include conservation grazing and overseeding with wildflower species including yellow rattle; allowing the existing hedgerows to grow out, flower and fruit; installation of bat, bird and dormouse boxes and hibernacula. This would help ensure a net gain for biodiversity as a whole. The landscaping proposals have been designed to benefit both visual amenity and biodiversity.

8.9.11 Trees lost to the Scheme would be replaced through new planting along the Scheme (as shown on the Planning Document - Environmental Masterplan (EMP)). Any mature trees which cannot be retained would be replaced as standard trees within the mitigation areas. Whilst no woodland would be lost to the Scheme, woodland and woodland edge planting would be implemented to create connectivity for species and provide a buffer to existing woodland, especially Banwell Wood.

8.9.12 The hybrid black poplar (referenced as T10-T15 in the Arboricultural Survey and Impact Assessment report, ES, Volume 3 Appendix 7.D) collectively form a notable stand of trees along Moor Road would be lost to the Scheme. The trees that are lost would be subject to a detailed survey over winter 2022/23 and cuttings for propagation taken, these cuttings would be included in the planting along the Scheme. Where possible poplars would be retained and protected in accordance with the Arboricultural Method Statement. Refer to ES, Volume 1 Chapter 7 – Landscape.

8.9.13 Where land is not required for construction, habitat creation, translocation and woodland planting would be undertaken as early as possible and wherever possible during the first 12 months of the programme, to facilitate establishment of vegetation during construction.

8.9.14 Bramble and tall ruderal vegetation would be allowed to

recolonise naturally in certain areas, as these species tend to recolonise sites more quickly than planted stock.

8.9.15 Sections of hedgerows of particular importance and species richness that would be lost would be coppiced where suitable in the first year of the programme in advance of construction. The hedgerow coppice stools would be translocated to other areas of the Scheme where hedgerow planting is planned or to in-fill gaps in poor quality hedgerows to improve habitat connectivity and mitigate for habitat loss. As part of this process, hedgerow soils (approximate depth of 300mm) containing hedgerow ground flora would also be translocated to form banks in which to plant where appropriate.

8.9.16 New hedgerows with standard trees would be planted along much of the Scheme and would connect areas of woodland or existing habitat to mitigate hedgerow loss and habitat fragmentation and reinforce north to south commuting opportunities for bats and other species.

8.9.17 Newly planted hedgerows (approximately 10km) would be species-rich, comprising a mix of at least seven woody native species of local provenance, planted per 30m within the hedgerow, and in keeping with species recorded in the area. Planting would include species such as hazel and honeysuckle to provide potential food and nesting resource for dormice to encourage further colonisation by this species.

8.9.18 A pre-construction check for both terrestrial and aquatic Schedule 9 listed invasive plant species should be undertaken at the appropriate time of year to inform any requirement to avoid or remove invasive species. The implementation of biosecurity best practice described as ‘check, clean, dry’ would help to mitigate any potential mobilisation of invasive aquatic plant species and also the potential for chytrid fungus or ophidian paramyxovirus, which effects amphibians and squamates respectively.

8.9.19 Appropriate habitat management measures would be incorporated into the highway maintenance regime during detailed design to ensure that the biodiversity value of reinstated habitats is maintained.

Aquatic Habitats

8.9.20 Construction related impacts (such as from dust and polluted run-off) would be avoided by implementing mitigation measures in accordance with best practice to prevent dust, noise, run-off, or other potential pollutants, as set out in the Air and Noise and Water Quality chapters (ES, Volume 1 Chapters 5, 11 and 13 respectively). Detailed pollution prevention measures would be outlined in the CEMP (ES, Volume 3 Appendix 16.A).

8.9.21 The contractor would follow best practice in undertaking construction in the flood plain. Measures would include, for example, development of appropriate method statements and emergency procedures and monitoring of weather forecasts and upstream water levels regularly to reduce the risk of flooding to working areas. Such measures would be detailed in the CEMP (ES, Volume 3 Appendix 16.A).

8.9.22 Appropriate measures would be taken to prevent damage to the Banwell River or rhyne bed and to limit run-off of pollutants; these measures would be included in the Pollution Prevention and Contingency Plan and Site Waste Management Plan outlined in the CEMP (ES, Volume 3 Appendix 16.A). Wherever possible a natural bed would be retained for all culverted sections of rhynes.

8.9.23 The diversion of the rhyne to the west of Moor Road would be carried out in accordance with good practice (refer to ES Volume 1 Chapter 14). Measures to minimise impacts upon these features are also provided under the species headings for otter and kingfisher below.

8.9.24 Aquatic species and water bodies would be safeguarded through the implementation of pollution control measures, refer to ES Volume 1 Chapter 14 and would be managed through the CEMP. Additionally, the design and implementation of the flood compensation areas / attenuation basins and associated scrapes would incorporate opportunities for biodiversity.

8.9.25 The loss of the pond at Ch. 1+900 would be governed by precautionary methods of work that would involve drainage procedures sensitive to the potential presence of fish and other species. The loss of the pond would be mitigated by the

construction of a new pond at a ratio of 2:1. This would form part of a wider wetland area to enhance the area for wetland species. it is proposed that the new pond is constructed in advance of the loss of the existing pond to allow for the direct translocation of any fish and other species found within the existing pond. If this is not possible due to programme a suitable receptor site would be identified within the Scheme extents for these species.

Protected Species - General overview

8.9.26 Specific species strategies will be developed pre construction in association with the vegetation clearance method statement, protected species licences and other consents or permits.

8.9.27 Below are general measures presented as a summary of the approach to construction phase mitigation with further details in individual sections:

a) Vegetation removal would be subject to appropriate vegetation clearance method statements and environmental permits to works. These would contain methods appropriate for protected species, most notably, bat, dormouse, and nesting bird.

b) Where appropriate hedgerows would be translocated to maintain connectivity. This is of particular importance in the eastern half of the site. Arisings of lower quality hedges or those that would not translocate successfully would be used for deadheading along lines of connectivity or as outlined in the Dormouse licence method statement. This should be intertwined with bramble and / or honeysuckle as dormouse provisions.

c) Attenuation basins are to be created as soon as feasible during construction with features such as perches for kingfisher and bird boxes installed nearby.

d) Planting in the south western corner of the Southern Link would be undertaken as soon as possible to enable establishment of a hop over for bats. Therefore, providing connectivity between the Banwell Woods and the woodland blocks to the west and ensuring the Scheme does not prevent connectivity.

e) Where appropriate planting of seed mixes, hedgerows, and trees, of local (or otherwise native) provenance would commence prior to construction. This would include night flowering species for moths / night invertebrates and bats with supplementary planting of fruit nut trees, bramble, and honeysuckle.

Fish

8.9.28 The detail of mitigation on fish species would be confirmed following the pre-construction surveys.

8.9.29 There is potential for direct impacts on fish species within the River Banwell and rhynes due to the temporary loss of habitat and bridge works near the river.

8.9.30 To reduce any impact on fish and macroinvertebrates macrophytes would be cut prior to culvert placement to make the area “unattractive” to both macroinvertebrates and fish through the removal of in-channel cover.

8.9.31 Sensitive timing and methodologies for works involving this would be implemented as set out in the CEMP (ES, Volume 3 Appendix 16.A) to avoid killing or injury of fish.

8.9.32 The loss of the pond at Ch. 1+900 would be governed by precautionary methods of work that would involve drainage procedures sensitive to the potential presence of fish and other species. In the event of fish being discovered the species would be determined and a suitable receptor being found.

Bats

8.9.33 In addition to mitigation embedded into the design principles of the essential mitigation for bats are described below (with details to be agreed through the licencing process in relation to roost impacts);

8.9.34 Potential bat roost emergence / re-entry surveys upon trees would be undertaken as a result of the ground level tree assessment, refer to ES Volume 3 Appendix 8.G4 These will follow standard guidelines for bat surveys with the time, species, location, and direction of flight for each bat encountered recorded. All bat encounters will be recorded on a site plan and survey sheet. These surveys will be carried out pre-construction and will determine the timing and approach to site clearance. Updates to this is expected in late 2022.

8.9.35 Pre-construction surveys would be undertaken prior to any tree

clearance and demolition of buildings, to ensure there is no new bat roost. If any new roosts are identified these would need to be included within the Scheme bat mitigation licence and mitigation agreed with Natural England. Following pre-construction surveys, any trees where the potential for roosting bats could not be ruled out would be soft-felled.

8.9.36 Site clearance and construction works would be subject to a Precautionary Methods of Works (PMW) including provisions for trees with potential bat roost or resting features. Further surveys to determine if works would directly impact a roost will be undertaken pre construction.

8.9.37 Removal of hedges appropriate for commuting bats would be followed immediately by the erection of Heras fencing with appropriate netting for screening and to temporarily replace the hedgerows outside of day-time working hours to facilitate commuting (subject to pre-construction hop over surveys). Bat boxes would be installed in appropriate areas at the beginning of vegetation clearance. The number and location of bat boxes would be determined in consultation with NE and would be dependent upon the need for a bat EPS licence.

8.9.38 The exclusion of the roosts would take place at an appropriate time of year when the bats would be least vulnerable. The nature and location of the replacement roosts, timing of the exclusion (where appropriate) and timing of the building demolition and tree felling would all be in accordance with the licence method statement, which would be developed in consultation with Natural England.

8.9.39 Where roosts are identified there would be the provision of relevant bat boxes erected on retained trees, or on pole-mounted where necessary to provide alternative roosting opportunities further away from the sources of disturbance.

8.9.40 A retrofit bat box of the Ecostyrocrete type would be included beneath the bridge over the River Banwell or as agreed with Natural England.

8.9.41 Veteranisation techniques would be employed to create habitats in younger trees that are otherwise found on older more mature

trees. Complementary to these techniques, fruit trees (including wild cherry and crab apple) have been included in the woodland and scrub planting mix to provide medium-term mitigation for roosting bats. Fruit trees enter senescence or 'veteranise' much earlier than most tree species, therefore starting to decay at a younger age, leading to the earlier development of cavities and other features that could provide new roosting sites for bats. These features would also provide many other wildlife benefits, especially for saproxylic invertebrates.

8.9.42 Low level and directional lighting (sensitive to bats such as cowled lighting and of 2700k or below) at the junction at Towerhead Farm, the Southern Link; and hop over planting in these areas combined with the directional hedgerow planting and culverts within the Scheme; would reinforce connectivity and flight lines and mitigate the potential for habitat fragmentation.

8.9.43 The landscape design includes the creation of a linked mosaic of higher quality habitats, including drainage swales, hedgerows, and wooded pasture. This would increase the foraging habitat to the east and west adjacent to the Scheme, in order to further reduce the fragmentation impacts.

8.9.44 Mitigation would include the retention of vegetation along known commuting routes for as long as possible or otherwise providing netted Heras fencing as a replacement flight path guide. As well as early construction of dead hedges or planting replacement hedges to reduce loss of connectivity, wherever possible, consideration would be given to the use of translocated hedgerows especially in the first year of construction.

8.9.45 Planting would provide a corridor for bats, particularly low flying species such as lesser horseshoe, that would buffer commuting bats from the road and preserve access between the areas of Banwell Woods and caves and the maternity roost to the north east beyond the site boundaries (Brockley Hall).

8.9.46 The construction of both the single span Banwell River Bridge and the Moor Road to Riverside Bridge would affect the commuting bats in this area. Construction practices to minimise impacts such as defined lay down areas away from the River Banwell (the main commuting corridor), replacement of lost

hedgerows with netted Heras fencing of suitable composition for guiding bats. Precluding night work would also minimise the impacts as would timing the works outside of the bat active season if competing ecological constraints such as eel migrations allow.

8.9.47 Work during hours of darkness (taken as the period 30 minutes before sunset to 30 minutes after sunrise) would be avoided as far as practicable. Should night working be required, these would be discussed with the ECoW and appropriate mitigation put in place as determined by the ECoW (particularly concerning lighting). Measures include (but are not limited to);

a) Temporary lighting used for construction would remain off when not in use and positioned thus to limit spill on to adjacent land, watercourses, sensitive receptors, or key bat flight lines within the area surrounding the works.
b) Directed lighting would be used to minimise light pollution for construction compounds and to ensure no light spill over 0.5 Lux on any identified bat commuting and foraging areas or roosting habitat or watercourses.
c) Lighting levels around construction compounds would be kept to the minimum necessary for security and safety by the contractor.
d) Dark conditions would be maintained within 20m of identified bat roosts.
e) Lighting designed to be sensitive to bats would also reduce impacts on other nocturnal wildlife such as otter.

Hazel Dormouse

8.9.48 Construction activities could result in severance of connectivity and individual dormouse being injured and/or killed, in the absence of mitigation or suitable working practices. To reduce these risks the mitigation below is recommended:

a) works would be governed by an EPS Licence obtained from NE;
b) landscaping proposal for habitat replacement based on a 2:1 dormouse habitat loss would be done in accordance with the EPS licence.

8.9.49 a staged clearance approach that is sensitive to this species' seasonal habitats would be undertaken; and

a) Dormouse nest boxes at a density of 5 per hectare would be erected in suitable habitat throughout the Scheme.

8.9.50 Methods of clearance could include reusing arisings in a 'dead hedge' to ensure the continuation of connectivity during clearance works. The installation of dormouse boxes should be erected prior to clearance works in retained habitat to provide opportunities that would be established at point of construction.

8.9.51 Dormouse boxes would be erected in the retained woodland to include the Southern Link and to the north east of the Scheme within the redline boundary. Planting and replacing hedgerows for connectivity would begin as soon as possible during construction to maximise growth within the construction period especially in areas to reinforce connectivity or where there would be habitat loss.

8.9.52 Works would follow a staged habitat manipulation using phased and directional vegetation reduction to displace animals to retained habitat and in accordance with the NE licence.

8.9.53 Evidence of Dormouse was predominantly to the east of the Scheme site with Banwell Woods, Towerhead Farm, and the land following the rhyne to the football grounds being most notable. Connectivity and sensitive works (including for light levels during night time works) should be considered in these locations.

8.9.54 An appropriate seed mix has been developed in accordance with biodiversity requirements (food for pertinent species such as dormouse, attractants to invertebrate prey species and of local and native species, refer to ES, Volume 1 Chapter 7).

8.9.55 Mitigation measures include timing of vegetation clearance and pre-construction nest checks to avoid injury / direct mortality and / or destruction of nests would be avoided.

Great Crested Newts

8.9.56 Although there were no GCN found onsite, given the location of the Scheme the construction would be carried out under an NE District Level licence and in liaison with NE. Mitigation is incorporated into the Scheme although further mitigation may be required offsite. This would be agreed with NE following

determination of the planning application. General construction methods and those assigned for reptiles above are applicable to GCN and other amphibians.

Reptile

8.9.57 Construction activities could result in individual reptiles being injured and / or killed, in the absence of mitigation or suitable working practices. To reduce the risk of reptile killing or injury the mitigation below is recommended. This will form the basis of a reptile method statement.

8.9.58 Consideration will be given to the extent of translocation required and whether other methods such as displacement into adjacent habitats would be appropriate.

8.9.59 Where required, reptiles would be translocated to the north of the Scheme within the red line boundary along the Banwell Bypass and to the within the Southern Link to maintain populations within their field blocks that are divided by the roads running north to south.

8.9.60 A modified translocation exercise would be carried out on the key reptile areas within the Scheme. The areas north of the Scheme would be fenced with Herptile fencing. The southern element of the Southern Link would also be fenced creating a hard stop 3 meters beyond the edge of the woodland. Mats would be placed at intervals along the edge of this fencing and checked routinely for two weeks prior to commencing the translocation effort. Areas would be fenced and trapped separately to allow for blocks to be open for construction once trapping in that area was complete. Note - one way Herptile fencing would not be suitable due to the presence of large grass snakes that can scale these, robust staked exclusion fencing should minimise this risk.

8.9.61 Translocations would be undertaken within the relevant grassland areas prior to vegetation clearance for construction in those locations. All reptiles found during this exercise would be moved to suitable receptor sites these would be adjacent where possible and grouped by chainage as per below. These sites would be areas that form the wider part of the likely territory and opportunities for these species:

a) Ch. 0+000 – Ch. 0+300
b) Ch. 0+400 to Ch. 0+700
c) Ch. 0+800 to Ch. 1+300
d) Ch. 1+400 to Ch. 1+700
e) Ch. 2+200 to Ch. 3+300
f) Southern Link

8.9.62 Where appropriate these areas would be improved for reptiles to include the provision of hibernacula prior to vegetation clearance. Hibernacula would be constructed south facing, above ground, made from logs, stone and earth (as per DMRB specifications (DMRB Volume 10 2001). These would include patches of bare ground and improvements to the wider habitat within the retained fields. Wherever possible hibernacula would be installed prior to clearance in an effort to ensure provisions are in place if trapping is carried out early or later in the season.

8.9.63 The large pond area to the north of the Scheme owned by Court Farm likely forms part of the wide habitat for species on site as indicated by the number of sightings of adult grass snakes in ponds beyond the Scheme boundaries (pers. Comms from Court Farm and recorded sightings during other surveys). Surveys of the area adjacent to Court Farm will be undertaken to understand wider carrying capacity prior to construction.

8.9.64 This translocation effort is to ensure that the population in the area remains robust and can naturally recolonise the area post construction to benefit from measures such as attenuation basins and to use culverts for connectivity.

8.9.65 Clearance works would follow a two-stage habitat manipulation, using phased and directional vegetation reduction in a contiguous manner and be outlined in specific a method statement based on best practice.

8.9.66 Clearance works would occur in suitable weather and within the reptile active season of April to October (temperature and weather dependent) prior to construction. Note - works earlier or later in the season are possible but governed by seasonal conditions as outlined in the relevant method statement.

8.9.67 Areas cleared within the Scheme would be maintained as unsuitable for reptiles by way of a scorched earth policy for the duration of the construction phase to ensure that reptiles do not re-colonise areas where they would be at risk of harm.

8.9.68 The dismantling of stone walls or other aspects that offer reptile hibernation opportunities would be timed to avoid the reptile hibernation period. A preconstruction survey to identify these sites would be carried out and the findings mapped.

8.9.69 Habitats suitable for reptiles are included in the landscape design for the Scheme and are shown on the EMPs (Planning Documents – Environmental Masterplans). In these locations, habitat mosaics would be created comprising long grassland, scrub, hedge-banks, and bare ground with south facing banks for basking and log piles created with wood from vegetation clearance to provide suitable refuge locations.

8.9.70 In addition to the number of smaller habitat piles ('hibernacula'), 1no large hibernacula (approximately 15m long and at least 2m wide) would be created adjacent to the woodland block to the north of the road at Ch. 1+200. This area is central to suitable habitat with features such as ponds, rhynes, hedgerows functionally linked and would provide continuity for the population of grass stakes in this area.

Amphibians

8.9.71 General construction methods and those assigned for reptiles above are applicable for other amphibians. Where possible amphibians would be kept along East Mead Rhyne to the south of the Scheme due to the importance of this area as a feature to these species.

Otter

8.9.72 A pre-construction survey of all suitable habitat areas adjacent to watercourses within the Scheme would be carried out to confirm the presence or absence of any otter holts and inform the requirement for any Natural England mitigation licence.

8.9.73 Working within 50m of a watercourse could cause disturbance to otters. Details of working time restrictions to reduce potential

disturbance to dispersing and foraging otter would depend upon the pre-construction surveys and mitigation licence requirements (if required). Any required restrictions would be detailed within the CEMP (ES, Volume 3 Appendix 16.A).

8.9.74 Restrictions on working hours to avoid night working would be implemented so that there would be no light spill in the vicinity of watercourses. Any temporary task lighting required would be directional and erected such to avoid sensitive features.

8.9.75 All excavations would be closed overnight, or ramps or another means of escape provided to reduce risk of trapping or injuring wildlife.

8.9.76 If any holts are found to be affected by the works an artificial holt will be constructed. It is recommended that an artificial holt is installed at Ch. 0+900 south of the Scheme adjacent to the tree lined rhyne as an enhancement feature.

8.9.77 Culverts with specific otter ledges and associated planting would ensure connectivity and opportunities remain for otter site wide. All culverts would provide some connectivity for this species with particularly sensitive areas such as Wallymead Rhyne Culvert (East) (Ch. 1+375), Old Yeo Rhyne Culvert (Mainline) (Ch. 1+760) and East Mead Rhyne Culvert (Ch. 2+310).

8.9.78 Mammal fencing would be installed as shown on the EMPs (Planning Documents – Environmental Masterplans). This would be maintained through the construction and aftercare phases in accordance with the LEMP (ES Volume 3 Appendix 16.C).

Birds

8.9.79 10 no. bird boxes would be installed within Barnwell Woods prior to construction. These would be suitable for blue tit and smaller birds to reduce the risk of birds using dormouse boxes in addition to providing nesting opportunities for these bird species.

8.9.80 An additional 10 no. of bird boxes would be distributed throughout the area near the football field in Riverside.

8.9.81 A further 55 no. boxes suitable for a variety of species would be

distributed through the site especially in suitable habitat at the western extent of Ch. 0+000 – Ch. 0+100, Ch. 0+600 near the attenuation basin, Ch. 2+000, Ch. 2+700, and at the Southern Link adjacent to the woodland.

8.9.82 In order to enhance the biodiversity value of the Scheme and provide mitigation for works, new wetland habitats, including attenuation basins, and scrapes / reed beds would be created as part of the Scheme. The latter would provide biodiversity net gain and a benefit for species such as reed warbler. Here, clay areas to the north east of the site can be left to naturally fill with water reed beds and be planted with species such as king cups (*Caltha palustris*). These aspects would be included in the Southern Link and north of the Scheme near Court Farm (Ch. 1+900).

8.9.83 Habitat suitable for nesting and foraging birds would be replaced through the landscape proposals for the Scheme, refer to Planning Documents – Environmental Masterplans. It is acknowledged that this vegetation could take some years to develop to be suitable for nesting birds. However, the structural diversity of the retained habitat that forms part of the Scheme would provide nesting habitat in the interim and would develop further with improved management for biodiversity.

8.9.84 To minimise the risk of loss of nests, eggs, or chicks and an associated reduction in reproductive success, first stage clearance of trees and/or scrub would be undertaken between September and February inclusive (weather and temperature dependent). This is outside of the main bird breeding season. If these timings are not possible, then vegetation would only be cleared during the nesting season where an ecologist has confirmed that active nests are not present. Should active nests be found, an appropriate buffer of retained vegetation would be kept around the nest at a minimum of 10m radius (species dependent), with signage in place to inform site staff. Clearance would only continue after confirmation by a suitably experienced ecologists that young birds have fledged.

Kingfisher

8.9.85 The measures outlined above for birds should also be implemented in suitable kingfisher habitat. In the unlikely event of a roost being found within the Scheme area a suitable buffer

conforming to the measures outlined above should be implemented.

8.9.86 Perching opportunities would be created over the new ponds. These would comprise appropriately sized wooden perches placed near newly planted willow species (Salix sp.). Here the willow can be guided around the perches to ensure longevity of perching opportunities upon the original guide perch rotting (i.e., the remaining 'trained' willow will outlast the original 'guide' perch).

Barn Owl

8.9.87 Presence is not expected on site. However, in the unlikely event of a roost being encountered measures outlined above for birds should be implemented.

European Badger

8.9.88 Embedded mitigation within the Scheme such as culverts would provide connectivity to foraging habitat for badgers in the wider area.

8.9.89 Further walk-over surveys of the Scheme would be completed prior to the vegetation removal and start of construction works (if required), to ensure that any new setts are identified in advance of works.

8.9.90 No works or tracking of heavy machinery would occur within 30m of retained active badger setts.

8.9.91 Active setts that would be lost or affected as a result of the Scheme construction would be closed under a Natural England development licence. This would be between the months of July and November and prior to commencement of construction. Works would be timed such that any severance of forging habitat would occur during the badger inactive season (Nov to Jan).

8.9.92 Excavations would be closed overnight, or ramps or another means of escape provided to reduce risk of trapping or injuring wildlife.

8.9.93 Mammal fencing would be used extensively throughout the

Scheme to minimise the potential for road mortalities.

8.9.94 Landscape planting for directing other species into culverts would be implemented to benefit badgers and prevent (re)colonising within the Scheme.

Terrestrial Invertebrates

8.9.95 The general construction measures mitigation measures would be implemented in suitable habitat for terrestrial invertebrates. Any plants suitable for notable species would be translocated / planted within the red line boundary of the Scheme in accordance with the Vegetation Clearance Method Statement and as detailed in the CEMP (ES, Volume 3 Appendix 16.A).

8.9.96 A diverse number of nectar producing plants and fruit bearing trees would provide refuge and food for a number of species on site.

Section 41 Species (including Hedgehog)

8.9.97 Standard construction methodologies would limit the impact on these species, such as (but not limited to) covering of excavations, ensuring no arisings were left unless for enhancement, well maintained lay down areas and fencing near sensitive habitat. Enhancements as those provided for dormouse (with planting) and for other species would benefit these species.

Invasive Non-Native Species

8.9.98 Pre-construction surveys would be carried out to identify whether there are any changes to the baseline for the known INNS and whether any others have spread into the area prior to construction. All works would be carried out in accordance with an INNS method statement and biosecurity measures. These will be outlined in the CEMP. Wherever possible INNS would be managed and retained onsite, however there may be some requirement to take material offsite to a licenced tip. This would be carried out under the appropriate controls.

Deer

8.9.99 Deer fencing would be installed, where appropriate, along the Southern Link as shown on the EMPs (Planning Document -

Environmental Master Plan drawings).

8.9.100 Excavations would be closed overnight, and ramps or another means of escape provided to reduce risk of trapping or injuring wildlife.

Essential Mitigation – Operational

8.9.101 Embedded mitigation would be implemented in order to mitigate for potential impacts of the operational phase. This are presented in the EMPs (Planning Document - Environmental Masterplan drawings).

8.9.102 Essential mitigation would be identified in the Register of Environmental Actions and Commitments (REAC) (ES, Volume 3 Appendix 16.B) to avoid or reduce the potential impacts on habitats and species.

Habitats

8.9.103 Mitigation and enhancement would be achieved under the landscaping proposals. The management and maintenance of the planting and retained vegetation in accordance with Landscape Environmental Management Plan (LEMP) (ES, Volume 3 Appendix 16.C).

Bat

8.9.104 Opportunities for bats would be contained within the landscape mitigation and detailed within the LEMP (ES, Volume 3 Appendix 16.C) and Maintenance Environmental Management Plan in addition to an EPS bat licence (if required).

8.9.105 Maintenance and enhancement of the large trees creating an avenue on Towerhead Road (A368) would be required to preserve the current hop-overs from the known roosts north. These should be either installed or retained to ensure that bats have sufficient guidance towards the north east away from the road.

Hazel Dormouse

8.9.106 Monitoring would be in accordance with the EPS licence

requirements.

8.9.107 The areas recommended for planting would be managed in accordance with the LEMP (ES, Volume 3 Appendix 16.C) and Dormouse licence.

8.9.108 Enhancement - The Southern Link attractants to this species could be enhanced by way of planting areas with woody species in parallel with the road connecting areas with the Banwell Woods. Hop over opportunities could be provided to enable access to the residential gardens to the west of this area (an underappreciated source of food for this species).

8.9.109 Following the setting out of dormouse nest boxes prior to works (in areas such as those adjacent to Towerhead Farm, the football grounds, and in the area adjacent to the Southern Link), a number of boxes would be placed in suitable habitat in both Banwell Woods and Court Farm. These should be in areas retained during construction at the same number per hectare as defined above.

8.9.110 Opportunities for connectivity are to be provided by the new culverts, pipes, and hedgerows.

Reptile and Amphibian

8.9.111 Habitats would be managed in accordance with the LEMP (ES, Volume 3 Appendix 16.C).

Otter

8.9.112 Habitats would be managed in accordance with the LEMP (ES, Volume 3 Appendix 16.C) with opportunities for connectivity provided by the new culverts. Mammal fencing would be checked and maintained as required.

Bird, kingfisher, Terrestrial Invertebrates and Section 41 species

8.9.113 Habitats, bird boxes and other mitigation measures would be managed in accordance with the LEMP (ES, Volume 3 Appendix 16.C).

Invasive Non-Native Species

8.9.114 INNS would be monitored throughout the aftercare period in accordance with the LEMP (ES, Volume 3 Appendix 16.C).

Wider Mitigation

8.9.115 Part of the consideration for the Scheme includes impacts on both the changes to traffic flows (with consideration of the opportunities for within Banwell village) and wider implications on traffic movements on the ARN (in the adjacent communities of Winscombe, Churchill, and Sandford). These are considered as separate but are part of the Scheme and have undergone a parallel development and consultation process.

8.9.116 Note; A Phase 1 walk over survey was undertaken of these areas. Therefore, assessment has been made using professional judgment based on desk studies and habitat suitability with a 'worst case' scenario used. Further pre-construction surveys would be undertaken including, but not limited to, for Otter, Badger, Bat and Invasives.

8.9.117 The areas affected were assessed to be of limited ecological value and the impacts of the proposals for the shared use path would be localised.

8.9.118 General construction measures as detailed in sections 8.9.2 – 8.9.5 would mitigate the construction impacts. Additionally, these areas would be incorporated into the Dormouse EPS licence and GCN district level licence as appropriate.

8.9.119 Within Banwell village the opportunities comprise of a range of measures that would be selected and developed based upon how well they positively impact placemaking, value for money and feedback from consultation. Such as the following:

a) Gateway features at either end of village with signage and landscaping;
b) A narrowing of additional sections of the road to encourage slower traffic speeds and facilitate better use of space;
c) A priority system through the narrow / single lane sections and junction layouts within the village;

d) Green infrastructure (such as avenue planting raised planters and wildflower planting);

e) Enhanced biodiversity using wildflowers and other planting (with local providence where possible);

f) Improved shared use paths and facilities – such as cycleways and footways, additional road crossing points and shared spaces including links back to Weston-super-Mare;

g) Creation of more outdoor space for local businesses (such as cafes, and shops);

h) Traffic enforcement – such as banning Heavy Goods Vehicles (HGVs) except for access / deliveries;

i) Physical traffic calming – such as road markings, traffic tables, shared space;

j) Reduced speed limits to 20mph to improve safety;

k) Improve active and sustainable travel on Wolvershill Road;

l) Improvements to public transport infrastructure such as bus stop locations; and

m) Rationalising road signage where possible to enhance the conservation area.

8.9.120 **Shared use path provisions**: three main routes would be considered to improve connectivity for walking, cycling and equestrians to mitigate increase traffic movements along the Scheme and adjacent local road network. These are presented below with impacts included in respective tables.

a) Banwell to Sandford; this would comprise a 3m wide shared use path leaving the Scheme at Ch. 2+570 following the continuation of Eastermead Lane through Towerhead Solar Farm, crossing the end of Catworthy Lane and then following the south side of Towerhead Brook before re-joining the A368 on the outskirts of Sandford. A cut off drain follows the southerly extent of the shared use path taking any path drainage away from Towerhead Brook. The impacts and affected species are associated with the Banwell to Sandford shared use path are shown in Table 8.17.

Table 8.17 Banwell to Sandford Shared use path, Significance and Mitigation

Phase	Description	Receptor	Impacts	Significance	Mitigation	Residual Effects (Significance)
Construction	Increased Noise	bat, otter, bird, owl, kingfisher, dormouse, badger, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice. (CEMP)	Slight adverse
	Increased lighting	bat, otter, bird, owl, kingfisher, dormouse, badger, hedgehog	Direct, negative, temporary.	Moderate adverse	Night time working restriction (CEMP)	Neutral
	Run off / pollutants	otter, bird, owl, kingfisher, reptile, amphibian, GCN, fish, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice. (CEMP)	Slight adverse
	Removal of habitat (Interaction with linear features)	bat, otter, bird, owl, kingfisher, dormouse, badger, reptile, amphibian, GCN, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice. (CEMP)	Slight adverse
Operation	Increased Noise	bat, otter, bird, kingfisher, dormouse, badger, reptile, amphibian, GCN, hedgehog		Slight adverse	General construction measures and good practice. (CEMP)	Slight adverse
	Run off / pollutants	bat, otter, bird, kingfisher, dormouse, badger, reptile, amphibian, GCN, hedgehog		Slight adverse	General construction measures and good practice. (CEMP)	Slight adverse

b) Access to Churchill Academy (west); this would comprise an upgrade of the existing PRoW (AX29/51/10) between the A368 and Churchill Green to create a 3m wide shared use path for improved links to the school and sixth form. This would be combined with localised pavement build outs, reinstated and widened verges and a new footway, approximately 90m in length, providing an improved link to an existing bus stop on Dinghurst Road. The full length of the route would be lit with low level full cut off lighting. The impacts and affected species associated with the Access to Churchill Academy (west) shared use path are shown in Table 8.18.

Table 8.18 Access to Churchill Academy (west) Shared use path, Significance and Mitigation

Phase	Description	Receptor	Impacts	Significance	Mitigation	Residual Effects (Significance)
Construction	Increased Noise	bat, otter, bird, kingfisher, dormouse, badger, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice. (CEMP)	Slight adverse
	Increased lighting	bat, otter, bird, kingfisher, dormouse, badger, hedgehog	Direct, negative, temporary.	Moderate adverse	Night time working restriction (CEMP)	Neutral
	Run off / pollutants	otter, bird, kingfisher, reptile, amphibian, GCN, fish, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice. (CEMP)	Slight adverse
	Removal of habitat (Interaction with linear features)	bat, otter, bird, owl, dormouse, badger, reptile, amphibian, GCN, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice. (CEMP)	Slight adverse
Operation	Increased Noise	bat, otter, bird, owl, dormouse, badger, reptile, amphibian, GCN, hedgehog		Slight adverse	General construction measures and good practice. (CEMP)	Slight adverse
	Increased Lighting	Bats, otter, dormouse, owl, hedgehog,		Moderate adverse	Species sensitive lighting strategy, to include bollard cowled and timed / seasonal lighting (CEMP)	Slight adverse
	Run off / pollutants	bat, otter, bird, owl, dormouse, badger, reptile, amphibian, GCN, hedgehog		Slight adverse	General construction measures and good practice. (CEMP)	Slight adverse

8.9.121 Access to Churchill Academy (east); this would comprise a similar upgrade to an existing PRoW (AX14/36/30) to the north of Churchill Academy crossing open fields on an already metalled surface path before meeting Ladymead Lane and Broadoak Road in Churchill. This would be accompanied by localised improvements to provide traffic calming through road markings. The impacts and affected species associated with the Access to Churchill Academy (east) shared use path are shown in Table 8.19.

Table 8.19 Access to Churchill Academy (east) Shared use path, Significance and Mitigation

Phase	Description	Receptor	Impacts	Significance	Mitigation	Residual Effects (Significance)
Construction	Increased Noise	bat, otter, bird, kingfisher, dormouse, badger, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice.	Slight adverse
	Increased lighting	bat, otter, bird, kingfisher, dormouse, badger, hedgehog	Direct, negative, temporary.	Moderate adverse	Night time working restriction	Neutral
	Run off / pollutants	otter, bird, kingfisher, reptile, amphibian, GCN, fish, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice.	Slight adverse
	Removal of habitat (Interaction with linear features)	bat, otter, bird, owl, dormouse, badger, reptile, amphibian, GCN, hedgehog	Direct, negative, temporary.	Moderate adverse	General construction measures and good practice.	Slight adverse
Operation	Increased Noise	bat, otter, bird, owl, dormouse, badger, reptile, amphibian, GCN, hedgehog	Direct, negative, temporary.	Slight adverse	General construction measures and good practice.	Slight adverse
	Run off / pollutants	bat, otter, bird, owl, dormouse, badger, reptile, amphibian, GCN, hedgehog	Direct, negative, temporary.	Slight adverse	General construction measures and good practice.	Slight adverse

8.10 Residual Environmental Effects (following mitigation)

Construction Phase

Designated Sites

8.10.1 Habitat extent (including functionally linked habitat): No land take within the SAC is required and there would be no direct impacts as a result of habitat loss. The SAC is located adjacent to the Scheme and the Scheme is within the consultation zone for the NSC SPD. Due to this distance the bat foraging and commuting routes present within the Scheme boundary would be considered part of the core roost sustenance zones for the lesser and greater horseshoe bat populations - the qualifying interests of the SAC. However, in the areas lost to the Scheme, north to south commuting lines, regularly used by bats, would be maintained or strengthened by planting, particularly of species rich hedgerows (orientated to enable trapping of insects in the prevailing winds and thus ensure a level of biomass). As such the effects of the loss of any suitable foraging or commuting habitat associated with the Scheme would not affect the integrity of the SAC. Potential impacts on the SAC are not anticipated during the construction phase. **The residual effect associated with the Scheme is considered to be Slight adverse and Not Significant at the International level.**

Habitats

8.10.2 The Scheme would run through open areas of improved grassland agricultural lays, hedgerows, and rhyne system that do not currently have large infrastructure but do incorporate residential aspects and agricultural buildings etc.

8.10.3 The majority of grassland creation throughout the Scheme, on all road verges, embankments and previously arable and pasture land, would be of NVC communities MG7 and in keeping with the local landscape. Also, to compensate for habitat lost, mitigate habitat fragmentation and to maximise the creation of priority habitat (as shown on EMPs (Planning Document - Environmental Master Plan drawings). Seeds of native and local provenance would be used. Methods of habitat creation would be developed

during detailed design but would include consideration of methods such as using green hay from the local area.

8.10.4 Although there would be a loss of improved grassland within the early construction phase of the Scheme, early planting and management of retained habitat would mitigate for this. With the implementation of species rich grassland through construction the area would be subject to a major beneficial impact to compensate for the improved grassland habitat loss. **The residual effect on grassland associated with the Scheme is assessed to be Neutral and not significant the local level.**

8.10.5 Habitat loss does not include any semi-natural broadleaved woodland or category A trees. The hybrid black poplar would be propagated and used as part of the planting mix. **The residual effect on habitats associated with the Scheme is considered to be Neutral and Not Significant at the Local level.**

8.10.6 The Environmental Masterplans (Planning Document - Environmental Masterplan drawings (Sheets 1 – 6)) illustrate the retention and replacement of any semi-natural habitats permanently lost as a result of the Scheme. The LEMP (ES Volume 3 Appendix 16.3) outlines the management requirements to enhance retained habitats. This strategy includes the creation of habitat corridors along the length of the Scheme, providing links to otherwise off-site habitats. The strategy has focussed on maximising the delivery of species-rich grassland and woodland edge planting, whilst ensuring that there is a net gain in biodiversity as detailed in the BNG report in ES, Volume 3 Appendix 8. P. Connectivity through continuity of habitat would be provided north to south (where possible) for commuting bats. **The residual effect on habitats associated with the Scheme is considered to be Neutral and Not Significant at the Local level.**

Aquatic habitats and species

8.10.7 Aquatic habitats - Pond: The pond lost to the Scheme would be replaced at a size of 2:1 and would be in an area of wetland and marshy grassland mosaic and in proximity to attenuation ponds which would provide an area for colonisation by appropriate species. **The residual effect on the pond would be Neutral and Not Significant at the Local level.**

8.10.8 Aquatic habitats - Rhynes: Mitigation would be provided within the detailed design of the new river habitat in the diverted channel, which would be agreed in consultation with Environment Agency specialists and be informed by pre-construction fish surveys. The detailed design would focus on balancing the habitat requirements (substrate, depth, flow types and refuges) of fish species and other aquatic species and habitats. With the embedded mitigation in terms of protection to river banks and aquatic vegetation and groundwater transfer, habitat loss would result in temporary/reversible damage to aquatic habitats that would not affect their integrity. **The residual effect on aquatic habitats would be Neutral and Not Significant at the Local level.**

8.10.9 Aquatic Habitats - R. Banwell : Habitats close to the Scheme, such as hydrologically connected aquatic habitats, are sensitive to effects from construction such as pollution events from fuel and chemical spills and from sediment run-off. Runoff of substrate associated with construction could result in increased siltation of the Banwell River and the rhynes. This could result in the temporary reduction in habitat abundance and diversity. Construction best practice mitigation measures would be implemented to avoid pollution of aquatic habitats. **The residual effect on aquatic habitats would be Neutral and Not Significant at the Local level.**

8.10.10 Aquatic habitats - Moor Road crossing: Habitats close to the Scheme, such as hydrologically connected aquatic habitats, are sensitive to effects from construction such as pollution events from fuel and chemical spills and from sediment run-off. Runoff of substrate associated with construction could result in increased siltation of the Banwell River and the rhynes. This could result in the temporary reduction in habitat abundance and diversity. Construction best practice mitigation measures would be implemented to avoid pollution of aquatic habitats. **The residual effect on aquatic habitats would be Neutral and Not Significant at the Local level.**

8.10.11 Aquatic habitats - Macrophytes:. Runoff of substrate associated with construction could result in increased siltation of the Banwell River and the rhynes. This could result in the temporary reduction in habitat abundance and diversity. Construction best practice

mitigation measures would be implemented to avoid pollution of aquatic habitats. **The residual effect on aquatic habitats would be Neutral and Not Significant at the Local level**

Fish

8.10.12 Indirect impacts on fish within the River Banwell or associated Rhynes would comprise rhyne diversions and over pumping within these watercourses.

8.10.13 Mortality of species is highly likely in the absence of mitigation or suitable working practices. Construction activities could result in adult fish being directly killed or injured, and hypoxia through dewatering resulting in death. Pre-construction surveys would be conducted to confirm species presence / absence and to inform the strategy and methodology for a fish translocation which would be implemented to reduce mortality. With this mitigation implemented, direct mortality would result in temporary / reversible damage to fish populations that would not affect their integrity. **The residual effects associated with the Scheme are considered to be Neutral and Not Significant at the Local level.**

8.10.14 Habitat loss: Construction activities at confirmed locations where fish populations are noted (through pre-construction surveys) would be sensitively timed, with the implementation of the mitigation, habitat loss would result in temporary / reversible damage to fish populations that would not affect their integrity. Habitat loss would represent a negligible adverse impact upon fish populations, which is assessed as a neutral effect and not significant. In summary, the fish assemblage would be subject to negligible adverse impacts from direct mortality and habitat loss as a result of construction activities. **The residual effects associated with the Scheme are considered to be Neutral and Not Significant at the Local level.**

Bats

8.10.15 Disturbance: Activities resulting in increased levels of noise, vibration or light can lead to bats abandoning roosts. The lesser horseshoe maternity roost / multi-species roost at the Ochre and Banwell caves lies adjacent to the Scheme and is of international importance., The screening provided currently by the woodland,

the extant road disturbance, and measures to preserve flightlines of bats implemented, the disturbance impacts to this roost would result in temporary / reversible damage to the bat populations that would not affect their integrity.

8.10.16 Habitat fragmentation: Construction would result in the severance and fragmentation of foraging habitat and commuting habitat, notably the following areas identified as important for bat activity:

a) Towerhead Farm;
b) the sloping fields running north of the existing road towards the solar farm; and
c) football grounds.

8.10.17 Additionally, lands in the centre of the site surrounding the Old Rhyne provide opportunities for commuting bats with a number recorded as commuting east to west just south of this location.

8.10.18 Habitat fragmentation is likely to affect all species in the identified assemblages, including the Annex II species. The only species likely to be exempt from these impacts are the open habitat adapted species (noctule, Leisler's bat, and serotine). Key roosts identified during surveys which would likely be impacted indirectly by fragmentation (these include the lesser / greater horseshoe day / mating / satellite breeding roost) within Banwell Woods at Ochre Caves and other cave assemblages.

8.10.19 With the implementation of essential mitigation, the timing of works and monitoring of bat activity through method statements, the CEMP and a bat licence if required, the impact on bats from noise and light is considered to be negligible.

8.10.20 The essential mitigation to safeguard as much as possible commuting routes and timing of works would minimise most impacts on bats. There would likely still require some bats to seek alternative foraging resources, travelling greater distances and thus expending more energy, although this would be provided within the Scheme boundary through the improvement of retained grassland and hedgerows which would be maintained for biodiversity during construction. In summary, the bat assemblage would be subject to limited impact from

fragmentation of foraging and commuting habitats which would be temporary / reversible. **The residual effect associated with the Scheme, is considered to be Slight Adverse and Not Significant at the International level**.

Hazel Dormouse

8.10.21 With the implementation of mitigation, mortality of dormouse during construction (as governed by a EPSL licence) would be minimal and there would be no observable impact on populations arising from direct mortality during construction works.

8.10.22 To mitigate for loss of woodland and hedgerow breeding habitat during the construction phase, dead hedging and early planting of trees and hedges would be undertaken where possible to reduce the time lag between habitat loss and establishment. Nest boxes would also be provided within retained woodland. The loss of breeding habitat would result in temporary / reversible damage to the assemblage of county importance that would negatively affect its integrity.

8.10.23 Foraging habitat: The habitat losses during the construction phase would reduce foraging opportunities for the population minimally in conjunction with fragmentation of retained areas of habitat, until new habitat creation was established. Where possible, habitat replacement would begin as early as possible during construction to reduce the time lag between loss and creation. The provision of native and species-rich hedgerows, dead hedging, and species rich hedgerow planting would provide additional habitat and connectivity of habitat across the Scheme. In addition, the retained vegetation would be managed for enhanced biodiversity which would benefit the dormouse population. **Residual effects considered to be Slight Adverse and Not Significant at the International level.**

Reptiles

8.10.24 Direct mortality: Construction activities could result in individual reptiles being injured and / or killed in the absence of mitigation or suitable working practices. For this reason, a modified translocation exercise would be carried out in the key reptile habitat areas where adjacent habitat is not retained, or if habitat is fragmented and displacement of reptiles would occur.

Translocation would be demarcated by herptile fencing north of the works fencing for the duration of the construction phase.

8.10.25 With the implementation of mitigation through good working practices in accordance with a reptile method statement, vegetation method statement and the CEMP, mortality of reptiles during construction would be minimal and there would be no observable impact on the reptile populations arising from direct mortality of reptiles during construction works.

8.10.26 Mitigation measures would include the creation of grassland, hedgerow, and woodland habitat creation suitable for reptiles and incorporation of features beneficial to reptiles, especially grass snake, such as hibernacula and log piles. Habitat creation includes translocation sites within the Scheme boundary.

8.10.27 In summary, the reptile assemblage would be subject to a moderate adverse impact from habitat loss as a result of construction activities / translocation. The residual effect associated with the Scheme is considered to be **Neutral and not significant at the County level.**

Amphibians

8.10.28 Direct mortality: Construction activities could result in individual reptiles being injured and / or killed in the absence of mitigation or suitable working practices.

8.10.29 With the implementation of mitigation through good working practices in accordance with a vegetation clearance method statement and the CEMP, mortality of amphibians during construction would be minimal and there would be no observable impact on the amphibians populations arising from direct mortality of amphibians during construction works. The residual effect associated with the Scheme is considered to be **Neutral and not significant at the County level.**

Otter

8.10.30 The construction of the Scheme in close proximity to watercourses has the potential to affect otters within the study

area through habitat loss, fragmentation, and degradation.

8.10.31 Habitat loss: Otter are recorded in the central aspect of the site where some habitat would be affected. The majority would be commuting areas as the opportunities for holts etc is minimal within the central aspect of the Scheme. Rhynes would be crossed by the Scheme with culverts and pipes installed with ledges suitable for otter, vegetation and fencing would be implemented to encourage use of these culverts and pipes.

8.10.32 Disturbance from construction activities would be minimised through the timing of works and the implementation of the vegetation method statement and associated best practice. This disturbance would represent a negligible adverse impact upon the otter population.

8.10.33 Pollution: With the implementation of construction best practice mitigation measures to avoid pollution of aquatic habitats there would be no observable impact on the otter population from habitat degradation resulting from construction works. In summary, the otter population would be subject to negligible adverse impacts from habitat loss and disturbance as a result of construction activities. **The residual effects associated with the Scheme are considered to be Neutral and Not Significant at the County level.**

Birds, Kingfisher and Barn Owl

8.10.34 Mitigation measures include timing of vegetation clearance and pre-construction nest checks (if works cannot be timed outside of the breeding bird season) to avoid injury / direct mortality and / or destruction of nests would be avoided. There would be no observable impact on the breeding or wintering bird assemblages resulting from injury or direct mortality during the construction phase of the Scheme.

8.10.35 To mitigate for loss of hedgerow breeding habitat during the construction phase, early planting of trees and hedges would be undertaken where possible to reduce the time lag between habitat loss and establishment (i.e., at the commencement of onsite activities). Nesting bird boxes would also be provided for a range of species impacted within retained woodland. Once

established, there would be a gain of broadleaved woodland and of hedgerow habitat available for breeding birds throughout the Scheme. There would be a net gain of species rich grassland, largely replacing lower value improved and poor semi-improved grassland. The loss of breeding habitat would result in temporary / reversible damage to the breeding bird assemblage of medium importance that would negatively affect its integrity.

8.10.36 Foraging habitat: The habitat losses during the construction phase would reduce foraging opportunities for the local bird assemblages and fragment retained areas of habitat, until new habitat creation was established. Where possible, habitat replacement would begin early during construction to reduce the time lag between loss and creation. In addition, the provision of native and species-rich hedgerows would provide additional habitat and connectivity of habitat for birds across the Scheme. The loss and fragmentation of foraging habitat would result in temporary / reversible damage to the breeding and wintering bird assemblages until new habitats are established, and this impact would negatively affect the integrity of the assemblages.

8.10.37 In summary, the breeding and wintering bird assemblages would be adversely impacted by the loss of breeding habitat, loss, and fragmentation of foraging habitat and disturbance (noise and lighting) from construction activities. These impacts would be addressed through the implementation of mitigation measures. **The residual effects associated with the Scheme are considered to be Neutral and Not Significant at the Local level.**

European Badger

8.10.38 Badgers have historically used the area within the Scheme boundary (currently under monitoring). Disturbance such as construction noise, severing of foraging routes by way of site demarcation, and increased lighting could affect a population. Suitable working methodologies and measures would be implemented during the construction phase as outlined in the CEMP. If a sett requires closing this would be carried out under a Badger licence. An artificial sett would be constructed if required prior to the full or partial closing of a main sett.

8.10.39 Severance could cause competition / expansion pressures due

to a temporary reduction in territory size and foraging resource. Such adverse effects would be reduced by careful construction programming so that certain crossing areas would remain available to badgers prior to final crossing points in the form of wildlife culverts being completed. Temporary fencing would be installed to funnel badgers to these areas throughout the construction phase.

8.10.40 With the implementation of embedded mitigation as part of the design, severance of habitats and territories would result in temporary / reversible damage to the badger population during the construction phase that would negatively affect its integrity. **The residual effects associated with the Scheme are considered to be Neutral and Not Significant at the Local level.**

Terrestrial Invertebrates

8.10.41 With mitigation in place, careful timing of works and construction carried out in accordance with relevant method statements and working practices outlined in the CEMP no direct or indirect impacts of the Scheme upon invertebrates are anticipated. The residual effect associated with the Scheme is considered to be **Neutral and not significant at the County level.**

Invasive Non-native Species

8.10.42 With construction carried out in accordance with an INNS Method Statement, biodiversity risk assessment and the CEMP no direct or indirect impacts of the Scheme upon INNS are anticipated. The residual effect associated with the Scheme is considered to be **Neutral and not significant at the local level.**

8.10.43 Table 8.20 below summarises likely effects of construction on key ecological features.

Table 8.20 Summary of likely significant effects of construction on key ecological features.

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
North Somerset and Mendips Bat Special Areas of Conservation (Designated Sites)	International European / High	Damage to habitats within the SAC from airborne pollutants (dust).	Slight adverse	Tree protection in accordance with Arboricultural method statement; bat hop overs and fencing to retain any flight lines; minimise lighting; General construction measures and good practice (CEMP)	Slight adverse
Habitat - Grassland (NVC MG7)	Local importance / Low	Potential reptile habitat affected	Slight adverse	Retained grassland to be managed to enhance its biodiversity (LEMP); protection of habitats through vegetation clearance method statement and good practice (CEMP)	Neutral
Habitat - Hedgerow	Local importance / Low	Loss of habitat and damage to areas of retained from dust, root compression or flooding.	Slight adverse	Retention of high quality hedgerows wherever possible; translocation of hedgerows; installation of dead hedges; planting of new hedgerows along the Scheme boundary to link into existing habitats	Neutral
Habitat - Woodland	Local importance / Low	Loss of B category trees, loss of hybrid Black Poplar and damage from dust, root compression or flooding	Neutral to slight adverse	Tree protection in accordance with Arboricultural method statement; woodland and woodland edge planting; early planting wherever possible; propagation of hybrid black poplar; use of local provenance stock. General construction	Neutral

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
				measures and good practice (CEMP)	
Habitat – Traditional Orchard	Local importance / Low	Loss of habitat and damage to areas of retained from dust, root compression or flooding.	Neutral to slight adverse	Planting of traditional orchard species within the planting mix; protection of traditional orchard through general construction measures and good practice (CEMP)	Neutral
Aquatic habitats – Environmental Pond	Local Importance / Low value	Loss of pond	Slight adverse	Creation of new pond of size 2:1. Translocation of any fish or associated species. General construction measures and good practice (CEMP)	Neutral
Aquatic Habitats - Rhynes	Local Importance / Low value	Diversion of culverts, small loss of natural bed. Pollution incidents	Slight adverse	Works in accordance with good practice and CEMP; retention of natural bed wherever possible; diversion of rhyne west of Moor Road in accordance with appropriate method statement and RAMS.	Neutral
Aquatic Habitats – Banwell River	Local Importance / Low value	Noise and visual disturbance, potential impact on macrophytes during construction	Slight adverse	General construction measures and good practice (CEMP)	Neutral
Aquatic Habitats – Moor Road crossing	Local Importance / Low value	Noise and visual disturbance, potential impact on macrophytes during construction	Slight adverse	General construction measures and good practice (CEMP)	Neutral
Aquatic Habitats – Macro-invertebrates	Local Importance / Low value	Diversion of culverts, small loss of natural bed.	Slight adverse	Retention of natural bed wherever possible; general construction measures and good practice (CEMP)	Neutral

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
Fish	Local Importance / Low value	Killing or injury of animals during site clearance.	Slight Adverse	Pre-construction surveys. Macrophytes would be cut prior to culvert works; work programme and embargo relating to fish species and migration; general construction measures and good practice (CEMP)	Neutral
		Death from pollutants entering the water		General construction measures and good practice (CEMP)	
		Loss of suitable habitat and associated severance of commuting routes.		Retention of natural bed wherever possible;	
Bats	International European / High	Working areas acting as a barrier to movement, potentially severing territories and roosts.	Large Adverse	Pre-construction tree and building roost surveys. Use of heras fencing and netting to retain flight lines during the active season. General construction measures and good practice (CEMP)	Slight adverse
		Increased noise and light levels during construction could potentially cause disturbance	Large Adverse	General construction measures and good practice (CEMP)	Slight adverse
		Loss of suitable foraging habitat and associated severance of commuting routes.	Large Adverse	Works to be undertaken under a bat EPS licence. Pre-construction crossing point surveys; implementation of bat boxes prior to vegetation clearance.	Slight adverse

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
Hazel Dormouse	International European / High	Working areas acting as a barrier to movement, potentially severing territories.	Large Adverse	Work to be carried out in accordance with the Dormouse EPS licence.	Slight adverse
		Increased noise and light levels during construction could potentially cause disturbance	Moderate Adverse	Work to be carried out in accordance with the Dormouse EPS licence.	Slight adverse
		Loss of suitable foraging habitat and associated severance of commuting routes.	Large Adverse	Work to be carried out in accordance with the Dormouse EPS licence.	Slight adverse
Reptile	County Importance / Medium Value	Increased noise and light levels during construction could potentially cause disturbance	Moderate Adverse	Translocation and vegetation clearance in accordance with relevant method statements and general construction measures and good practice (CEMP)	Neutral
		Killing or injury of animals during site clearance.	Moderate Adverse	Translocation and vegetation clearance in accordance with relevant method statements and general construction measures and good practice (CEMP)	Neutral
		Loss of suitable habitat and associated severance of commuting routes.	Moderate Adverse	Translocation and vegetation clearance in accordance with relevant method statements and general construction measures and good practice (CEMP). Landscape planting.	Neutral
Amphibian	County Importance / Medium Value	Loss of suitable habitat, hibernacula and changes to the vegetation structure in water courses	Moderate Adverse	Translocation as required during vegetation clearance in accordance with method statement; construction of flood	Neutral

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
				compensation areas, attenuation basins and new pond; provision of hibernacula	
		Impact from pollutants entering the water bodies	Moderate Adverse	General construction measures and good practice (CEMP)	Neutral
Great Crested Newt	Negligible	Whilst no evidence was found, the works would be covered by a EPSL for GCN	Neutral	All works governed by GCN district licence	Neutral
Otter	County Importance / Medium Value	Working areas acting as a barrier to movement, potentially severing territories.	Slight Adverse	Works in accordance with vegetation clearance method statement. General construction measures and good practice (CEMP). Landscape planting.	Neutral
		Increased noise and light levels during construction could potentially cause disturbance	Moderate Adverse	General construction measures and good practice (CEMP)	Neutral
		Loss of suitable foraging habitat and associated severance of commuting routes.	Moderate Adverse	Works in accordance with vegetation clearance method statement. General construction measures and good practice (CEMP). Landscape planting.	Neutral
		Death from pollutants entering the water	Moderate Adverse	General construction measures and good practice (CEMP)	Neutral
Bird (including Kingfisher)	Local Importance / Low Value	Working areas acting cause loss of habitat which would also act as a barrier to movement, potentially severing territories. Loss of suitable foraging / nesting habitat and associated severance of commuting routes .	Slight adverse	Works in accordance with vegetation clearance method statement. General construction measures and good practice (CEMP). Landscape planting.	Neutral

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
		Increased noise and light levels during construction could potentially cause disturbance	Slight adverse	General construction measures and good practice (CEMP)	Neutral
		Disturbance to nesting birds during site clearance. Destruction of or damage to resting places during site work clearance, with associated loss of young.	Slight adverse	Works in accordance with vegetation clearance method statement. General construction measures and good practice (CEMP). Landscape planting.	Neutral
		Impact on wintering birds	Slight adverse	General construction measures and good practice (CEMP)	Neutral
		Disturbance to nesting birds during site clearance. Destruction of or damage to resting places during site work clearance, with associated loss of young.		Works in accordance with vegetation clearance method statement. General construction measures and good practice (CEMP). Landscape planting.	
European Badger	Local Importance / Low Value	Working areas acting as a barrier to movement, potentially severing territories	Slight adverse	Works in accordance with vegetation clearance method statement and badger licence if required. General construction measures and good practice (CEMP). Landscape planting.	Neutral
		Increased noise and light levels during construction could potentially cause disturbance	Slight adverse	General construction measures and good practice (CEMP). Landscape planting.	Neutral

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
		Loss of suitable foraging habitat and associated severance of commuting routes	Slight adverse	Works in accordance with vegetation clearance method statement and badger licence if required. General construction measures and good practice (CEMP). Landscape planting.	Neutral
Terrestrial Invertebrates	Local Importance / Low value	Killing or injury of animals during site clearance.	Slight adverse	General construction measures and good practice (CEMP).	Neutral
		Death from pollutants entering the water		General construction measures and good practice (CEMP).	
		Loss of suitable habitat and associated severance of commuting routes.		General construction measures and good practice (CEMP). Landscape planting.	
Section 41	Low	Loss and severance of habitat	Slight adverse	Works in accordance with vegetation clearance method statement. General construction measures and good practice (CEMP).	Neutral
Invasive species	N/A (but could affect ecological features of up to Very High Value) Low (Local Importance)	Potential that imported of materials for construction or landscaping works could introduce new invasive species to the area.	Slight adverse	General construction measures and good practice (CEMP).	Neutral
		Construction phase activities such as excavation and the import / export of excavated materials have the potential to cause the spread of Himalayan balsam both within and outside the Scheme		General construction measures and good practice (CEMP).	

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Mitigation measures	Significance of Impact After Mitigation
		boundary, especially if contaminated material were to enter watercourses.			

Operational phase

8.10.44 Given the management for biodiversity of the retained vegetation and the new planting that would commence during construction, the development of the flood compensation areas and hibernacula and the associated biodiversity net gain it is anticipated that there would be benefits for a wide range of species including those that are currently not identified within the area in particular water vole and GCN.

Designated sites

8.10.45 The known bat roosts represent a notable population of lesser and greater horseshoe bats. The Scheme takes traffic further north from the current road adjacent to the SAC reducing the potential localised impact on the SAC.

8.10.46 The radio-tracking study undertaken for the Scheme tracked greater horseshoe bats to sample their movements in relation to the habitats within the Scheme boundary. The results of the radio-tracking showed that these bats frequently crossed the Towerhead Road to the east and a number of sensitive commuting routes existed south of the Scheme. This includes crossing both above the road and use of an existing underpass to the east of the Scheme and westward towards the south west of Banwell. The provision of bat hop – overs would improve the current commuting opportunities for bats across the A468.

8.10.47 An increased risk of mortality is not considered to be a threat to the qualifying status of the populations within the SAC, as outlined in the HRA (Volume 3 Appendix 8.C).

8.10.48 The critical load for woodland is 10 kg N ha-1 yr-1 with the 2018 baseline measurements between 33.9 kg N ha-1 yr-1 and 53.9 kg N ha-1 yr-1 with the higher values near the current alignment of the A368 / Towerhead Road. Projections up to year 2038 show nitrogen deposition increase although this is dependent on car technology and user behaviour.

8.10.49 Although projected increases between the DM and DS scenarios are >1% than the Critical Load, the actual real term change in quantity between the current baseline and future levels is low

overall, when considered in relation to further potential changes in ground flora.

8.10.50 When considering the above, an increase in nitrogen deposition at the levels modelled by the Air Quality chapter (ES Volume 1 Chapter 5) is not predicted to have a significant effect on bat food resources within Banwell Woods and therefore a significant effect on SAC qualifying feature is considered unlikely.

8.10.51 No observable impacts on Mendip Hills and North Somerset Bat SAC are predicted as a result of the operation phase of the Scheme. **The residual effect associated with the Scheme is considered to be Slight Adverse and Not Significant at the International level.**

Habitats

8.10.52 There may be increased visitors following the introduction of an shared use path and wider improvements to the active travel network that form part of the Scheme. These could increase pollution levels including from dogs / horses. However, any adverse impacts would be offset by the improved management of the retained vegetation and the areas of landscaping that form part of the Scheme.

8.10.53 With the habitat creation and enhancement measures as outlined the Scheme would achieve a ‘net gain’ in biodiversity. This is detailed in ES Volume 3 Appendix 8.P – Biodiversity Net Gain Report. The Scheme has been assessed using BNG Metric 3.0 and with the implementation of habitats, management of existing habitats and the construction of swales, ditches and attenuation ponds it would create approximately **41%** Habitat Units, **40.5%** Hedgerow Units and **75%** River Units.

8.10.54 With the inclusion of traditional fruit species included in the planting mix and the propagation of hybrid black poplar tree species these would offset the impacts on the traditional orchard. There is also the potential for further improvements in management and species diversity within the traditional orchard which would provide further improvement in the overall habitat and setting.

8.10.55 Given the land acquired as part of the Scheme for mitigation there would be a net gain in biodiversity. Conservation grazing and the creation of a mosaic of wet and grass grasslands would improve the biodiversity of the area as a whole. It is anticipated that there would be an overall improvement in the quality of the grassland for biodiversity through the implementation of conservation grazing in accordance with the LEMP to manage the grassland. **The residual effect associated with the Scheme on habitats is considered to be Slight Beneficial and Not Significant at the Local level.**

Aquatic Habitats

8.10.56 During operation and with the implementation and management of mitigation measures in place especially in terms of wetland and marshy grassland habitat creation it is considered that the residual effect on aquatic habitats including the replacement pond, the River Banwell and macrophytes would be **Neutral.**

8.10.57 With consideration during design and mitigation in place and the Moor Road crossing is considered to be **Slight adverse**.

8.10.58 **The residual effects of the Scheme on aquatic habitats and species would be Not Significant at the Local level.**

Fish

8.10.59 No impacts on fish through increased sedimentation, hydrological changes to springheads and increased pollution events through surface run off or groundwater feeds would occur during operation due to embedded mitigation in the design. In addition, the replacement pond and flood compensation areas offers further opportunities for fish species.

8.10.60 The Moor Road bridge would cover up to 15m of the River Banwell. However, there would likely be no observable impact on the fish assemblage from the operational phase of the Scheme. **The residual effect associated with the Scheme is Neutral and Not Significant at the Local level.**

Bats

8.10.61 The mitigation measures incorporated into the Scheme aim to

maintain a permeable landscape for foraging and commuting bats in the wider landscape, including a number of safe crossing points to reduce the risk of collisions (by way of culverts and planting / translocating hedgerows, trees, and woodland edge species) and to facilitate corridors north to south reinforcing existing routes and south to north corridors. With the establishment of the planting and associated provision of the safe crossing points and guide for bats towards features and management to create alternative foraging/commuting routes there would be a negligible collision risk or fragmentation to bat species. **The residual effect associated with the Scheme is considered to be Slight Adverse and Not Significant at the International level**.

8.10.62 With embedded mitigation, the reduction in traffic adjacent to the Scheme, the design of the single lane 40mph road in place and established hedgerow and woodland planting, increased light levels from traffic damage to commuting and foraging bats would not affect the integrity of the bat populations. **The residual effect associated with the Scheme is considered to be Slight Adverse and not Significant at the International level.**

8.10.63 While known roosts are unlikely to be subject to higher noise levels as a result of the Scheme in operation due to placement, and current screening from Barnwell woods, roosts within Banwell (in domestic dwellings etc) could see a reduction in noise levels as a result of the Scheme in operation due to the reduction in traffic and congestion within Banwell itself. While it is likely that increased noise levels north of Banwell village centre could affect foraging bats, specifically the species that use passive listening as a foraging technique, it is likely to not be significant with the implementation of mitigation. Additionally, the main roost within the SAC would not have significant levels of increase due to the presence of the current road and screening from the woodland.

8.10.64 The single span bridge at Riverside would be sufficiently high above the River Banwell and would preserve the wildlife corridor and also for the adjacent rhyne. Further, commuting bats that transverse east to west have provisions to preserve this. The Moor Road bridge would enable some commuting unless the river is spate (predicted levels at 1 in a 100 years) when bats may fly along Riverside. Bats would be able to raise above the bridge

as it is at level and would have low sides (1m) and the predicted volume of traffic would present a low risk to bats re collisions.

8.10.65 Bat assemblages would therefore be subject to negligible residual impacts once the planting has established. The residual effects associated with the Scheme are considered to be **Slight Adverse and Not Significant at the International level.**

Hazel Dormouse

8.10.66 Potential for collision is poorly understood with dormouse. However, there is limited opportunity for direct contact with vehicles due to widespread planting and access opportunities such as culverts. Therefore, this would be considered as **negligible** to Dormouse.

8.10.67 The use of the wood of felled trees would be considered in the construction of hibernacula or summer attractants to reptiles and amphibians or in hedgerow connectivity efforts (dead hedge) for dormouse.

8.10.68 Increased light levels associated with the live traffic in the eastern section of the Scheme could deter dormouse and alter their behaviour. However, the measures incorporated into the Scheme such as cuttings, solid parapets on all overbridges, sensitive design (junctions over roundabouts), and planting regime are considered to mitigate the impacts associated with increased light spill from vehicle lights onto surrounding habitat and would not affect the integrity of the population. In addition, as part of the Dormouse licence there would be long term monitoring which would identify any potential impacts which would require further mitigation to be implemented. **The residual effect associated with the Scheme is considered to be Slight Adverse and Not Significant at the International level.**

Reptiles

8.10.69 No observable direct or indirect impacts during the operational phase of the Scheme upon reptiles are anticipated. In addition to the habitat net gain as described above, further biodiversity enhancement measures such as installation of bird and dormouse boxes and enhancement of existing habitat for reptiles, would contribute to this ‘net gain’ for biodiversity. **The**

residual effect associated with the Scheme is considered to be Neutral and Not Significant at the County Level.

Amphibians

8.10.70 No observable direct or indirect impacts during the operational phase of the Scheme upon amphibians are anticipated. **The residual effect associated with the Scheme is considered to be Neutral and Not Significant at the County Level**.

Otter

8.10.71 There is potential that otters would attempt to cross the Scheme from the south either over ground or via culverts under the road. The use of the site by otters seems to be confined to Riverside and the Old Rhyne, with further evidence north towards Towerhead Brook. Otter territories can be extensive and therefore the entire Scheme would be considered to have an impact. However, the embedded mitigation including culverts, otter ledges, mammal fencing, and appropriate planting for shelter and a potential increase in prey species as a result of this. This would be reinformed by the implementation and conservation management of planting. The Moor Road bridge may restrict otter movement when in spate encouraging them onto the bank and potentially along Riverside, however this is considered an extreme situation during which time there would be very limited or no traffic, so the likelihood of collision is negligible. **The residual effect associated with the Scheme is considered to be Neutral and Not Significant at the County Level**.

Birds

8.10.72 The planting of trees and hedgerows would assist in encouraging and channelling movement of birds over the bridges as safe crossing points and increased opportunities for nesting and foraging. With this mitigation implemented, direct increase in mortality would result in no permanent / irreversible damage to bird assemblages and would not affect their integrity.

8.10.73 Areas of grassland habitat created close to the new road as part of the Scheme that would be beneficial for ground nesting birds are predicted to experience similar operational noise levels to

those areas currently used by breeding birds. Therefore, the habitat would continue to provide functional habitat for breeding birds that are habituated to a similar noise level. With the creation of additional habitat, disturbance would result in permanent / irreversible damage to bird assemblages that would not affect their integrity.

8.10.74 No observable direct or indirect impacts during the operational phase of the Scheme upon kingfisher are anticipated.

8.10.75 In addition to the habitat net gain as described above, further biodiversity enhancement measures such as installation of bird and dormouse boxes and enhancement of existing habitat for reptiles, would contribute to this 'net gain' for biodiversity.

8.10.76 **The residual effect associated with the Scheme is considered to be Neutral and Not Significant at the local level**.

European Badger

8.10.77 The inclusion of crossing points have been included in the design of the Scheme where the road would sever potential badger territories to restore safe crossing points for within their territories and across the wider landscape. The installation of mammal fencing, and hedgerows, tree, and woodland edge planting (in addition to natural scrub recolonisation) would assist in encouraging and channelling movement of badgers away from the road and to the crossing points throughout the operational phase of the Scheme. These features would be installed prior to the completed road network opening. **The residual effect associated with the Scheme is considered to be Neutral and Not Significant at the local level**.

Terrestrial Invertebrates

8.10.78 No observable direct or indirect impacts during the operational phase of the Scheme upon invertebrates are anticipated. **The residual effect associated with the Scheme is considered to be Neutral and Not Significant at the local level**.

Section 41 species

8.10.79 Given the increased planting and the management for biodiversity it is anticipated that the foraging and breeding opportunities for hedgehog and other species, would improve during operation. **The residual effect associated with the Scheme is considered to be Slight Beneficial and Not Significant at the local level**.

Invasive Non-Native Species

8.10.80 With mitigation in place and the new and retained habitats managed through the LEMP and MEMP, **the residual effect associated with the Scheme is considered to be Neutral and Not Significant at the local level**.

Deer

8.10.81 Given the planting as described above and the provision of deer fencing it is considered that there would be a benefit to the local deer population. **The residual effect associated with the Scheme is considered to be Neutral and Not Significant at the local level**.

8.10.82 Table 8.21 below summarises likely residual effects during operation on key ecological features.

Table 8.21 Summary of likely residual operational effects on key ecological features

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Proposed Mitigation	Significance of Impact After Mitigation
North Somerset and Mendips Bat Special Areas of Conservation	International European / High	No direct impact, limited impact on vegetation from air quality	Slight adverse	Management of Scheme planting to ensure activity and connection for the bats (LEMP)	Slight adverse
Habitat - Grassland (NVC MG7)	Local importance / Low	Habitat degradation	Neutral	Management of Scheme grassland (LEMP)	Slight beneficial
Habitat - Hedgerow	Local importance / Low	Managed for wildlife	Neutral	Management of Scheme hedgerows (LEMP)	Slight beneficial
Habitat - Woodland	Local importance / Low	Managed for wildlife	Neutral	Management of Scheme woodland (LEMP)	Slight beneficial
Habitat – Traditional Orchard	Local importance / Low	Managed for wildlife	Neutral	Management of orchard species along the Scheme (LEMP)	Neutral
Aquatic habitats – Environmental Pond	Local Importance / Low value	Replacement pond	Neutral	Management of pond (LEMP)	Neutral
Aquatic habitats - Rhynes	Local Importance / Low value	No impact on the rhyne system	Neutral	Management of rhynes and associated habitats (LEMP)	Neutral
Aquatic habitats – Banwell River	Local Importance / Low value	No impact	Neutral	Management of river habitats (LEMP)	Neutral
Aquatic habitats – Moor Road crossing	Local Importance / Low value	Potential for over-shading, dependant on detailed design	Slight adverse	Design to minimise impact on the River Banwell and rhyne. Management of rhyne and associated habitats (LEMP)	Slight adverse Subject to detailed design

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Proposed Mitigation	Significance of Impact After Mitigation
Aquatic Habitat – Macroinvertebrates	Local Importance / Low value	No impact, implementation of flood compensation areas and positive drainage	Neutral	Management of flood compensation area and associated habitats and species (LEMP)	Neutral
Fish	Local Importance / Low value	No impact	Neutral	Management of aquatic habitats (LEMP)	Neutral
Bats	International European / High	Introduction of lighting to areas – impacts on foraging and commuting	Slight adverse	Establishment and monitoring of planting. Monitoring as required in association with the bat licence	Slight adverse
		Roosts	Slight adverse	Monitoring of bat boxes as required in association with the bat licence	Slight adverse
		Impact on commuting routes	Moderate adverse	Design to minimise impact on the River Banwell and rhyne. Liaison with NE during detailed design.	Slight adverse Subject to detailed design
Hazel Dormouse	International European / High	No impact – under Dormouse licence	Moderate adverse	Monitoring in association with the dormouse licence. Management of dormouse habitat (LEMP)	Slight adverse
Reptile	County Importance / Medium Value	No impact	Slight adverse	Management of Scheme grassland and hibernacula (LEMP)	Neutral
Amphibian	County Importance / Medium Value	No impact	Slight adverse	Monitoring and management in association with the GCN District Licence as required. Management of Scheme habitats (LEMP)	Neutral
Otter	County Importance / Medium Value	Negligible impact, to be confirmed for Moor Road connection	Slight adverse	Management of Scheme habitats (LEMP)	Neutral

Ecological Feature	Nature Conservation Value	Description of Impact	Significance of Impact Prior to Mitigation	Proposed Mitigation	Significance of Impact After Mitigation
Bird (including Kingfisher)	Local Importance / Low Value	Increased levels of noise and traffic	Slight adverse	Management of Scheme habitats (LEMP)	Neutral
European Badger	Local Importance / Low Value	Light and noise due to the road	Slight adverse	Monitoring in accordance with Badger licence if required. Management of Scheme habitats (LEMP)	Neutral
Terrestrial Invertebrates	Local Importance / Low value	Potential for pollution events	Neutral		Neutral
Section 41 species	Local Importance / Low value	Increased opportunities for foraging and breeding	Slight beneficial	Management of Scheme habitats (LEMP)	Slight beneficial
Invasive Non-Native Species	Local Importance / Low value	Potential for spreading	Neutral	Management of Scheme habitats (LEMP)	Neutral
Deer	Local Importance / Low value	Potential for injury	Neutral	Management of Scheme habitats (LEMP)	Neutral

8.11 Monitoring

8.11.1 Monitoring of proposed mitigation would be undertaken to ensure its success in delivering the required outcome or function for the ecological receptor, either habitat or a specific species. Monitoring would be required within the pre, during, and post construction phases of the Scheme.

8.11.2 Monitoring of the effectiveness of mitigation measures would be carried out and the methods for monitoring would be detailed within the LEMP (Volume 3 Appendix 16.C) and Maintenance Environmental Management Plan. These would include frequency and type of surveys, key performance indicators and any further mitigation measures required. The final monitoring plan would be agreed with the relevant statutory bodies in advance of the monitoring commencing. In addition, any monitoring required through the protected species licences would be carried out and reported to NE. The results of monitoring would be circulated to the relevant statutory bodies and discussed at Environmental Liaison Group meetings or equivalent which would be held through construction and during the 5 year aftercare phase.

8.11.3 A commitment to the implementation of all agreed mitigation and monitoring measures for the Scheme would be secured through planning conditions.

8.12 Summary and Conclusions

8.12.1 Provided the mitigation measures recommended in this chapter are fully implemented, the Scheme would be expected to avoid, mitigate, or compensate for all potentially significant and adverse impacts over the long-term.

8.12.2 There would be no significant residual impact on the South Somerset and Mendips Bats SAC as outlined in the Habitat Regulations Assessment (refer to ES Volume 3 Appendix 8.C).

8.12.3 Whilst there would be an increase in air pollutants on Banwell Wood as part of the Scheme this would not be significant and may reduce over time with changes to vehicles and associated behaviours.

8.12.4 The loss of hybrid / black poplar would be replaced by new propagated planting. No residual impacts are considered to be significant.

8.12.5 The construction works would be carried out in accordance with a Dormouse licence and with the mitigation in place and the management of the new and retained woodland and hedgerow planting there would be a negligible and not significant residual impact.

8.12.6 Whilst there would be temporary and short term impacts on the aquatic habitats and species they would be not significant during the operation of the Scheme.

8.12.7 The Scheme would meet the requirement of biodiversity net gain over the long term, as the replacement habitats for those lost to the Scheme would be larger in extent and more species-rich than those which they are replacing. A mosaic of wetland habitats would be created to include the flood compensation areas, attenuation basins, marshy grassland and the replacement wildlife pond. 11no culverts would be installed together with mammal fencing and appropriate planting to facilitate bat, dormouse, otter, and other protected species' use of the wider habitats surrounding the Scheme. These would be further enhanced by the retention of habitats and associated improvements through management for biodiversity.

8.12.8 If otter holts or badger setts are impacted by the Scheme the works would be carried out under protected species licences as appropriate.

8.12.9 Detailed mitigation measures would be specified within a CEMP (Volume 3 Appendix 16.A) for the Scheme. The contractor would be required to develop and implement the CEMP. Supplementary to the CEMP, method statements would be prepared setting out detailed measures to control impacts upon species and habitats of high nature conservation value, such as the River Banwell.

8.12.10 Monitoring of the effectiveness of mitigation measures would be carried out and the methods for monitoring would be detailed within the LEMP (Volume 3 Appendix 16.C).

8.12.11 A commitment to the implementation of all agreed mitigation and monitoring measures for the Scheme would be secured through planning conditions.

8.12.12 Subject to the full implementation of the proposed mitigation measures, it is considered that the Scheme can be carried out in accordance with the relevant legislation, planning policy and biodiversity targets, and achieve biodiversity net gain.

8.13 References

8.1 DMRB LA 108 Biodiversity - Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure, “Design Manual for Roads and Bridges Sustainability and Environment Appraisal LA 108 Biodiversity Revision 1,” 2020.

8.2 DMRB LD 118 Biodiversity Design - Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure, “Design Manual for Roads and Bridges Sustainability and Environment Appraisal LD 118 Biodiversity Design Revision 0,” 2020.

8.3 DMRB LA 104 – Environmental assessment and monitoring - Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure, “Design Manual for Roads and Bridges Sustainability and Environment Appraisal LD 118 Biodiversity Design Revision 1,” 2020

8.4 The Conservation of Habitats and Species Regulations (Habitats Regulations) 2017 (as amended) - https://www.legislation.gov.uk/uksi/2017/1012/contents/made

8.5 Wildlife and Countryside (WCA) Act 1981 (as amended) - https://www.legislation.gov.uk/ukpga/1981/69

8.6 Natural Environment and Rural Communities (NERC) Act 2006 - https://www.legislation.gov.uk/ukpga/2006/16/contents

8.7 Protection of Badgers Act 1992 - https://www.legislation.gov.uk/ukpga/1992/51/contents

8.8 Wild Mammals (Protection) Act 1996 - https://www.legislation.gov.uk/ukpga/1996/3/contents

8.9 The Hedgerows Regulations 1997 - https://www.legislation.gov.uk/uksi/1997/1160/contents/made

8.10 Salmon and Freshwater Fisheries Act 1975 - https://www.legislation.gov.uk/ukpga/1975/51

8.11 The Eels (England and Wales) Regulations 2009 - https://www.legislation.gov.uk/uksi/2009/3344/contents/made

8.12 The Water Environment (Water Framework Directive) (WFD) (England and Wales) Regulations 2017 - https://www.legislation.gov.uk/uksi/2017/407/contents/made

8.13 Environment Act (2021) - https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

8.14 Environment Act (1995) - https://www.legislation.gov.uk/ukpga/1995/25/contents

8.15 Natural Environment and Rural Communities Act 2006 - https://www.legislation.gov.uk/ukpga/2006/16/contents

8.16 Town and Country Planning Act 1990 - https://www.legislation.gov.uk/ukpga/1990/8/contents

8.17 National Planning Policy Framework 2021 - https://www.gov.uk/government/publications/national-planning-policy-framework--2

8.18 National Planning Practice Guidance (PPG) - https://www.gov.uk/government/collections/planning-practice-guidance

8.19 UK-Post 2010 Biodiversity Framework - https://jncc.gov.uk/our-work/uk-post-2010-biodiversity-framework/

8.20 Biodiversity 2020: A Strategy for England's Wildlife and ecosystems services, Natural England (2011) - https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services

8.21 A Nature Recovery Network to create a Wilder Future, the Wildlife Trusts (2018) - https://www.wildlifetrusts.org/sites/default/files/2018-06/Nature_recovery_network_final.pdf

8.22 West of England Joint Green Infrastructure Strategy 2020-20302 - https://www.westofengland-ca.gov.uk/wp-content/uploads/2020/07/Joint-Green-Infrastructure-Strategy-%E2%80%93-June-2020..pdf

8.23 North Somerset Council Core Strategy Considerations, 2017 - https://www.n-somerset.gov.uk/my-services/planning-building-control/planning-policy/core-strategy

8.24 North Somerset Emerging Local Plan (2023 – 2038) - https://www.n-somerset.gov.uk/my-services/planning-building-control/planning-policy/our-local-plan/local-plan-2038

8.25 North Somerset Council's Green Infrastructure Strategy (2021) - https://www.n-somerset.gov.uk/my-services/libraries-leisure-open-spaces/parks-countryside/green-infrastructure-strategy

8.26 North Somerset Council Supplementary Planning Document: Biodiversity and Trees (2005) - https://www.n-somerset.gov.uk/sites/default/files/2020-03/SD%2046%20biodiversity%20and%20trees%20supplementary%20planning%20document.pdf

8.27 North Somerset Council Supplementary Planning Document: North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development (2018) - https://www.n-somerset.gov.uk/sites/default/files/2020-03/North%20Somerset%20and%20Mendip%20Bats%20SAC%20guidance%20supplementary%20planning%20document.pdf

8.28 The Action for Nature North Somerset Biodiversity Action Plan (NSC, 2005) – Superseded by North Somerset Council Supplementary Planning Document: Biodiversity and Trees.

8.29 Mendip Hills AONB Management Plan (2019-2024) - https://www.mendiphillsaonb.org.uk/wp-content/uploads/2022/04/FINAL-Mendip-Hills-AONB-Management-Plan-Review-2019-v1-1.pdf

8.30 Sites and Policies Plan Part 1: Development Management Policies - https://www.n-somerset.gov.uk/sites/default/files/2020-04/sites%20and%20policies%20plan%20part%201%20development%20management%20policies%20July%202016.pdf

8.31 CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland - https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/

8.32 DMRB LA 115 Habitats Regulations Assessment - Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure, "Design Manual for Roads and Bridges Sustainability and Environment Appraisal LA 115 Habitats Regulations assessment.

8.33 DMRB LA105 Air Quality - Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure, “Design Manual for Roads and Bridges Sustainability and Environment Appraisal LA 105 Air Quality

8.34 Bristol Regional Environmental Records Centre (BRERC) - https://www.brerc.org.uk/

8.35 Multi-Agency Geographic Information for the Countryside (MAGIC) (Defra) - https://magic.defra.gov.uk/

8.36 Environment Agency – Ecology and Fish Data Explorer and the Catchment Data Explorer - Environment Agency Fish Explorer https://environment.data.gov.uk/ecology/explorer [Accessed 01.04.2022]

8.37 British Standard 5837:2012 ‘Trees in relation to design, demolition and construction – recommendations’ - https://knowledge.bsigroup.com/products/trees-in-relation-to-design-demolition-and-construction-recommendations/standard

8.38 Natural England’s Biodiversity Metric 3.0 - https://www.gov.uk/guidance/biodiversity-metric-calculate-the-biodiversity-net-gain-of-a-project-or-development

8.39 NRA Conservation Technical Handbook (1992) - https://www.abebooks.co.uk/9781873160367/River-Corridor-Surveys-Methods-Procedures-1873160364/plp

8.40 LEAFPACS macrophyte methodology (Water Framework Directive UK Technical Advisory Group 2014) - https://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Biological%20Method%20Statements/River%20Macrophytes%20UKTAG%20Method%20Statement.pdf

8.41 Common Standards Monitoring Guidance for Ditches (JNCC 2005) - https://data.jncc.gov.uk/data/1b15dd18-48e3-4479-a168-79789216bc3d/CSM-Ditches-2005.pdf

8.42 Bat Conservation Trust’s Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins J. (ed.), 2016) - https://www.bats.org.uk/resources/guidance-for-professionals/bat-surveys-for-professional-ecologists-good-practice-guidelines-3rd-edition

8.43 DEFRA Local Scale guidelines - https://www.gov.uk/guidance/bats-advice-for-making-planning-decisions

8.44 Survey protocols for the British herpetofauna (Sewell et al., 2013) - http://www.narrs.org.uk/documents/Survey_protocols_for_the_British_herpetofauna.pdf

8.45 Froglife Advice Sheet 10 (Froglife, 1999) - https://gat04-live-1517c8a4486c41609369c68f30c8-aa81074.divio-media.org/M4-Newport/C%20-%20Core%20Documents/11.%20Ecology%20and%20Nature%20Conservation/11.3.3%20-%20Froglife%20Froglife%20Advice%20Sheet%2010%20reptile%20survey.%20Froglife%2C%20London.%201999.pdf

8.46 British Trust for Ornithology guidance - https://www.bto.org/our-science/projects/breeding-bird-survey/taking-part/survey-methods-help-and-guidance

8.47 Barn Owl Survey methodology and guidance - http://ousewashes.org.uk/wp-content/uploads/2017/07/Survey_Methodology.pdf

8.48 Guidance note 08/18 (ILP Bats and Artificial Lighting in the UK) - Bats and artificial lighting in the UK Bats and the Built Environment series https://cdn.bats.org.uk/uploads/pdf/Resources/ilp-guidance-note-8-bats-and-artificial-lighting-compressed.pdf?v=1542109349 [Accessed 10.01.2022]

8.49 Fisheries guidance https://www.fisheries.noaa.gov/