38. Ecological Impact Assessment report

West Sussex County Council

LYMINSTER BYPASS

Ecological Impact Assessment

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SUMMARY

1.1.1. West Sussex County Council proposes the construction of a new bypass, comprising carriageway, a viaduct over Black Ditch, a footway/cycleway, equestrian crossing, drainage and associated landscaping. The Proposed Bypass will be fenced along its route and the existing culvert at Brookfield Stream will be replaced with a wider culvert.

1.1.2. The Site comprises fields of arable and improved pasture, poor semi-improved and semi-improved neutral grassland, dissected by dry and wet drains, hedgerows and dense scrub, with scattered trees and small parcels of broadleaved woodland either side of the existing A284 Lyminster Road. Two watercourses, Black Ditch and Brookfield Stream, traverse the route of the Proposed Bypass. The ecological baseline status has been established through desk studies and field surveys.

1.1.3. The Application Site does not include any statutory or non-statutory designated sites. The network of drains and semi-improved neutral grassland within the southern section of the scheme is listed as coastal and floodplain grazing marsh, this habitat is a habitat of principal importance (HPI) as listed under the Natural Environment and Rural Communities (NERC) Act 2006.

1.1.4. A range of sites, habitats and species were considered in the assessment including:

- Statutory and non-statutory designated sites
- Habitats of Principal Importance;
- Bats;
- Badger;
- Water vole;
- Otter;
- Great crested newt;
- Reptile;
- Breeding birds
- Barn owls;
- Invertebrates;
- Other species of Principal Importance; and
- Fish

1.1.5. Below is a summary of the effects of the Proposed Bypass on ecology and nature conservation during both the construction and operational phase. Table 1 provides further detail.

1.1.6. The assessment concluded that through the construction phase there would be a temporary loss of habitat for a number of protected species which would result in short to medium term negative effects of varying significance, dependent upon the species. However, a number of mitigation and enhancement measures (as detailed in Table 1) will be implemented and it is therefore anticipated that for the majority of habitats and species, significant longer-term residual effects can be avoided. This includes extensive landscaping comprising wet grassland, scrub, hedgerows, trees, wildflower grassland and amenity grassland and the installation of badger crossing points, bat boxes and provision of additional habitat for water voles. The proposed landscaping will provide continuous high-quality habitat and replace areas of arable habitat considered to be of low ecological value, therefore providing improved habitat connectivity for highly-mobile species to the wider landscape.

1.1.7. As a result of extensive landscaping, upon establishment, longer term positive or negligible residual effects are anticipated for all important ecological features (IEF's). The exception to this is barn owl

in which the assessment concluded that through the operational phase despite the mitigation proposed there would be a negative effect upon populations of barn owls significant at the Site scale due to the increased likelihood of collision risk.

Table 1 – Summary of Effects Table for Ecology and Nature Conservation

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Construction Phase				
Statutory designated sites	▪ Habitat degradation	Negligible.	Good practice dust management measures during construction as a matter of best practice.	Negligible.
Non-statutory designated sites	▪ Habitat degradation	Negligible.	Good practice dust management measures during construction as a matter of best practice.	Negligible.
Coastal and Floodplain Grazing Marsh	▪ Habitat loss ▪ Habitat degradation	Short-term permanent negative effect significant at the Local scale.	Works within this area kept to a minimum, with all retained habitat to be fenced. Good practice pollution prevention measures, outlined within a Construction Environment Management Plan (CEMP).	Short term residual negative effect significant at the Site level.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Deciduous Woodland	▪ Habitat loss ▪ Habitat degradation	Short-term permanent negative effect significant at the Local scale.	All retained woodland and trees will be protected in accordance with British Standard BS5837:2012 Trees in Relation to Construction. Good practice dust management measures during construction as a matter of best practice outlined in a CEMP.	Short term residual negative effect significant at the Site level
Hedgerows	▪ Habitat loss ▪ Habitat degradation	Short-term permanent negative effect significant at the Site scale.	All retained hedgerow and trees will be protected in accordance with British Standard BS5837:2012 Trees in Relation to Construction. Good practice dust management measures during construction as a matter of best practice outlined in a CEMP.	Short term residual negative effect significant at the Site level

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Rivers and Streams	▪ Habitat loss ▪ Habitat degradation	Short-term temporary or permanent negative effect significant at District scale.	Good practice pollution prevention measures will be implemented, and works will be avoided within the vicinity of watercourses as far as possible, with precautions taken to minimise the likelihood of pollutants entering the watercourse. All measured outlined in a CEMP.	Short term residual negative effect significant at the Site level

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Bats (Roosting)	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Short-term temporary and permanent, direct negative effects significant at the Local scale.	Retention of the confirmed bat roost, with a 20m buffer zone set up around this tree. Undertake updated surveys to ensure that mitigation is appropriate and based on information current at the time of works. Providing new roosting opportunities in the form of bat boxes installed on retained mature trees in suitable locations to replace the number of potential roosting features (PRFs) lost, with additional PRFs provided as an enhancement measure.	Negligible
Bats (Commuting and foraging)	▪ Habitat loss ▪ Habitat degradation	Short-term temporary and permanent, negative effects significant up to the District level.	Minimise construction phase lighting and implement good practice measures to reduce noise, dust and vibration. Installation of protective fencing around retained trees in line with BS5837:2012.	Short term temporary and permanent direct negative effects significant up to the Local scale.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Badger	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Short-term temporary and permanent, negative effects significant at the Local scale.	Updated surveys to monitor the use of the two setts to be impacted by the works. If setts are found to be in current use, a licence from Natural England will be applied for to enable the closure of any active setts. All significant, deep excavations are to be covered/fenced to prevent access by animals. Unfenced excavations are to be fitted with a ramp / shallow side to permit egress. Other fencing used on site will be designed to allow badgers to pass under / around. Implement good practice measures to reduce noise during construction and night works will be avoided where possible to avoid disturbance through the use of artificial lighting.	Short term temporary and permanent, indirect negative effects significant at the Site scale.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Water vole	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Short-term temporary or permanent direct negative effect significant at the Local scale.	Displacement of water voles under direct supervision of an ecologist holding a Natural England Class Licence for the 'Intentional disturbance of water voles and damage/destruction of water vole burrows by means of 'Displacement' between 15th February to 15th April in suitable weather conditions. After this time, the habitat will be kept unsuitable for water vole until such a time that all piling works have been completed to ensure water vole are not disturbed as a result of construction works. Creation of a new water treatment pond and connecting ditch to provide new habitat for water voles. Good practice pollution prevention measures to be implemented.	Negligible.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Otter	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Precautionary assessment of a short-term temporary, negative effect at Site scale.	Good practice pollution prevention measures to be implemented.	Negligible.
Reptiles	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Short-term temporary, direct negative effects significant at the Site scale.	Habitat clearance to take place in two stages, outside of the hibernation season (indicatively November – February) and supervised by an ecologist. Temporary exclusion fencing should be installed around areas to be affected by the construction works to prevent animals colonising the construction zone.	Temporary, short term negative effects significant at the Site scale.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Breeding birds (Excluding Barn Owl)	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Short-term temporary, direct and indirect negative effects significant at the Local scale.	Site clearance works will be undertaken outside of the bird nesting season (March to August inclusive). If this is not possible, Site clearance will proceed under the supervision of a suitably qualified ecologist in accordance with a precautionary working method statement and may require the installation of exclusion zones so as not to disturb Schedule 1 species. Installation of protective fencing around retained trees and scrub in line with BS5837:2012.	Short term temporary direct and indirect negative effects upon the breeding bird assemblage significant at the Site scale.
Barn owl	▪ Habitat degradation	Short-term temporary indirect negative effects significant at the Site scale.	Minimise construction phase lighting and implement good practice measures to reduce noise, dust and vibration. Avoid night-time works.	Short-term temporary residual negative effect significant at the Site level.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Invertebrates	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Medium-term temporary, direct negative effects upon invertebrate populations significant at the Site scale.	Implement good practice pollution prevention measures. Appropriate management regime of the coastal and floodplain grazing marsh habitat.	Negligible.
Fish (European Eel)	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Short-term temporary, direct negative effects upon European eel populations significant at the Site scale.	Piling works and culvert construction to be timed to avoid the key migration period (late spring / early summer). Where this is not possible, other mitigation measures such as the use of sensitive piling methods should be discussed and agreed with the Environment Agency. Good practice pollution prevention measures to be implemented.	Long term permanent positive effect significant at the Site level.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Other Species of Principal Importance (SPI) (common toad, hedgehog, brown hare and harvest mouse)	▪ Direct loss ▪ Habitat loss ▪ Habitat degradation	Short-term temporary, direct and indirect negative effects at the Site scale.	Measures set out with regards to sensitive habitat clearance for reptiles and breeding birds will also mitigate effects upon these species.	Short term temporary, direct negative effects significant at the Site scale.
Operational Phase				
Coastal and Floodplain Grazing Marsh	▪ Habitat degradation ▪ Habitat creation	Negligible	No additional mitigation measures.	Negligible
Deciduous Woodland	▪ Habitat degradation ▪ Habitat creation	Negligible	No additional mitigation measures.	Negligible
Hedgerows	▪ Habitat degradation ▪ Habitat creation	Negligible	No additional mitigation measures.	Long-term permanent positive effect significant at the Site scale.
Rivers and Streams	▪ Habitat degradation ▪ Habitat creation	Negligible	No additional mitigation measures.	Negligible

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Bats (roosting)	▪ Habitat degradation ▪ Habitat creation	Long-term positive effect significant at the Site scale	Replace any damaged boxes.	Long-term positive effect significant at the Site scale
Bats (foraging and commuting)	▪ Direct loss ▪ Habitat degradation ▪ Habitat creation	Negligible.	No additional mitigation measures.	Negligible.
Badger	▪ Direct loss ▪ Habitat degradation ▪ Habitat creation	Negligible.	No additional mitigation measures.	Negligible.
Water vole	▪ Habitat creation	Negligible.	Management plan to be produced and followed as part of the pond maintenance regime.	Negligible.
Otter	▪ Habitat creation	Negligible.	No additional mitigation measures.	Negligible.

	Description of Effects	Significance and Nature of Effects Prior to Mitigation/ Enhancement	Summary of Mitigation / Enhancement	Significance and Nature of Effects Following Mitigation / Enhancement (Residual)
Reptiles	▪ Habitat creation	Long-term permanent direct positive effect significant at the Site scale.	No additional mitigation measures.	Long-term permanent direct positive effect significant at the Site scale.
Breeding birds	▪ Habitat creation	Negligible	No additional mitigation measures.	Negligible.
Barn owl	▪ Direct loss	Long-term permanent direct negative effect significant at the Site scale.	Installation of barn owl nest boxes at least 1.5km from the Proposed Bypass.	Long-term permanent direct negative effect on barn owl populations significant at the Site scale.
Invertebrates	▪ Habitat creation	Negligible	No additional mitigation measures.	Negligible.
Fish	▪ Habitat creation	Negligible	No additional mitigation measures.	Negligible
Other Species of Principal Importance (SPI)	▪ Habitat creation	Long-term positive effects significant at the Site Scale.	No additional mitigation measures.	Long-term permanent positive effects significant at the Site Scale.

2. INTRODUCTION

2.1. APPLICATION SITE DESCRIPTION

2.1.1. The Application Site is located across farmland and grazing land between Lyminster village to the west and Poling to the east. South of the Site lies the North Littlehampton development and to the north is the existing A284 and its junction with the A27 Crossbush.

2.1.2. The Site comprises predominantly arable and grazing land and the red line boundary associated with this application encloses an area of approximately 13ha which includes all land required temporarily for site compounds and access in addition to the land required for the bypass. The Site is divided by the Black Ditch, a main river which flows east to west before outfalling into the tidal River Arun.

2.1.3. To the north of Black Ditch lies arable land which is formed of two large fields bordered by mature hedgerows and trees and separated by a Public Right of Way (PROW) Bridleway. A row of mature poplar trees marks the northern limit of the arable land beyond which are fields used for grazing cattle. Brookfield Stream, an ordinary watercourse which flows east to west before outfalling into the tidal River Arun forms the boundary between the cattle field and the private garden which is part of the Brookfield Estate.

2.1.4. South of Black Ditch is grazing land used for horse grazing which is bisected by mature banks of hawthorn and bramble running north-south. To the south of the grazing land, the land rises steeply marking the limit of the Black Ditch floodplain and the start of the North Littlehampton development. The location of the Application Site is shown on the Planning Application Location Plan Red Line Boundary prepared by Capita. Drawing reference A284LY-CAP-HGN-00-DR-C-0143.

2.2. PROPOSED SCHEME DESCRIPTION

2.2.1. The Proposed Bypass will form the northern section of a new north-south road link between the A27 Crossbush Junction and the B2187 East Street / Fitzalan Link Road roundabout in Littlehampton. The northern section is being delivered by West Sussex County Council whilst the southern section is part of a larger private development.

2.2.2. The Proposed Bypass construction extends from a point approximately 600m south of the A27 Crossbush junction. However, the red line boundary extends from a point approximately 400m south of the same junction as this section of the existing A284 is being resurfaced with low noise surfacing as part of the scheme. The Proposed Bypass will then connect to the southern section of the bypass which is being constructed as part of the mixed-use North Littlehampton development to the south.

2.2.3. The Proposed Bypass would comprise a new 7.3m wide carriageway with 1.0m hard strips either side. A 3m wide shared cycleway / footway would run from the northern end of the scheme along the west side of the carriageway to reach a signalised Pegasus crossing. A 2.5m grassed verge would be provided on the opposite side of the carriageway apart from along the length of the viaduct. A T-junction would link the existing A284 to the new road.

2.2.4. The Proposed Bypass would have a speed limit of 50mph reducing to 40mph towards the northern end in order to match the existing 40mph speed limit in this location. At the southern end, the speed limit would reduce to 30mph on the approach to the roundabout which is due to be constructed as part of the Lyminster Bypass (south) works.

2.2.5. From the southern end, the Proposed Bypass would be approximately at grade until it reached the southern limit of the Black Ditch flood plain. From this point, the bypass would be constructed on a 225m long viaduct which would span the entirety of the Black Ditch flood plain. The proposed viaduct would be a piled structure with piers at 20m centres. The surface of the viaduct would sit approximately 4.0 – 4.5m above existing ground level.

2.2.6. Brookfield Stream would be crossed with a replacement enlarged and extended culvert. Surface water run-off from the Proposed Bypass would drain into these two watercourses with attenuation provided to restrict the rate of discharge of the surface water to greenfield run-off rates. South of Black Ditch, cellular storage would be used as attenuation and prior to discharge into Black Ditch, this surface water run-off would pass through a wetland area located to the east of the viaduct. This feature would provide water polishing with the added benefit of encouraging biodiversity. The section of road north of Black Ditch up to the Pegasus crossing would drain into a swale running along the eastern side of the proposed road achieving both attenuation and water quality objectives. From the Pegasus crossing to Brookfield Stream, surface water would discharge to a swale and into a dry balancing pond located to the east of the road prior to draining into the watercourse. Surface water from the section of road north of Brookfield Stream would discharge directly into the watercourse as is the current situation.

2.2.7. Limited street lighting would be required for safety reasons in the vicinity of the junction with the existing A284 and the Pegasus crossing with further lighting along the southern section on the approach to the roundabout constructed as part of the North Littlehampton development.

2.2.8. Ecological mitigation would form part of the scheme with badger crossings, additional water vole habitat, bat and bird boxes.

2.2.9. The scheme would require the removal of some trees but landscaping proposals would form part of the scheme with new trees planted where appropriate and 1,650m of hedging used to delineate field boundaries.

2.2.10. Further details regarding the Proposed Bypass are provided within the associated Planning Statement.

2.3. ECIA OVERVIEW

2.3.1. This report details the outcome of the assessment of likely significant effects arising from the Proposed Bypass upon important ecological features in the context of the Application Site and surrounding area. In particular, it considers the likely effects upon sites designated for their nature conservation value, habitat beyond designated areas of elevated conservation value, and species affected by the Proposed Bypass during both the construction and operational phases. Where appropriate, measures to prevent, minimise or control those effects are presented and residual effects assessed following the adoption of those measures.

2.3.2. This report describes the assessment methodology, the baseline conditions at the Application Site and in the surrounding area, mitigation measures adopted for the purposes of the assessment, a summary of the likely significant effects, the further mitigation measures required to prevent, reduce or offset any significant negative effects, and the likely residual effects after these measures have been employed.

LIMITATIONS AND ASSUMPTIONS

- Any limitations applicable to individual technical surveys are documented within the relevant technical appendices.
- Following consultation with WSCC, it was concluded that an updated Site visit was not necessary in 2018 to confirm that Site conditions remained the same as was recorded during the 2017 surveys. For the purpose of this assessment, we have assumed that Site conditions have remained the same as they were during the baseline surveys (e.g. land is still being grazed). Updated surveys where necessary and detailed within this report will be undertaken prior to construction commencing.
- The results from some of the protected species surveys that have been used to inform this assessment were undertaken more than three years ago, including the reptile, breeding bird and terrestrial invertebrate surveys, with guidance recommending that dedicated site survey information of an age no more than 2-3 years old should be available to inform planning applications (British Standards Institution (2013)). However, this is not considered to be a significant limitation as where possible more up to date habitat information and / or desk study data have been used to inform this impact assessment. Additionally, updated surveys across the whole Application Site and wider Survey Area were undertaken in 2017, in which there were no significant differences in habitats present and current management of the Application Site. Therefore, overall it is considered that sufficient information was available to inform the impact assessment.

3. LEGISLATION, POLICY AND GUIDANCE

3.1. LEGISLATIVE FRAMEWORK

3.1.1. The main wildlife legislation applicable to this assessment is listed below, with more detailed information included in Appendix A:

- The Conservation of Habitats and Species Regulations 2017;
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Countryside and Rights of Way Act 2000 (CRoW);
- Natural Environment and Rural Communities Act 2006 (NERC);
- The Protection of Badgers Act 1992; and
- The Hedgerow Regulations 1997.

3.2. PLANNING POLICY

3.2.1. Applicable planning policy relevant to this report is listed below, with more detailed information provided in Appendix A.

- National Planning Policy Framework (2018); and
- The Arun District Council Local Plan 2011-2031, adopted July 2018.

3.3. IMPACT ASSESSMENT GUIDANCE

3.3.1. This Ecological Impact Assessment (EcIA) has been informed by The Chartered Institute of Ecology and Environmental Management's Guidelines for Ecological Impact Assessment in the United Kingdom (2018) (hereafter the CIEEM Guidelines (2018)).

3.3.2. Baseline surveys completed to inform this assessment have been carried out with regard for good practice guidelines where applicable, and in compliance with the scope agreed with West Sussex County Council (WSCC) who is both the applicant and the Local Planning Authority. References to specific guidelines are contained within the respective technical reports contained in Appendices E-J and noted where applicable in Table 15 (Appendix C). which summarise the ecological baseline surveys completed to inform this assessment.

4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

4.1. INTRODUCTION

4.1.1. This Ecological Impact Assessment (EcIA) has been prepared with reference to CIEEM Guidelines (2018). Each ecological feature has been evaluated within the geographic scale of reference and potential effects during the construction and operational phases of the Proposed Bypass, in the absence of mitigation, assessed. Mitigation measures have then been taken into consideration (in this context to include mitigation and compensatory measures), and residual effects assessed.

4.2. SCOPE OF THE ASSESSMENT

4.2.1. The scope of this report is to consider the likely effects of the Proposed Bypass upon important ecological features (IEF) (habitats, species and ecosystems, including ecosystem function and processes that may be affected, with reference to a geographical context in which they are considered important) within the Application Site and in the wider area (where appropriate) identified during the baseline survey and data collection.

4.2.2. Important ecological features within the following categories are subject to assessment:

- Designated sites and habitats;
- Protected species and species of conservation concern; and
- Habitats of nature conservation value at a Local scale and above.

CONSULTATION UNDERTAKEN TO DATE

4.2.3. Appendix D provides a summary of the consultation activities undertaken in support of the preparation of the report. This includes consultation that was undertaken at an early stage of the project as part of previous design iterations.

EXTENT OF THE STUDY AREA

4.2.4. A Study Area incorporating land up to 500m from the Proposed Bypass was identified to inform the scope and extent of ecological surveys. This maximum extent was selected to ensure robust survey data was collected, particularly for highly mobile species. This Study Area was further refined, as necessary, for each potential ecological feature and the areas surveyed are detailed in Table 3, and in each of the corresponding technical reports (Appendices E-J).

4.2.5. Search radii for the purposes of the ecological desk study are detailed in Table 2 below.

METHOD OF BASELINE DATA COLLECTION

Desk Study

4.2.6. An ecological desk study was initially undertaken in March 2014 (WSP 2014) as part of a Preliminary Ecological Appraisal and updated for the purpose of this EcIA in August 2018 (Appendix B) to collate and review existing information available in the public domain and to obtain information held by relevant third parties. The desk study was completed to obtain existing baseline data; primarily focusing on obtaining records of legally protected species and habitats, species and habitats of conservation concern, and habitat designated for its nature conservation value. The relevant search radii around the Proposed Bypass and data sources are shown in Table 2 below.

Table 2 – Search Radii and Data Sources for Potential Ecological Features

Potential Ecological Feature	Search Radius from Proposed Bypass	Data Source
Designated Sites and Habitats		
European Designated Sites, Special Areas of Conservation (SAC) designated for bat populations	30km	Natural England Corporate datasets, citations and data held by the Joint Nature Conservation Committee (JNCC).
European Designated Sites (SAC, Special Protection Areas (SPA) and Ramsar Sites (wetlands of international importance)).	10km	Natural England Corporate datasets, citations and data held by the Joint Nature Conservation Committee (JNCC).
UK Statutory Designated Sites (Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR, Local Nature Reserves (LNR)).	2km	Natural England Corporate datasets.
Non-statutory Designated Sites Local Wildlife Sites (LWS)	2km	Sussex Biological Records Centre.
Ancient Woodland		Natural England Corporate datasets.
Habitats of Principal Importance (HPI)		Natural England Corporate datasets.
Species		
Protected & Notable Species Records	2km	Sussex Biological Records Centre.
Bat Records	5km	Sussex Biological Records Centre.

Field Surveys

4.2.7. A summary of the ecological surveys and associated Survey Area undertaken to inform this assessment is provided below, with further detail provided in Appendix C. Detailed information including survey conditions, surveyors, methodologies and limitations is included in the dedicated reports (Appendices E-J).

Table 3 – Summary of Ecological Surveys Undertaken

Survey Type	Survey Area	Relevant Appendix / Reference
Extended Phase 1 habitat survey and Preliminary Bat Roost Assessment (PBRA)	250m of the Application Site	Appendix E
Bat	Survey dependent, up to 250m from the Application Site	Appendices F-G

Survey Type	Survey Area	Relevant Appendix / Reference
Badger	250m of the Application Site	Appendix H
Water vole	250m of the Application Site	Appendix I
Otter	250m of the Application Site	Appendix I
Reptile	Application Site	Barry Kemp Conservation Ltd (2015a)
Great crested newt	500m from Application Site	Appendix J
Breeding bird	Up to 250m from the Application Site	Barry Kemp Conservation Ltd (2015b)
Barn owl	Up to 250m from the Application Site	Barry Kemp Conservation Ltd (2015c)
Invertebrate	Application Site	Edwards Ecological Services Ltd (2015)
Botanical	Application Site (south of the Black Ditch only)	Dolphin Ecological Surveys (2015)

SCOPING AND EVALUATION OF ECOLOGICAL FEATURES

4.2.8. The results from the above baseline surveys undertaken were used in conjunction with information on the Proposed Bypass design to assess the likely significant ecological effects that the Proposed Bypass could have during both the construction and operational phases.

4.2.9. In order to assess the potential significance of effects resulting from the Proposed Bypass, the value of the IEF is first determined with reference to a defined geographical scale (recommended in good practice (CIEEM 2018)), and extended to include the 'Site'**:**

- International (i.e. Europe);
- National (i.e. the UK);
- Regional (i.e. South-East England);
- County (i.e. West Sussex);
- District (i.e. Arun);
- Local (i.e. within Lyminster); and
- Site (i.e. within the Proposed Bypass Boundary).

4.2.10. In addition, in order to distinguish between habitats and species that are of value and/or relevance at the Site scale and those that have negligible value at any scale (i.e. of conservation value at a scale below Site), the latter have been assigned to be of negligible value.

4.2.11. A number of characteristics are considered to contribute to the importance of ecological features, including for example (but not exclusively) the rarity of a species or habitat, habitat diversity, whether the species population size is notable in a wider context, rich assemblages of plants and animals

and species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change.

4.2.12. IEFs have been scoped in to the assessment if effects could be significant at Site scale or above (in accordance with the geographic scale of reference) or if effects have legal implications.

CHARACTERISING THE POTENTIAL EFFECT

4.2.13. Based on an understanding of the baseline conditions and of the Proposed Bypass, potential effects on IEF scoped into the assessment have been considered, taking into account construction (to include site preparation) and operational phases. Effects have been assessed against baseline conditions and have been characterised with reference to ecological structure and function of the feature in question, for instance the fragility/stability of an ecosystem and its connectivity to other features or resources.

4.2.14. Ecological effects are described in terms of relevant characteristics, as identified in good practice guidelines (CIEEM 2018) including:

- whether the effect is positive or negative;
- the extent (area) which would be affected;
- the magnitude (size, amount, intensity or volume) of the effect;
- the duration[1] (short term, medium term, long term and permanent or temporary) of anticipated change and consequently resulting effects;
- whether the effect is reversible (i.e. whether recovery from the effect is possible within a reasonable timescale); and
- the timing and frequency of change as a consequence of the Proposed Bypass.

ASSIGNING SIGNIFICANCE

4.2.15. The geographical scale of significance has been used as specified within good practice guidelines (CIEEM 2018) both to evaluate the ecological feature and to assess the scale at which an effect is significant. An ecologically significant effect is defined as an effect that either supports or undermines biodiversity conservation objectives for 'IEFs' or for biodiversity in general[2].

4.2.16. The significance of effects upon IEFs is determined considering their value at a geographic scale (as noted above); however, any given effect may be significant at a reduced scale depending on the extent and magnitude of the effect. For example, although a habitat type may represent 20% of the resource at a County level and hence be considered of value at this scale, the proposed works might affect only a portion of the habitat representing 1% of the resource in the County hence the effect would not be considered significant at this scale. However, that 1% may represent 20% of the

[1] Good practice guidelines (CIEEM 2018) advise the duration of an effect should be defined with regard to the ecological characteristics of the feature affected. Consequently, what is considered short term, medium term or long term can vary depending on the feature affected; therefore, the meaning of these terms will be defined within the assessment text where used.

[2] CIEEM (2018) p24.

resource at a Local scale and therefore the effect at this geographic scale would be considered significant.

5. BASELINE CONDITIONS

5.1. SITE DESCRIPTION

5.1.1. The Application Site predominantly comprises fields of arable, improved grassland and semi-improved neutral grassland. Smaller areas of amenity grassland, broadleaved plantation and semi-natural woodland are present within the northern areas and a network of drainage ditches bordered by continuous scrub is present within the south. Two main watercourses traverse the Site, namely Black Ditch in the south and Brookfield Stream in the north. The majority of the fields are bordered by intact or defunct species-poor hedgerows. An area of swamp is present in the south, amongst the mosaic of small drains and semi-improved neutral grassland (south of Black Ditch).

5.2. HABITATS (OFF SITE)

DESIGNATED SITES

5.2.1. There are no statutory or non-statutory designated sites within the Site boundary. The following sites designated for their nature conservation interest are identified within the desk study area (30km for SACs designated for bat populations, 10km for internationally designated sites, 2km for national and local sites). A summary for each site is provided below, with locations shown on Figures 1-3. Further details are provided in Appendix B:

- The Mens SAC lies approximately 16.9km to the north of the Application Site. Barbastelle is an Annex II species that is a qualifying feature but not a primary reason for site selection.
- Singleton and Cocking Tunnels SAC lies approximately 18km north west of the Application Site. Populations of barbastelle (*Barbastella barbastellus*) and Bechstein's bat (*Myotis bechsteinii*) are Annex II species that are a qualifying feature but not a primary reason for site selection.
- Ebernoe Common SAC lies approximately 21.1km to the north of the Application Site. Barbastelle and Bechstein's bat are both Annex II species and the primary reason for site selection.
- Arun Valley SPA, SAC and Ramsar lies within 8.9km of the Application Site – designated for over-wintering population of Bewick's swans *Cygnus columbianus bewickii*, population of Ramshorn snail *Anisus vorticulus* and the area is of outstanding ornithological importance notably for wintering wildfowl and breeding waders, including Eurasian wigeon *Anas penelope*, Eurasian teal *Anas crecca*, Northern shoveler *Anas clypeata* and Ruff *Philomachus pugnax*;
- Duncton to Bignor Escarpment SAC lies within 9.8km of the Site – designated as the site supports Asperulo-Fagetum beech forests;
- Arun Valley, Watersfield to Arundel LWS lies within 1.7km of the Site – supporting a section of the River Arun forming an extensive tract of wetland; and
- Poling Copse LWS lies within 1.5km of the Site and supports ancient semi-natural woodland.

5.2.2. Two Notable Road Verges, A259 Eldon Way and Warningcamp Lane, are located 1.5km and 1.8km from the Site respectively.

ANCIENT WOODLAND AND HABITATS OF PRINCIPAL IMPORTANCE (HPI)

5.2.3. Seven parcels of ancient woodland are located within 2km of the Site. The closest of these, Stubbs Copse, is located 824m north east. Several parcels of HPI fall within the Application Site and are discussed in Section 5.3 below. Additionally, reedbed (650m north-west) and intertidal mudflat (1.8km north-west), which are both HPI, are present within 2km of the Proposed Bypass.

5.3. HABITATS (ON SITE)

HABITATS OF PRINCIPAL IMPORTANCE (HPI)

5.3.1. The Application Site has been identified to contain an area of Coastal and Floodplain Grazing Marsh (a large area, totalling 2.10ha located directly south of Black Ditch and the Brookfield Stream) deciduous woodland, comprising an area of 0.77ha, species-poor hedgerow (approximately 150m in length) and rivers and streams (Black Ditch and Brookfield Stream) which are listed as HPI under the NERC Act 2006. Given the widespread nature of these habitats within the local area, these habitats are considered to be of value at up to the Local conservation value, with the exception of Black Ditch and Brookfield Stream which are considered to be of value up to the District conservation value.

PHASE 1 HABITATS

5.3.2. The Extended Phase 1 Habitat Survey map is shown on Figure 3 and within the Phase 1 Habitat Survey and Preliminary Bat Roost Assessment Report (Appendix E).

5.3.3. A species list of plants identified during the field survey is also provided in Appendix E.

5.3.4. The following Phase 1 habitat types were recorded within the Application Site and wider Survey Area (250m buffer) during the field survey undertaken in 2017 as detailed in Table 4.

Table 4 – Habitats Recorded Within the Application Site and 250m Buffer

Phase 1 Habitat Type (JNCC codes in parenthesis)	Area (ha)	Length (m)	Description
Broadleaved semi-natural woodland (A1.1.1)	0.3	N/A	There are two small parcels of semi-natural broadleaved woodland in the north-west of the Survey Area. BW1, located in the corner of a field, is formed of mature oak *Quercus robur* and beech *Fagus sylvatica* trees and includes a dense scrubby understorey. BW2 is located adjacent to the west of the A284 and includes mature oak trees in the canopy layer growing over a relatively sparse shrub layer that includes holly *Ilex aquifolium*, hawthorn *Crataegus monogyna* and elder *Sambucus nigra*. The ground layer is dominated by ivy *Hedera helix* and bramble *Rubus fruitcosus* agg.

Phase 1 Habitat Type (JNCC codes in parenthesis)	Area (ha)	Length (m)	Description
Broadleaved plantation woodland (A1.1.2)	2.5	N/A	Five parcels of plantation broadleaved woodland occur within the Survey Area. PBW1 is located immediately east of the A284 road in the north of the Survey Area. The woodland includes trees of varying ages and contains several large mature specimens including poplar *Poplus* sp., lime *Tilia* sp., yew *Taxus baccata* and horse chestnut *Aesculus hippocastanum.* PBW2 comprises an area of woodland formed of semi-mature trees, with stem diameters generally of approximately 30cm. A small number of mature poplar and oak trees occur within this woodland. PBW3 comprises an area south of the lake in the north of the Survey Area (SW2) and is dominated by semi-mature willow trees alongside dense bramble scrub. PBW4 is located east of the lake (SW1). Young holm oak *Quercus ilex* dominates on the eastern side of the woodland with a dense stand of dense bamboo Bambusoideae sp. to the south of the parcel. Mature trees including oak, beech and horse chestnut occur to the east of the parcel. PBW5 comprises a small area of woodland adjacent to the A284 in the centre of the Survey Area that is dominated by multi-stemmed sycamore *Acer psuedoplantanus* trees. Also present are elder and holly in the understorey and snow drops in the ground layer.
Mixed plantation woodland (A1.3.2)	0.08	N/A	A single parcel of mixed plantation woodland occurs to the south of the A284 road that comprises semi mature trees including ash Fraxinus exelsior and silver birch Betula pendula in addition to two pine Pinus sp. trees.
Dense scrub (A2.1)	1.1	N/A	To the south of Black Ditch areas of dense scrub (DS1-8) run along many of the transverse ditches, these may previously have formed hedgerows but now form broad bands of dense scrub. These areas tend to be dominated by blackthorn *Prunus spinosa* and hawthorn. A broad belt of dense scrub of similar species composition also runs

Phase 1 Habitat Type (JNCC codes in parenthesis)	Area (ha)	Length (m)	Description
			along the embankment that forms the southern boundary of the floodplain.
Semi-improved neutral grassland (B2.2)	10.2	N/A	Eleven parcels of semi-improved neutral grassland are located in the south of the Survey Area (SNG1-11). SNG1, located north of Black Ditch, and SNG2-4 located south east of Black Ditch have coarse, unmanaged swards and appear not to be in routine management. SNG5-6 and SNG8-11 are closely grazed by horses.
Poor semi-improved grassland with tall ruderal vegetation and scattered scrub (B6/C3.3.1/A2.2)	0.5	N/A	The top of the embankment in the south of the Survey Area immediately north of the construction site comprises a recently disturbed habitat type containing a range of vegetation, which has been described as a mosaic of tall ruderal vegetation with semi-improved grassland and scattered scrub. Species include a range of ruderal species such as nettle, fleabane, and bristly ox-tongue *Helminthotheca echioides* alongside coarse grassland and scattered scrub that includes bramble, buddleia *Buddleja davidii* and Japanese knotweed *Fallopia japonica*.
Improved grassland (B4)	16.0	N/A	Eleven parcels of improved pasture occur across the north of the Survey Area (I1-11). The fields all have low sward heights and are dominated by perennial rye-grass. At the time of survey this was sheep grazed to the west of the A284 and cattle grazed to the east.
Tall ruderal (C3.1)	0.04	N/A	Tall ruderal vegetation is found within the verges of the A284 which is dominated by nettles.
Swamp (F.1)	0.5	N/A	One area of swamp was recorded in the southern section of the Survey Area (SP1); the land in this area is dominated by common reed *Phragmites australis*
Standing water (G1)	0.3	0.9	Standing water bodies were mapped within the Survey Area (SW1-SW10). SW1 is a large ornamental pond in the north of the Survey Area. SW3-5 comprise ditches to the margins of fields in the north of the Survey Area that contain small amounts of water alongside emergent vegetation to the margins.

Phase 1 Habitat Type (JNCC codes in parenthesis)	Area (ha)	Length (m)	Description
			SW6-10 comprise ditches separating pastures that lie perpendicular to Black Ditch that contain very little standing water and are densely overgrown by scrub.
Running water (G2)	N/A	1.1	Two areas of running water are present within the Survey Area comprising black ditch and Brookfield Stream.
Arable (J1.1)	18.7	N/A	Two large arable fields dominate the centre of the Survey Area.
Amenity grassland (J.1.2)	2.2	N/A	Mown amenity grassland is present within the northern section of the Survey Area, alongside planted trees.
Species-poor intact hedgerow (J2.1.2)	N/A	1.4	Species poor intact hedgerows are present along some field boundaries within the north of the Survey Area. These are generally dominated by hawthorn, around 2-3m high and show signs of management by flailing.
Species-poor defunct hedge (J2.2.2)	N/A	0.5	
Dry ditch (J.2.6)	N/A	0.9	Dry ditches occur to the south east and north east of the Survey Area and include ditches that appear to hold water infrequently or never.
Bare ground (J.4)	11.9	N/A	An extensive area in the south of the Survey Area is an active construction site where habitats had recently been cleared.
Other, including non-surveyed land (residential properties etc)	4.6	N/A	Buildings and hard standing occur within the Survey Area. Residential properties and associated grounds were generally excluded from the survey.

5.3.5. Of the habitats recorded within the Survey Area, Table 5 identifies those located within the Application Site details their conservation value.

Table 5 – Habitats Recorded Within the Application Site

Phase 1 Habitat Type	Area (ha)	Length (m)	Conservation Value	Rationale
Broadleaved semi-natural woodland (A1.1.1)	<0.01	N/A	-	Evaluated as part of the deciduous woodland HPI

Phase 1 Habitat Type	Area (ha)	Length (m)	Conservation Value	Rationale
Broadleaved plantation woodland (A1.1.2)	0.77	N/A	-	Evaluated as part of the deciduous woodland HPI
Dense scrub (A2.1)	0.15	N/A	Site	Common habitat type, widespread in the local area.
Semi-improved neutral grassland (B2.2)	1.48	N/A	-	Evaluated as part of the coastal and floodplain grazing marsh
Poor semi-improved grassland with tall ruderal vegetation and scattered scrub (B6/C3.3.1/A2.2)	0.19	N/A	Site	A mosaic of common habitat types widespread in the local area
Improved grassland (B4)	0.58	N/A	Site	Common habitat type, widespread in the local area
Tall ruderal (C3.1)	0.19	N/A	Site	Common habitat type, widespread in the local area
Standing water (G1)	<0.01	N/A	-	Assessed as part of the coastal and floodplain grazing marsh HPI
Running water (G2)	N/A	522.99	-	Assessed as part of the rivers and streams HPI
Arable (J1.1)	2.51	N/A	Site	Widespread common habitat with low ecological value
Amenity grassland (J.1.2)	<0.01	N/A	Negligible	Common habitat type with negligible ecological value
Species-poor intact hedgerow (J2.1.2)	N/A	94.93	-	Assessed as part of the hedgerow HPI.
Species-poor defunct hedge (J2.2.2)	N/A	205.90	-	Assessed as part of the hedgerow HPI.
Dry ditch (J.2.6)	N/A	59.27	-	Assessed as part of the coastal and floodplain grazing marsh HPI
Bare ground (J.4)	0.15	N/A	Negligible	Habitat of negligible ecological value

Phase 1 Habitat Type	Area (ha)	Length (m)	Conservation Value	Rationale
Other	0.38	N/A	Negligible	Habitat of negligible ecological value

5.3.6. The mosaic of habitats within the south of the Application Site comprising semi-improved neutral grassland, drains (recorded as standing water and dense scrub), running water and swamp are identified as a HPI: Coastal and Floodplain Grazing Marsh is considered to be of value in supporting a number of notable species. However, the botanical survey that was undertaken reported that the current management regime of grazing is having an adverse effect on the botanical value of the grassland.

INVASIVE SPECIES

5.3.7. Japanese knotweed is present in two areas, along a bund within the southern plantation woodland on the eastern side of the A284 Lyminster Road to the north of the Application Site and to the south of the Application Site advancement to the North Littlehampton development. This species is listed on Schedule 9 of the WCA in which it is an offence to cause it to spread in the wild. The Proposed Bypass may lead to the spread of this species in the absence of appropriate control measures, therefore due to associated legal implications, effects in relation to Japanese knotweed are considered as part of the assessment.

5.4. PROTECTED/NOTABLE SPECIES

5.4.1. A summary of records of protected / notable bat species within 5km and all other protected / notable species (excluding birds) recorded within 2km is provided in Appendix B. It should be noted that the absence of records does not provide confirmation that a species is absent from the search area.

5.4.2. Dedicated species surveys for the Site (and relevant surrounding habitat, where accessible and appropriate for the survey type) have been completed for the following species groups initially in 2014/2015, with some of these surveys updated in 2017; bat, badger, GCN, water vole, otter, reptile, invertebrates, breeding birds, barn owl and botanical surveys. This information has been utilised to inform their associated baseline assessments.

5.4.3. For notable/protected species not listed above, a level of baseline information has been interpreted from the results of the Extended Phase 1 habitat survey and the desk study. These provide information on the suitability of habitats on the Site to support these species, incidental sightings, anecdotal evidence and historic records from the area.

BATS

Roosting

5.4.4. Individual trees and parcels of woodland within the Survey Area have been assessed during the Extended Phase 1 habitat survey undertaken in February 2017 for their potential to support roosting

bats; as shown on Figure 4 and within the Phase 1 Habitat Survey and Preliminary Bat Roost Assessment Report, Appendix E. In summary[3]:

- 46 trees and tree groups with low potential to support roosting bats;
- 26 trees with moderate potential to support roosting bats (T1a, T7, T10c, T13a, T17a-b, T18a-b, T19a, T20a, T32a, T32d-f, T32h-i, T33, T37a-c, T39a, T41, T44a, T46b, T50 and T66a); and
- Five trees with high potential to support roosting bats (T3, T10d-e, T19d and T24).

5.4.5. Those trees assessed with having moderate or high potential to support roosting bats within 50m of the Proposed Bypass were then subject to an at-height Potential Roost Feature (PRF). Further details of which are provided within Appendix F and Table 6 below. Trees that remained with a moderate or high potential were subject to a further at-height inspection or emergence/re-entry survey, further details are provided in Appendix F.

Table 6 – Results of the At-Height Inspection

Tree Number (Ecology)	Tree number (Arboriculture)[4]	Potential following an at-Height Inspection
T1a	Within G8	Moderate
T3	T11	Moderate
T5	T36	Negligible
T17a	Within G5	Low
T17b	Within G5	Moderate
T18a	Within G5	Moderate
T32a	N/A	Low
T32d	N/A	High
T32e	N/A	Low
T32f	N/A	Moderate
T32h	N/A	High
T32i	N/A	High
T39a	T66	Low

[3] Please note, the following tree numbers listed follow those recorded as part of the Ecology Surveys and differ from those recorded as part of the arboricultural survey.

[4] N/A refers to trees that were not assessed as part of the arboricultural assessment.

Tree Number (Ecology)	Tree number (Arboriculture)[4]	Potential following an at-Height Inspection
T41	T69	High
T44a	T73	Confirmed - Single roosting Natterer's bat (*Myotis nattereri)* observed (species confirmed via DNA analysis of droppings collected)
T46b	T78	Low
T50	T79	Moderate

5.4.6. It is acknowledged that tree roosting species frequently switch roosts and that evidence of roosting does not persist for long periods of time. Therefore, whilst the survey effort employed is in-line with industry guidance and considered to be sufficient to inform an assessment of impacts of the Proposed Bypass, there remains the possibility that bat roosts within the surveyed trees may have not been recorded, and that these could include rarer species. Given the spread of survey dates however, it is considered unlikely that a maternity colony occurs in these trees, as evidence would likely have been present. Therefore, a precautionary assessment would be that the day roosts (or possibly hibernation roosts, considered to be reasonably unlikely based on PRFs encountered) may occur in these trees. Overall, the roosting resource of the surveyed trees is assessed to be of value at up to District level, on a precautionary basis, although on the basis of the identified roost alone, the value would be lower.

Foraging and Commuting

5.4.7. A combination of walked-transects, static monitoring and hop-over bat surveys were undertaken as detailed in Appendix G. At least nine species of bat were recorded using the Survey Area as a foraging and commuting resource, with the main areas of bat activity within the Survey Area including:

- The pond in the north of the Survey Area;
- The woodland parcel and associated linear features in the north of the Survey Area;
- Lyminster Road (A284); and
- The treeline along the southern boundary of the Survey Area.

5.4.8. The overall assemblage of bats recorded within the Survey Area is regarded to be of conservation value at up to a District scale given the variety of species recorded and presence of rarer species (including the rarer barbastelle bat) see Table 7 below.

5.4.9. The assemblage of bat species recorded is unsurprising given the range of habitats present within and adjacent to the Survey Area (semi-improved grassland, established hedgerows (used as commuting corridors), woodland and nearby riparian habitats). The lack of artificial lighting and combination of woodland, scrub and hedgerow habitats, particularly in the northern sections of the Survey Area, also provides suitable conditions to support a range of foraging and commuting bats. The basis for this evaluation is due to the relatively high levels of activity and diversity of bats

recorded but is limited due to the prevalence of common species (with scarce, uncommon or rare species being generally infrequent with the exception of noctule which was regularly recorded).

Table 7 – Evaluation of Importance of Survey Area to Bat Species Recorded

Species	UK Status[5]	County Status[6]	Est. UK Pop[7]	Relative Frequency in the Survey Area	Likely Value of Survey Area to Populations of Bat Species
Barbastelle	Rare	Very rare, widespread	5,000	Infrequent	District
Brown long-eared	Common	Relatively abundant, widespread	245,000	Infrequent	Site
Daubenton's	Common	Fairly abundant, widespread	560,000	Regular	Local
Natterer's bat	Uncommon (but widespread)	Scarce, widespread	148,000	Very Infrequent	Site
Whiskered/Brandt's	Uncommon (but widespread)	Scarce, widespread	64,000/30,000	Very Infrequent	Site
Alcathoe whiskered bat	Very rare only recently recognised in the UK	Very rare-hardly known	Unknown	Very infrequent	Site
Noctule	Uncommon	Uncommon, widespread	50,000	Regular	Local
Leisler's	Scarce	Rarely recorded	10,000	Very infrequent	Site
Serotine	Uncommon	Uncommon, widespread	15,000	Infrequent	Local
Nathusius' pipistrelle	Rare (but widespread)	Scarce, widespread	16,000	Infrequent	Local

[5] UK Status is based on the National Bat Monitoring Programme (NBMP) Population Trends 2012 (BCT, 2015)

[6] County Status based on data held on the Sussex Bat Group website: http://www.sussexbatgroup.org.uk/batsinsussex

[7] Estimated UK Population based on Battersby (2005) or Harris *et al* (1995)

Species	UK Status[5]	County Status[6]	Est. UK Pop[7]	Relative Frequency in the Survey Area	Likely Value of Survey Area to Populations of Bat Species
Common pipistrelle	Common	Abundant, widespread	2.43 million	Very frequent	Local
Soprano pipistrelle	Common	Fairly common, widespread	1.3 million	Very frequent	Local

BADGER

5.4.10. Six badger setts were identified within the Survey Area (Setts 1-3, Setts 4a-b and Sett 5, see Appendix H) along with a number of signs including latrines, snuffle holes, tracks and pathways.

5.4.11. Two setts (4a-4b) are located within the southern part of the Application Site. Sett 4a was considered to comprise two disused entrances and Sett 4b one disused entrance, with no evidence of current use by badger recorded.

5.4.12. Setts 1-3 was considered likely to comprise a main sett (Sett 3) and associated annex setts (Setts 1-2) located in the northern part of the Survey Area, over 100m from the Application Site. Sett 1 and 3 were both active, whilst Sett 2 was considered to be inactive. Sett 5 had one entrance and was an active outlier sett.

5.4.13. Badgers are widespread within Sussex and southern England and are afforded legal protection for reasons of animal cruelty, not rarity. Therefore, the wider Survey Area is considered of Local conservation value for badgers with the Application Site being of conservation value at the Site level only.

WATER VOLE

5.4.14. Water vole surveys were undertaken of all suitable and accessible habitat within a minimum of 250m of the Proposed Bypass. The presence of water vole was confirmed at the Black Ditch to the south of the Survey Area, Brookfield Stream and Pond 1 both to the north of the Survey Area. The transverse ditches running south from Black Ditch are largely sub-optimal for water vole due to dense scrub cover and shallow water depth, with several likely dry or purely damp in summer.

5.4.15. Water voles have experienced one of the fastest declines of any native mammal in recent years with populations in Sussex estimated to have reduced by 90% over the past 30 years (Sussex Wildlife Trust, 2018). Based on this and the presence of water voles within the Survey Area, and the suitability of the Black Ditch and Brookfield Stream for foraging and burrowing purposes, the water vole population utilising the Site is of value at the District Level.

OTTER

5.4.16. The Black Ditch and Brookfield Stream provide suitable foraging and commuting habitat for otter, comprising slow flowing watercourses with riparian marginal vegetation. No evidence of otter was identified during the 2015 or 2017 water vole surveys.

5.4.17. Although no evidence of otter has been recorded within the Survey Area, they have been recorded as present along the River Arun, to the west of the Application Site and links to the Black Ditch.

Otters are known to have a large home range. Internationally, the otter is listed as being near threatened on the International Union for Conservations of Nature and Natural Resources (IUCN) Red List due to its ongoing population decline. Based on the above as the area around the Black Ditch and the Brookfield Stream offers foraging and commuting habitat for otter, and the high conservation status afforded to otter, a precautionary value of the Site for otter populations is considered to have value up to District level.

GREAT CRESTED NEWT

5.4.18. Six waterbodies (1, 1a, 2, 3, 11a and 11b, see Appendix J) present within a 500m radius of the Site were found to provide potentially suitable aquatic habitat for great crested newt (GCN). Of these six waterbodies, two (2 and 11a) were found to have average suitability, with the remaining four waterbodies (1, 1a, 3 and 11b) found to have poor suitability for GCN. Five of these waterbodies were then subject to an eDNA survey which detected the presence of GCN in waterbody 2, approximately 450m from the Application Site.

5.4.19. As great crested newts are most likely to use the terrestrial habitat within 250m of the breeding pond, it is considered unlikely that the population associated with waterbody 2 is dependent upon habitat within the Application Site. Whilst considered unlikely, there is a low potential that individuals may occasionally access terrestrial habitat at a greater distance than 500m including habitat within the Application Site. Sussex is considered to be a stronghold for GCN populations in the UK, but populations are patchily distributed (Sussex Wildlife Trust, 2017)) As such, the Site is regarded to be of conservation value at the Site level.

REPTILES

5.4.20. Reptile surveys were undertaken of approximately 3.3ha of suitable habitat within the Survey Area. During these surveys, slow worm *Anguis fragilis* and grass snake [8]*Natrix helvetica Helvetica* were recorded in the area to the south of the Black Ditch, with low populations of both species recorded.

5.4.21. Due to the presence of a small population of slow worm and grass snake which are both widespread species and the limited suitable habitat present, the value of the Site for reptile populations is considered to be of Site value.

BREEDING BIRDS

5.4.22. A total of 63 species were recorded within or over the Survey Area during the breeding bird surveys completed in 2015. Of these, 36 were recorded as breeding or exhibiting breeding behaviour within or immediately adjacent to the Site and as such, the Site is considered integral to the breeding success of those birds.

5.4.23. Of the species recorded, the number within each conservation category is listed below. It should be noted that categories are not exclusive and therefore a species can be listed in more than one

[8] formally classified as *Natrix natrix* and is still referred to this in current legislation protecting this species.

conservation category (for example listed as both a SPI and as either a red or amber list Birds of Conservation Concern (BoCC).

- Two species, Cetti's warbler *Cettia cetti* and Mediterranean gull *Laius melanocephalus* listed on Schedule 1 of the Wildlife and Countryside Act 1981) were recorded, with Cetti's warbler confirmed as a breeding or possible breeding species within the Survey Area.
- Twelve species listed as SPI (also UKBAP species) were recorded of which seven species, comprising grey partridge *Perdix perdic,* skylark *Alauda arvensis*, song thrush *Turdus philomelos*, dunnock *Prunella modularis*, linnet *Carduelis cannabina*, bullfinch *Pyrrhula pyrrhula* and yellowhammer *Emberiza citronella*, were confirmed or possible breeders within the Survey Area whilst five SPI, herring gull *Larus argentatus, cuckoo Cuculus canorus*, starling *Sturnus vulgaris*, spotted flycatcher *Muscicapa striata* and house sparrow *Passer domesticus* were not considered to breed within the Survey Area.
- Ten BoCC red list species were recorded of which five (grey partridge, skylark, song thrush, linnet and yellowhammer) were confirmed or possible breeders within the Survey Area. Five red list species, (herring gull, cuckoo, starling, spotted flycatcher and house sparrow) were considered not to breed within the Survey Area.
- Twelve BoCC amber list species were recorded. Six (mallard *anas platyrhynchos*, tufted duck *Aythya fuligula*, swallow *Hirundo rustica,* mistle thrush *Turdus viscivorus,* dunnock and bullfinch) were confirmed, or possible breeders with the Survey Area, whilst six (kestrel *Falco tinnunculus*, black-headed gull.
- *Chroicocephalus ridibundus,* Mediterranean gull, swift *Apus apus,* green woodpecker *Picus viridis* and willow warbler *Phylloscopus trochilus*) were not considered to breed within the Survey Area.

5.4.24. The day time inspection found no evidence of barn owls nesting along the proposed bypass route. This was supported by two nocturnal surveys. During one of the surveys a barn owl was observed hunting along the Black Ditch and then later towards the north of the Survey Area carrying an item of prey. On both observations, the flight path crossed the route of the Proposed Bypass. Additionally, during the bat surveys undertaken in 2017, barn owl were regularly recorded foraging across the route of the Proposed Bypass.

5.4.25. The breeding bird community within the Survey Area is considered of District conservation value as although typical for the habitats present, a number of species of considerable conservation concern within the county, including Cetti's warbler and skylark which utilise these habitats for breeding were observed, as well as numerous commoner species.

INVERTEBRATES

5.4.26. The Extended Phase 1 habitat survey identified the majority of habitats present within the Site to be relatively common and widespread, such as dense scrub, improved pasture and plantation woodland, and concluded that these habitats would be unlikely to support invertebrate populations of conservation interest. However, the neutral grassland and associated wet and dry ditch network around Black Ditch were considered to have greater potential to support valuable invertebrate populations.

5.4.27. Further targeted invertebrate surveys were undertaken of four different areas comprising habitat; south of the Black Ditch, the Black Ditch itself, north of the Black Ditch and The Brookfield Property. In total, 200 different species were recorded across the four areas. The area to the south of the Black Ditch was identified as being the most significant area for invertebrate species within the Site,

with over 63% of the total number of species recorded here (127 of 200 species). North of the Black Ditch supported 38% of the total number of species recorded (77 species), with Brookfield supporting 16% (33 species) and the Black Ditch only supporting approximately 6% (13 species) of the total. Across the Site, 15 species of conservation significance were recorded including 11 nationally scarce species, three red data book species and one SPI. Nine of these species of conservation significance were recorded south of the Black Ditch. However, it is of relevance that although listed to be of conservation significance; six of these species are frequently or commonly found.

5.4.28. The targeted invertebrate survey data confirms that habitats to the south of Black Ditch, and to a lesser extent, land immediately to the north of Black Ditch support the most diverse invertebrate community. The community present in association with the neutral grassland and drainage channels in these areas is of conservation value at the Local scale. It contains a diverse range of species, including specialist species associated with grazing marsh, however relatively few rarer species. The species diversity and abundance is likely supressed by current grazing pressures.

FISH

5.4.29. Information regarding fish populations and species was requested from the Environment Agency as part of the original application in 2014 and is detailed within Table 8 below. This data is supported by the National Fish Population Database (Environment Agency (2018)) which enabled comparisons in eel population numbers in the Black Ditch against nearby waterbodies including the River Arun and its tributaries. This comparison showed that the Black Ditch supports a relatively high density of eels within the local area. Additionally, records of European Eel were returned in the desk study (see Appendix B). European eel is a species protected under Schedule 5 of the WCA and the Eel (England and Wales) Regulations 2009.

Table 8 – Black Ditch Fish Records (Environment Agency)

Species	Grid reference	Date	Max. capture per survey	Density of catch (numbers per 100m^2)
European eel	TQ0250304383	05/09/2005	38	5.5
European eel	TQ0447504049	05/09/2005	13	2.1
European eel	TQ0629103999	24/08/2012	6	3.2
European eel	TQ0320104474	04/10/2012	18	3.8

5.4.30. Additionally, eel is listed as critically endangered on the IUCN Red List of threatened species. Based on the above data, the value of the Site for eel populations has been appraised on a precautionary basis. The Site is considered to have District value for European eel due to the relatively high density of numbers caught on the most recent survey (04/10/2012), where 18 eels were counted during one assessment. Black Ditch is therefore considered to be an important resource for this species, which is closely linked to the River Arun, suggesting that otter (although not recorded during the surveys) would favour the Site as a foraging and commuting resource. Although no

information regarding the presence of eels within the Brookfield Stream has been provided, the habitat is suitable and therefore their presence is assumed on a precautionary basis.

SPECIES OF PRINCIPAL IMPORTANCE UNDER THE NERC ACT 2006

5.4.31. The ecological desk study identified other SPI to be present within the vicinity of the Site, including:

- West European hedgehog
- Brown hare
- Harvest mouse
- Common toad (also recorded on Site during the reptile surveys)

5.4.32. Due to the presence of suitable habitat within the Application Site and records of these SPI either occurring within the Application Site itself (common toad) or within 1km (hedgehog, brown hare, harvest mouse), these species are considered of value at the Site level as similar habitat is frequent in the local landscape and therefore the population (if present) is not considered to be particularly rare.

FUTURE BASELINE

5.4.33. It is expected that should the Proposed Bypass not proceed, the baseline conditioned on Site would effectively remain the same. This is because the habitats are largely managed, arable and agricultural fields and it can be assumed that the existing management regimes would be continued.

6. IMPORTANT ECOLOGICAL FEATURES AND POTENTIAL EFFECT PATHWAYS

6.1.1. Table 9 below lists the ecological features identified during the baseline assessment and summarises the scoping of potential effects which are to be taken forward in this EcIA.

Table 9 – Scoping of Ecological Features for Inclusion in EcIA.

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
Off Site Habitats			
Singleton and Cocking Tunnels, The Mens and Ebernoe Common SAC	Out	International	Three SACs designated for populations of Barbastelle and/or Bechstein's bats. A Habitat Regulations Assessment (HRA) screen matrix carried out by WSCC concluded that the Proposed Bypass will not have any significant adverse effect, either alone or in combination with other relevant projects and plans on the integrity of any European designated site (WSCC, 2015). Furthermore, the closest SAC designated for bat populations is located over 16km from the Application Site. Core Sustenance Zones (CSZs) for barbastelle and Bechstein's bat are 6km and 1km respectively (Collins, 2016). Therefore, it is considered extremely unlikely that there would be any direct or indirect effects on these ecological features and further assessment is considered unnecessary.
Arun Valley	Out	International	A wetland of international importance (SPA), a site for ramshorn snail (SAC) and the area is of outstanding ornithological importance notably for wintering wildfowl and breeding waders, notably Eurasian wigeon, Eurasian teal, Northern shoveler and ruff (Ramsar). Due to the distance from and absence of effect pathways and the reasons for designation of the site being based upon wetland bird species, it is

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
			considered extremely unlikely that there would be any direct or indirect effects on this ecological feature and further assessment is considered unnecessary. A HRA screen matrix carried out by WSCC concluded that the Proposed Bypass will not have any significant adverse effect, either alone or in combination with other relevant projects and plans on the integrity of any European designated site (WSCC, 2015).
Duncton to Bignor Escarpment	Out	International	Supporting an Annex 1 habitat: 9130 Asperulo-Fagetum beech forests. Due to the distance from and absence of effect pathways and the reasons for designation of the site being based upon woodland habitat, it is considered extremely unlikely that there would be any direct or indirect effects on this ecological feature and further assessment is considered unnecessary. Additionally, the Air Quality Assessment Report (Capita 2018a) scoped out any impacts upon ecological receptors as a result of the construction or operational phase. A HRA screening matrix carried out by WSCC concluded that the Proposed Bypass will not have any significant adverse effect, either alone or in combination with other relevant projects and plans on the integrity of any European designated site (WSCC, 2015).
Poling Copse LWS and Arun Valley, Watersfield to Arundel LWS	Out	County	Poling copse comprises ancient semi-natural woodland and Arun Valley, Watersfield to Arundel comprises a section of the River Arun forming an extensive tract of wetland. Due to the distance from and absence of effect pathways and the reasons for designation of the site being based upon woodland habitat (Poling Copse) and wetland bird species (Arun Valley,

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
			Watersfield to Arundel), it is considered extremely unlikely that there would be any direct or indirect effects on this ecological feature and further assessment is considered unnecessary.
Notable Road Verge (A259 Eldon Way and Warningcamp Lane)	Out	Local	Diverse grassland habitat noted on a local road verge, located approximately 1.5km south (Eldon Way) and 1.8km to the north (Warmingcamp Lane) of the Proposed Bypass. It is considered unlikely that there would be any direct or indirect effects on these ecological features through increased passing of construction traffic due to their distance away from the Application Site. Further assessment is therefore considered unnecessary.
Notable Road Verge (Warningcamp Lane)	Out	Local	Diverse grassland habitat noted on a local road verge, located approximately 1.8km to the north of the Proposed Bypass. It is considered extremely unlikely that there would be any direct or indirect effects on this ecological feature as it is a rural, narrow country lane, unsuitable for construction traffic. Further assessment is therefore considered unnecessary.
Seven parcels of ancient woodland within 2km of the Proposed Bypass.	Out	District	The closest of these, Stubbs Copse, is located approximately 824m north east of the Proposed Bypass. Due to the distance from and nature of the Proposed Bypass and the reasons for designation of the site being based upon woodland habitat, it is considered extremely unlikely that there would be any direct or indirect effects on this ecological feature and further assessment is considered unnecessary. Furthermore, the transport assessment (WSP 2018) have not identified increased traffic loading the A27, which runs close to the parcels of ancient woodland. This is supported by the air quality assessment (Capita 2018a) whereby the ancient woodland was not identified as a sensitive receptor.

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
On Site Habitats			
Other habitat of ecological value within the Application Site (coastal and floodplain grazing marsh, deciduous woodland, hedgerows, watercourses, grassland, scrub and scattered trees)	In	District to Local	The majority of semi-natural habitat types present within the Application Site are valued at less than Local level. However, a number of habitats are HPI (including coastal and floodplain grazing marsh, deciduous woodland, rivers and streams) or could be qualifying HPI (hedgerows), which are an exception to this and are considered to be of up to District value. Other habitats, including semi-improved neutral grassland and swamp; are considered to be of Local value. The following potential effects upon these habitats are considered further: ▪ Habitat loss, fragmentation and degradation of, woodland, native hedgerows and trees during the construction phase; ▪ Habitat loss, fragmentation and degradation of existing waterbodies during the construction phase, including downstream effects; ▪ Habitat loss, fragmentation and degradation of semi-improved neutral grassland during the construction phase; ▪ Management of retained and created habitat during the operational phase.
Species			
Bats (Roosting)	In	Up to District	The surveys undertaken identified a Natterer's bat roost in one of the trees. The confirmed roost could be affected via the following potential effect pathways: ▪ Habitat loss and fragmentation (foraging and potential roosting) during the construction phase. ▪ Direct effects (killing and injury and / or disturbance) during the construction phases. ▪ Habitat degradation (associated with lighting) during the

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
			construction and operational phase ▪ Habitat creation and management of retained habitat during the operational phase.
Bats (Foraging)	In	Up to District	The Site was found to support a diverse assemblage of bat species using the Site for foraging and commuting purposes which could be affected via the following potential effect pathways: ▪ Habitat loss and fragmentation (foraging and commuting habitat) during the construction phase. ▪ Habitat degradation (associated with lighting) during the construction and operational phase ▪ Habitat creation and management of retained habitat during the operational phase.
Badger	In	Local	Two setts, recorded as disused during the badger survey are present within the Application Site. Evidence of badgers using the area for foraging and commuting purposes was also recorded. Badgers could be affected via the following potential effect pathways: ▪ Direct loss (mortality and injury) during the construction and operational phases. ▪ Direct habitat loss (sett destruction and reduction in foraging area) during the construction phase. ▪ Disturbance (noise and light) during the construction and operational phases. ▪ Habitat degradation (fragmentation / other alteration) during the construction and operational phases.
Water vole	In	Local	Water vole has been recorded in both the Black Ditch and the Brookfield Stream. The water vole assemblage on Site could be affected by the following effect pathways:

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
			▪ Habitat loss, degradation and fragmentation during the construction phase. ▪ Habitat degradation during the operational phase through change in water quality. ▪ Direct effects (killing and injury and/or disturbance) during the construction phase. ▪ Direct effects (killing and injury) during the operational phase. ▪ Habitat creation and management of retained habitat during the operational phase.
Otter	In	Site	Although no evidence of otter has been recorded during the surveys, the Site is considered to offer commuting and foraging habitat to otter and has links to the River Arun where otters have been recorded. The otter assemblage on Site (if present) could be affected by the following effect pathways: ▪ Habitat loss, degradation and fragmentation during the construction phase; ▪ Habitat degradation during the operational phase through change in water quality; ▪ Direct effects (killing and injury and, or disturbance) during the construction and operational phase; and ▪ Habitat creation and management of retained habitat during the operational phase.

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
Great Crested Newt	Out[9]	Site	Although GCN presence was confirmed in a pond within 500m of the Site, the reasonable likelihood of GCN being present within the works area of the Proposed Bypass is considered to be negligible and further assessment is considered unnecessary.
Reptiles	In	Site	Two species of reptile; slow worm and grass snake were identified on Site, in the area of land south of the Black Ditch. Reptiles could be affected via the following potential effect pathways: ▪ Direct loss (mortality and injury) during the construction phase. ▪ Direct habitat loss during the construction phase. ▪ Habitat degradation (fragmentation / other alteration) during the construction and operational phases. ▪ Habitat creation and management of retained habitat during the operational phase.
Breeding birds	In	Local	36 species were recorded as breeding or exhibiting breeding behaviour within or immediately adjacent to the Site. Breeding birds could be affected via the following potential effect pathway: ▪ Direct loss (mortality and injury) during the construction and operational phases. ▪ Direct habitat loss during the construction phase.

[9] Please note, although the likelihood of GCN being present within the Site is considered to be very low, and therefore a European Protected Species Licence from Natural England is not considered to be necessary. precautionary working methods are recommended within the GCN technical report (Appendix J) which should be followed during the Construction Phase.

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
			▪ Disturbance (noise, visual and light) during construction and operational phases. ▪ Habitat degradation (fragmentation / other alteration) during the construction and operational phases. ▪ Habitat creation and management of retained habitat during the operational phase.
Barn owl	In	Local	Barn owl were recorded foraging across the route of the Proposed Bypass. This species could be affected by the following effect pathway: ▪ Disturbance (noise and visual) during the construction phase. ▪ Disturbance (noise, visual and light) during construction and operational phases. ▪ Habitat degradation (fragmentation / other alteration) during the construction and operational phases. ▪ Direct loss (mortality and injury) during the operational phase.
Invertebrates	In	Local	The neutral grassland and associated wet and dry ditch network around Black Ditch support invertebrate populations of a Local conservation value. Invertebrates could be affected via the following potential effect pathways: ▪ Habitat loss and fragmentation during the construction phase. ▪ Direct effects (killing and injury and, or disturbance) during the construction and operational phase. ▪ Habitat degradation through inappropriate management during the construction and operational phase. ▪ Habitat creation and management of retained habitat during the operational phase.

Ecological Feature	Scoping (In/Out)	Nature Conservation Value	Potential Pathway of Effect
Fish	In	Local	Records of European eel have been provided for the Black Ditch. This species could be affected via the following potential effect pathway: ▪ Direct loss (mortality and injury) during the construction phase. ▪ Disturbance (noise and visual) during the piling works at the construction phase. ▪ Habitat degradation (fragmentation / other alteration) during the construction phase.
Other Species of Principal Importance (SPI)	In	Site	Common toad was identified within the Survey Area during the reptile surveys. Additionally, records of three other SPI; hedgehog, brown hare and harvest mouse were returned in the desk study, with suitable habitat present on Site for these species. These species could be affected via the following potential effect pathway: ▪ Direct loss (mortality and injury) during the construction and operational phases. ▪ Direct habitat loss during the construction phase. ▪ Disturbance (noise, visual and light) during construction and operational phases. ▪ Habitat degradation (fragmentation / other alteration) during the construction and operational phases. ▪ Habitat creation and management of retained habitat during the operational phase.
Japanese knotweed	In		Japanese knotweed is present in two areas to the north and south of the Application Site. The Proposed Scheme may lead to the spread of this species in the absence of appropriate control measures, therefore due to associated legal implications, effects in relation to Japanese knotweed will be considered as part of the assessment.

7. RELEVANT ELEMENTS OF THE PROPOSED BYPASS AND ESTABLISHING THE PRE-MITIGATION SCENARIO

7.1. OVERVIEW

7.1.1. The Proposed Bypass involves the construction of a 1.1km long carriageway with a shared use footway/cycleway along one side. The Proposed Bypass is fenced along its route, and the road will have a speed limit ranging between 40-50mph. A viaduct, spanning 225m is to be constructed from the area of coastal and floodplain grazing marsh over the Black Ditch heading northwards. The existing culvert at Brookfield Stream will be replaced with a wider culvert. To the south of the Proposed Bypass a large housing development is currently being constructed (North Littlehampton development) with the road infrastructure created as part of the housing development linking to the Proposed Bypass.

7.1.2. Mitigation measures embedded within designs e.g. landscape strategy are detailed in Sections 7.2 and 7.3 below. Actions to be taken during construction, for example the seasonal timing of works to avoid effects upon nesting birds are detailed in Section 8.

7.2. CONSTRUCTION PHASE

General

7.2.1. The construction of the Proposed Bypass, subject to planning permission, is expected to commence in Spring 2020 and is likely to last 15 months. It is anticipated, during this time that construction will be, more or less, continuous throughout the development programme, with all works to be conducted during day-time hours, anticipated to be industry standard hours: 07:30-17:00 Monday to Friday, and 08:00-13:00 Saturday.

7.2.2. It is expected that two site compounds will be used during the construction of the Proposed Bypass, one located at the southern end at the interface between the Proposed Bypass and the North Littlehampton development. The second compound is located towards the centre of the Proposed Bypass on an area comprising arable land.

Habitat creation

7.2.3. Habitat creation is required to compensate for the loss of habitat during the construction phase and mitigate the effects of habitat fragmentation within the landscape, and where possible result in long-term ecological enhancement. The following habitat creation forms part of the Proposed Bypass (rounded to 10m or m^2).

- Wet grassland / scrub (14,921m^2);
- Wildflower grassland (6,781m^2);
- Native tree belt (1746m^2);
- Amenity grassland verge (5590m^2);
- Native hedgerow (1,580m); and
- Tree planting (38 individual trees).

7.2.4. The distribution of habitat creation areas is shown on drawing references: A284LY-CAP-EXX-00-DR-L-0027 – 30, Rev P04.

Fauna crossing points

7.2.5. The Proposed Bypass includes two fauna crossing points, one located towards the centre of the Site, north of the species-rich hedgerow and the second one located south of the Brookfield Stream towards the north of the Site. The tunnels will primarily ensure the safe passage for badgers and have been designed accordingly but will also benefit other species. They will comprise 600mm concrete pipe, widening towards each end. Approximately 100m of badger mesh fencing will be installed either side of each crossing point, to channel badgers towards the crossing points. The fencing will be at least 1000mm in height above ground and 600mm below ground (partially returned to prevent badgers excavating under the fence).

7.2.6. The tunnels, although designed to facilitate badger crossing, will also allow other species to cross below the road in these locations. The fencing will also reduce access to the carriageway.

Mammal pass

7.2.7. A new culvert to replace the existing one will be installed in the Brookfield Stream. This will be a 1.8m high with a 0.3m bed and 3.3m wide box culvert going underneath the carriageway and will include 0.5m ledges on either side to allow mammals to pass through.

Lighting design

7.2.8. There is currently no lighting strategy in place for the construction phase, however, the principles set out below with regards to construction phase lighting will be adhered to in the finalised lighting strategy:

- The minimal necessary lighting required will be used, which should be achievable as construction works will be conducted during day-time hours;
- Where night work is required, the use of artificial lighting will be limited and light spill will be avoided on water courses, areas of badger setts or known paths and away from key commuting and foraging habitat for bats;
- A buffer zone will be set up around the tree with the confirmed bat roost in which no artificial lighting is installed during construction.

7.3. OPERATIONAL PHASE

7.4. HABITAT CREATION

7.4.1. During the operational phase, the above design measures will be maintained. Specifically, landscaping will be maintained during establishment and the operational phase of the Proposed Bypass. Any failures will be replaced where necessary. Habitat management proposals will be progressed as part of the detailed design; in outline the following principles will be implemented.

Grassland

7.4.2. Wildflower and wet grassland habitats will be managed to promote biological diversity and will include the following actions:

- Managing the areas to promote a variety of sward heights, and species compositions by selecting an appropriate approach to cutting regimes, including the removal of arisings;
- Removal of scrub encroachment, which otherwise may become dominant to the detriment of native grassland species;

- Creating irregular edge habitat along linear features such as newly created and retained hedgerows to provide a range of microhabitats suitable for a range of invertebrates and suitable conditions for reptiles by providing both cover and basking opportunities); and
- Amenity grassland verges will be subject to a more frequent cutting regime suited to its amenity function.

Tree and hedgerow planting

7.4.3. During the operational phase, trees will only be removed where a health and safety risk is identified which cannot be managed through other means (e.g. selective pruning). Should this occur, these will be replaced with new native species.

7.4.4. Hedgerow management during the operational phase will include the following actions:

- Cutting or laying on a 2-3-year rotation outside of the bird nesting season (i.e. outside March-August inclusive), with up to 50% of hedgerows to be cut at any one times to promote structural complexity and enable shrubs to flower and fruit regularly and therefore be of benefit to small mammals and birds;
- The gapping up of hedgerows where appropriate using native species to maintain connectivity of the hedgerow network;
- The creation of a margin at the hedgerow base of at least 2m width which is infrequently cut (i.e. 2-3-year rotation) to allow a diverse edge to development and reduce disturbance immediately adjacent to the hedgerow; and
- Retaining standard trees within hedgerows, and where cutting is required positioning cut wood in proximity to hedgerows to promote diversity of micro-habitats favoured by invertebrates.

LIGHTING DESIGN

7.4.5. An outline lighting design has been prepared which currently shows artificial lighting of varying illuminance along the Proposed Bypass, with the exception of the viaduct where it will remain unlit. The principles set out below with regards to operational phase lighting will be adhered to in the finalised detailed lighting strategy:

- Keep lighting to a minimum where possible;
- Where lights are used, effective luminaires or other directional light accessories (shields, hoods or cowls) will be employed to ensure that light spillage, particularly onto adjacent hedgerows, woodland parcels, tree lines and watercourses is avoided;
- A buffer zone will be set up around the tree with the confirmed bat roost in which no artificial lighting is to be installed and careful consideration in the use of hoods, cowls or shields to prevent light spill from nearly lights onto the roost; and
- Where lighting is to be installed along the majority of the carriageway, consideration will be given to varying lighting levels. For example, it may be possible to reduce lighting levels or perhaps even switch installations off after certain times (e.g. between 00:00 and sunrise) along the road route. This use of “adaptive lighting” can tailor the installation to suit human health and safety as well as wildlife needs.

8. ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

8.1. CONSTRUCTION PHASE

OTHER HABITAT OF CONSERVATION VALUE

Assessment of Effects

Coastal and Floodplain Grazing Marsh

8.1.1. The coastal and floodplain grazing marsh located within the Site to the south of the Black Ditch supports semi-improved grassland and a mosaic of ditches, swamp, standing and running water. The construction phase will impact the natural habitats found at the Site through vegetation clearance and infrastructure works to build the Proposed Bypass, including the viaduct.

8.1.2. In the absence of any mitigation the overall reduction in this habitat during construction (by approximately 16,900m^2) would result in a permanent, long-term negative effect significant at Local scale since a coherent infrastructure of semi-natural habitat will be retained on the Site. Additionally, in the absence of mitigation, there is also the risk of accidental damage or degradation to retained habitat during the construction phase, i.e., encroachment of works and material storage. Although this is unlikely to occur, it could lead to additional permanent or temporary habitat loss, depending on the nature of the incident. However, as it would only affect a small area proportional to the planned habitat removal, the significance of the negative effect will not alter.

8.1.3. In the absence of mitigation, it is also possible that pollution events and contamination of ground water may occur within reach of all waterbodies on Site, including the ditches, during the construction phase. Although it is unlikely to occur, it could alter the chemical and hydrological integrity of the waterbodies, which would have a short term, temporary or permanent negative effect significant at up to District scale in the absence of mitigation, depending on the magnitude of the incident.

Deciduous Woodland

8.1.4. The Application Site supports a small area of deciduous woodland, comprising semi-natural and plantation woodland with some of this to be lost as a result of the Proposed Bypass. In the absence of mitigation, the overall reduction in this habitat by approximately 6000m^2 is considered to be a permanent long-term negative effect of significance at Local scale. If the retained woodland habitat is not properly protected in line with BS5837:2012 it is likely that additional trees would be lost, however, the additional loss would not alter the significance of the effect of the Proposed Bypass upon this habitat type.

Hedgerows

8.1.5. The Application Site supports a number of hedgerows (totalling approximately 300m in length), likely to qualify as HPIs. During the construction phase there will be a loss of sections of hedgerow totalling approximately 70m. This represents two separate hedgerow breaches of approximately 35m in length each. In the absence of mitigation, as set out for woodland habitat, if the retained hedgerows are not protected during the construction phase it could lead to further loss of this habitat which will result in a permanent or temporary negative effect significant at the Site scale.

Rivers and Streams

8.1.6. Two watercourses, the Black Ditch and Brookfield Stream traverse the Application Site, with works proposed affecting both watercourses (viaduct construction and installation of a new culvert). In the absence of mitigation, during construction there is a risk of damage or degradation to these watercourses, and as set out above in relation to coastal and floodplain grazing marsh, a risk of pollution events. This would result in a temporary or permanent negative effect significant at District scale in the absence of mitigation, depending on the magnitude of the incident.

Mitigation / Enhancement

8.1.7. Habitat loss, mainly as a result of piling works within the area of coastal and floodplain grazing marsh for the new viaduct will be kept to an absolute minimum. Areas excluded from the construction footprint will be fenced (Herras-type or equivalent) to prevent construction activities from impacting these retained habitats.

8.1.8. All retained hedgerow, woodland and trees will be protected in accordance with British Standard BS5837:2012 Trees in Relation to Construction, including the erection of robust protective fencing encompassing root protection areas. Any gaps within the retained sections of species-poor hedgerow (PH8), which is being directly impacted will be identified and replanted with locally sourced, native woody species to increase the biodiversity value of this hedgerow. The proposed landscape plan shows tall 'heavy standard' *Tilia cordata* trees are to be planted on either side of this hedgerow, adjacent to the new bypass, to provide a means of connectivity between the dissected hedgerow.

8.1.9. During the construction phase, good practice pollution prevention measures will be implemented, and works will be avoided within the vicinity of watercourses as far as possible, with precautions taken (e.g. no fuel or other potential pollutants stored within 20m) to minimise the likelihood of pollutants entering the watercourse..

8.1.10. The measures outlined above will be included within a Construction Environmental Management Plan (CEMP), to ensure necessary ecological mitigation is implemented during site clearance activity. This will ensure that vegetation removal is appropriately timed to avoid the most sensitive seasonal periods for the protected species that are present (and ensure that potential conflicts between different species requirements are resolved).

8.1.11. New hedgerow and tree planting as well as wildflower grassland habitat included in the landscape design will help to mitigate for the loss of existing habitat as a result of the Proposed Bypass. This includes new habitat creation on areas currently comprising arable land and therefore currently of low ecological value.

Residual Effects

8.1.12. With the adoption of the above measures, it is predicted that in the short term there will be a residual negative effect significant at the Site level for the HPI as there will be a time lag before sensitive management of retained sections and replacement habitat to compensate for the loss is established. However, in the long term there will not be a significant residual negative effect to the following habitats:

- Coastal and flood plain grazing marsh;
- Deciduous woodland;
- Hedgerows; and

- Rivers and Streams

BATS

Assessment of Effects (Roosting bats)

8.1.13. Habitat removal to facilitate construction will not result in the loss of the confirmed roost (T44a), however it will require the removal of three trees assessed to have moderate potential to support roosting bats, including:

- T1a (PRF includes damage / split on the western aspect up the length of the tree.);
- T32a (PRF includes two woodpecker holes); and
- T17b (PRF includes extensive flaking bark and rot on main stem).

8.1.14. No trees with high potential to support roosting bats will be removed. Bats may use PRFs on a transient basis, and as such, it is not possible to rule out the presence of bats roosting within these trees. and if bats are present at the time of works there is a risk of direct loss of individuals through injury/mortality.

8.1.15. There will be limited after dark lighting during the construction phase (see Section 7,2), however there will be noise and vibration that may affect roosting opportunities in retained trees with potential to support roosting bats further away from the Proposed Bypass. Habitat degradation resulting from noise and vibration will be temporary and short term.

8.1.16. In the absence of mitigation, the removal of three moderate potential trees that could support roosting bats will result in a both temporary and permanent, negative effect upon the bat populations significant at the Local scale. This is because in addition to the tree removals, there will also be habitat degradation over a wider area both in terms of disturbance to retained trees and habitat fragmentation.

Assessment of Effects (Foraging and commuting bats)

8.1.17. The construction phase will result in the severance of commuting routes, either through the creation of physical barriers or through the insensitive use of lighting, of which there is currently very low levels of artificial lighting within the Site.

8.1.18. A number of trees with low or negligible potential to support roosting bats, including areas of plantation broadleaved woodland and sections of hedgerow will also be removed to facilitate the Proposed Bypass. This will result in the loss of areas of foraging and commuting habitat for bats.

8.1.19. In the absence of mitigation, the removal and degradation of habitat, disturbance to bats occupying this habitat will likely result in both a temporary and permanent, short term negative effects upon the bat populations significant up to the District level.

Mitigation / Enhancement (Roosting bats)

8.1.20. No artificial lighting will be installed and light spill from nearby lights will be prevented around the confirmed roost. Any works / vehicle movements taking place that could cause a disturbance effect will be prevented in this area during the period when bats may be present.

8.1.21. Prior to tree removal, as bats may use PRFs on a transient basis, and the time lapse between the most recent surveys (2017) and construction commencing (2020), an updated ground level inspection will be completed to confirm the level of potential for bat roosts to be present. This is to

ensure that mitigation is appropriate and based on information current at the time of works. The following approach will then be taken:

- Trees assessed as having low potential to support bat roosts will be soft felled by suitably qualified arborists, following an at height inspection of any potential roost features to confirm the absence of roosting bats (and evidence of roosting bats);
- Trees assessed as having moderate potential to support bat roosts will be subject to a climbing inspection to enable a thorough assessment of potential and the search for evidence indicating the presence of roosting bats. If at this stage the potential is downgraded to low, the trees will be soft felled by suitably qualified arborists as above. If evidence of bats is recorded, or the potential for a roost to be present remains, further survey will be completed in the form of a dusk or dawn emergence to establish the presence or likely absence of roosting bats.

8.1.22. In the event that the presence of a bat roost is highlighted at this stage, the requirement for works affecting the roost would be reconsidered to identify whether adverse effects can be avoided. Where possible, in this scenario proposals would be updated to enable retention and protection of the bat roost. In the event that retention is not possible, a licence would be sought from Natural England to permit works to proceed, the licence application would be subject to a detailed method statement.

8.1.23. To mitigate for the loss of roosting opportunities across the Site, and to enable future monitoring, new roosting opportunities in the form of bat boxes will be installed on retained mature trees in suitable locations. The number of bat boxes installed will at least replicate the number of PRFs lost from the three moderate potential trees (five PRFs in total), with another five additional PRFs provided as an enhancement measure.

8.1.24. The detailed lighting strategy for the construction phase of the Proposed Bypass has not yet been progressed. However, during the construction phase, the principles set out in Section 7.3 regarding lighting will be applied. This includes keeping lighting to a minimum and where it is utilised, either low or high-pressure sodium lights are use, or directional light accessories (shields, hood or cowls) are employed to ensure that light spillage is kept to a minimum.

8.1.25. In addition, measures will be taken to conserve and protect retained trees which have potential to support roosting bats. This will include the installation of protective fencing in line with BS5837:2012. Appropriate good practice measures will also be implemented to reduce noise, dust and vibration during construction.

Mitigation / Enhancement (Foraging and commuting bats)

8.1.26. Landscaping which will form part of the Proposed Bypass aims to provide replacement habitat for that lost will not be functional during the construction phase as the area will be in use for construction activities until the landscaping is installed on completion. Therefore, the effects of new landscaping are considered under the operational phase assessment.

8.1.27. As set out above for roosting bats, lighting will be kept to a minimum to avoid light spillage on retained habitat that bats will use for foraging and commuting purposes.

8.1.28. In addition, measures will be taken to conserve and protect retained trees, shrub and hedgerow habitat which provides a foraging/commuting resource for bats. This will include the installation of protective fencing in line with BS5837:2012.

Residual Effects (Roosting bats)

8.1.29. With the adoption of the above mitigation measures, which will remove the risk of increased injury and/or mortality of bats associated with construction activities and ensure that PRFs are maintained within the Application Site it is predicted that during the construction phase there will be a neutral residual effect upon roosting bats.

Residual Effects (Foraging and commuting bats)

8.1.30. There will be an unavoidable loss of foraging and commuting habitat for bats and therefore following the implementation of the mitigation measures, there will remain short-term, temporary and permanent direct negative effects significant up to the Local scale.

BADGER

Assessment of Effects

8.1.31. The site preparation, earthworks and construction phase of the Proposed Bypass has the potential to bring about negative effects on badger through possible habitat loss, disturbance and potential injury/harm to individuals. Two disused setts (Setts 4a and 4b) were recorded on the Site and will be lost as a result of the Proposed Bypass.

8.1.32. The removal and degradation of habitat, and disturbance to badgers occupying this habitat will result in both temporary and permanent, short term direct negative effects upon the badger population significant at the Local scale. This is due to potential effects occurring to the social group located in this area including mortality, injury, habitat loss, displacement and disturbance.

Mitigation / Enhancement

8.1.33. An updated Site visit and / or monitoring surveys, comprising the use of camera traps will be undertaken to confirm the setts are not in current use. Where setts are confirmed as not being in current use, it is advised that one-way exclusion gates are fitted to the entrances and that the setts will be carefully excavated under ecological supervision. A walkover of the route of the Proposed Bypass and a 30m buffer will also be undertaken to check for any new setts prior to commencement of works.

8.1.34. If the setts are found to be in current use, it will be necessary to close these setts prior to construction works commencing, under a licence from Natural England. These licences are typically only issued once for activities affecting setts to occur between 1st July and 30th November inclusive, in order to avoid the badger breeding season. A suitable mitigation strategy will need to be in place to obtain the licence and is likely to include the installation of one-way badger gates, kept in place for a minimum of 21 days, monitoring of the sett for signs of badgers entering of leaving the sett and destruction of the sett once badgers are excluded to reduce the risk of badgers re-occupying the sett. The area will also be secured against re-entry by badgers by using heavy-gauge chain link fencing.

8.1.35. The remaining setts (Setts, 1-3 and 5) are located more than 100m from the Proposed Bypass and therefore should not be affected by the works. To ensure this is the case, a 30m buffer around each sett in which no construction works can take place will be clearly marked.

8.1.36. Badgers use the wider area for foraging and commuting purposes and therefore measures need to be put in place during the construction phase to minimise effects upon badger movement and foraging activity. These will include fencing dangerous areas of the construction site (e.g. deep

excavations) or providing a means of egress from shallow excavations, whilst ensuring other construction fencing is raised 180mm above ground level to enable badgers to pass beneath. Storage of plant and materials on areas of potential foraging habitat (e.g. retained grassland) will be avoided. In addition, appropriate good practice measures will be implemented to reduce noise during construction and there will be no night works unless specifically needed, to avoid disturbance through the use of artificial lighting. Where the use of lighting is unavoidable, hoods, cowls or shields will be used to avoid light spill onto setts or badger paths.

Residual Effects

8.1.37. The above mitigation will remove the risk of increased injury and/or mortality of badgers associated directly with construction activities and reduce the degree to which habitat will be fragmented during the construction phase. There will still be a reduction in habitat available to the local badger population. As a consequence, individual animals may exploit alternative resources, with potential increased exposure to road traffic on existing road networks. Following the implementation of mitigation residual effects upon the badger population will be both temporary and permanent, short term indirect negative effects significant at the Site scale.

WATER VOLE

Assessment of Effects

8.1.38. The construction impacts to water vole include localised effects to Black Ditch and Brookfield Stream where the new viaduct and new culvert will be constructed. Populations can be at risk from projects involving waterbody vegetation clearance or bankside work (DMRB, 1999). The construction of the viaduct will result in piling works within 5m of the Black Ditch. Water vole burrows may extend up to 2m from the bank edge and therefore works within 5m may damage burrows (through vibration effects) causing mortality of individuals.

8.1.39. A ‘cattle drinking area’ is currently on the south side of the Black Ditch, directly in line with the proposed viaduct. It is currently proposed that this area is filled in and the bank reinstated.

8.1.40. The existing Brookfield Stream culvert comprises of a 900mm pipe completely submerged. This will be replaced with a 1.8m high (0.3m bed) by 3.3m wide box culvert with 0.5m mammal ledges on each side.

8.1.41. In the absence of appropriate design, the works could lead to permanent fragmentation of the watercourses, thereby restricting passage. Additionally, the construction of the viaduct will lead to increased shading and therefore a reduction in food availability and cover.

8.1.42. Pollution of a water course can adversely affect water vole and their food supply. Certain compounds, such as heavy metals or pesticides, that enter the water course may affect water vole directly, through lethal levels of toxicity and sub-lethal effects on reproduction and fitness, as well as indirectly, through degradation and contamination of the food chain.

8.1.43. In the absence of mitigation, the construction phase would affect water voles on a short term temporary or permanent basis, resulting in a direct negative effect, of significance at Local level.

Mitigation / Enhancement

8.1.44. Design drawings show that the Proposed Bypass will require works affecting less than 50m of bankside habitat along the Black Ditch during the installation of the new viaduct. On this basis, it is considered appropriate to displace water voles from the works area spanning the Black Ditch for the

duration of the works, rather than implementing a programme of trapping and translocation. The new culvert installation on Brookfield Stream where is traverses the A284 may affect a small amount of bankside habitat immediately adjacent to the works, however this is largely shaded and not likely to be occupied by water voles at the time of the works, although this species occurs up and downstream of this location.

8.1.45. The displacement would be required to avoid the risk of disturbance to individuals in burrows near to the piling works, required for Piers 7 and 8 of the new viaduct, and harm to individuals which could otherwise occur if vibrations were to collapse burrows in nearby bankside habitat. All works would need to be supervised by an ecologist holding a Natural England Class Licence for the 'Intentional disturbance of water voles and damage/destruction of water vole burrows by means of 'Displacement'. A condition of this licence is to demonstrate that mitigation works include creation or enhancement of alternative compensatory habitat, such that there will be a demonstrable net conservation gain for water voles.

8.1.46. To displace water voles from the works area, displacement must take place between 15th February and 15th April, during suitable weather conditions (i.e. >5°C). All vegetation will need to be removed from the displacement area, with all arisings removed. The area will need to be left for a minimum of five days and a maximum of 10 days, and re-surveyed to check for the presence of water voles. If water voles remain present, or there is uncertainty as to whether burrows remain occupied or not, a destructive search would need to be undertaken to excavate burrows using hand tools.

8.1.47. During the construction phase, the cleared area must remain unsuitable for water voles. This can be achieved by regularly managing the vegetation re-growth, or by laying matting and / or other material to prevent re-growth.

8.1.48. As part of the proposed landscaping plans, there will be a new water treatment pond and ditch created to the east of the Proposed Bypass, with the new ditch linking back to the Black Ditch. This will be designed following guidance set out below and taken from the Water Vole Mitigation Handbook (Dean *et al*. 2016). Therefore, it is considered that this new pond and ditch habitat will deliver in terms of suitable water vole habitat compensation.

8.1.49. The following criteria for the design of the new pond and ditch system will be followed:

- Ensuring the watercourse contains water throughout the year;
- Providing a suitable bank profile, which allows water voles to access the water easily; and
- Establishing suitable bankside and marginal vegetation to provide both food and cover for water voles.

8.1.50. Enhancements to riparian habitats will additionally be implemented as necessary to ensure equivalent or better habitat for water voles is available, to that present prior to construction of the Proposed Bypass.

8.1.51. As part of the Proposed Works, tree removals will take place immediately to the north of the Brookfield Stream, an area that is currently heavily shaded. The removal of these trees will reduce the amount of shade on the watercourse and therefore increase its suitability for water voles. Additional habitat enhancement within the Brookfield Stream will include plug planting into the stream to increase the quality of the habitat for water voles by providing both additional food sources and means of cover.

8.1.52. During the construction phase, the water courses will be protected which will benefit the habitats by reducing potential damage/ pollution. Good practice pollution prevention measures will be implemented, and works will be avoided within the vicinity of watercourses as far as possible, to minimise the likelihood of pollutants entering the watercourse. Clear fencing and/ or markers will be used to separate works from watercourses where undertaken in close proximity to avoid incidental incursion. These measures will be agreed in advance with the Environment Agency and WSCC and included within a CEMP.

Residual Effects

8.1.53. With the adoption of the above measures, a temporary short-term effect on water vole populations significant at the Site level will remain as a result of displacement of animals. However, effects to water vole will be avoided and potential disturbance effects will be minimised and therefore any potential effects on water voles will be reduced in the long term and result in a residual neutral effect.

OTTER

Assessment of Effects

8.1.54. Although no signs of otter have been recorded within the Site, both the Black Ditch and Brookfield Stream have the potential for otter to pass through these areas. Additionally, otters have a large home range, with records of otter within the River Arun which links to the Black Ditch.

8.1.55. During the construction phase, there are likely to be localised effects to the Black Ditch and the Brookfield Stream, as a result of the construction of the new viaduct and culvert which could restrict otter passage and reduce the availability of prey within the watercourse.

8.1.56. Additionally, works within the Site not directly affecting the watercourses, but in close proximity will result in noise and visual disturbance during hours of construction (assumed Mon - Fri 07:30 – 18:00). Although otters are known to become habituated to high levels of activity, and occur in urban environments, as this is an area that is largely undisturbed at present it is reasonable to assume this may deter otter activity during the day, at least temporarily.

8.1.57. Pollution of a watercourse can adversely affect otters and their food supply, as they are vulnerable to bio-accumulation of contaminants and the loss of prey (Grogan *et al*., 2001). Certain compounds, such as heavy metals or pesticides, that enter the water course may affect otters. Pollutants such as oil or petrol could also reduce the waterproofing properties of the otter's fur, affecting its ability to control body temperature whilst in the water (DMRB, 1999). In the absence of mitigation, it is considered possible that construction activities could lead to a short-term temporary, negative effect significant at Site level.

Mitigation / Enhancement

8.1.58. During the construction phase, the water courses will be fenced to prevent encroachment, which will benefit the habitats by reducing potential damage/ pollution. Good practice pollution prevention measures will be implemented, and works will be avoided within the vicinity of watercourses as far as possible, with precautions taken (e.g. no fuel or other potential pollutants stored within 20m) to minimise the likelihood of pollutants entering the watercourse. Additionally, where bare earth is exposed close to watercourses, matting will be placed down to prevent sediment run-off. These measures will be included within a CEMP.

8.1.59. Prior to any works taking place within the vicinity of the watercourses, a precautionary check will be undertaken by a Suitably Qualified Ecologist (SQE) to look for signs of otters. If signs of otters are detected during this check a more detailed survey will be undertaken of the wider area to help establish the level of use of the watercourses by otter and recommendations will be provided on an appropriate way to proceed.

Residual Effects

8.1.60. The presence of otter is considered unlikely given that surveys undertaken to date have not identified any signs and therefore the above is presented on a precautionary basis only. With the adoption of the above measures, direct effects to otter will be avoided and potential disturbance effects will result in a neutral residual effect.

REPTILE

Assessment of Effects

8.1.61. Suitable reptile habitat exists within the Site, with low populations of slow-worm and grass snake recorded in an area of habitat south of the Black Ditch. The Proposed Bypass extends over this area of habitat and in the absence of mitigation, it is possible that there will be direct loss of animals from the population as a result of mortality and/or injury during enabling works to facilitate construction. In addition, habitat removal required during the construction phase will reduce the area of habitat available to support the reptile population present and fragment retained areas of suitable habitat; inhibiting population movement.

8.1.62. The removal and degradation of habitat, and direct loss of slow worm and grass snake occupying this habitat will result in short term temporary, direct negative effects upon the populations of significance at the Site level.

Mitigation / Enhancement

8.1.63. Although reptiles were only recorded south of the Black Ditch, given the mobile and relatively widespread nature of some reptile species, it is advised that all areas of suitable habitat will be treated as potentially supporting reptiles. In all areas of suitable habitat, mitigation will entail the clearance of vegetation outside of the sensitive hibernation season (indicatively November-February inclusive, but weather dependent). Where tall herbaceous vegetation is cleared during the active season for reptiles, then it will be undertaken in two stages over at least two consecutive days and include an initial cut down to 150mm, with the second cut reducing vegetation as close as possible down to ground level in order to progressively render habitat unsuitable for reptiles. Any natural refugia will be dismantled by hand with all works undertaken under the supervision of a suitably qualified ecologist. The areas of grassland to the north and south of the Black Ditch represent the most suitable areas for reptiles and therefore additional enhancement measures will be implemented in these areas. This includes enhancing retained habitat close to the construction zone through the reduction of grazing pressures that is likely to occur as a result of the commencement of development activities.

8.1.64. Subsequent to the sensitive habitat clearance as described in above, temporary amphibian/ reptile exclusion fencing will be installed around areas to be affected by the construction works, including those areas used for storage of construction materials. Given the low numbers of animals recorded in this area, this fencing need not completely enclose the habitat such that, in consultation with an ecologist, entrances for vehicles may be left open in appropriate locations. The purpose of the

fencing would be to prevent animals colonising the construction zone and, for example, making use of stored construction materials or machinery for refuge. Finally, as slow worms do not respond as well to habitat manipulation as other reptile species, a small number of artificial refugia will be installed in this location to be checked on occasion by a suitably qualified ecologist prior to works to confirm few or no reptiles are present. In the event that more than expected numbers of reptiles are discovered, it may be appropriate to consider undertaking a more extensive translocation exercise, subject to further ecological advice.

Residual Effects

8.1.65. The above mitigation will reduce the risk of injury and/or mortality of grass snakes and slow worms during the construction phase. There will still be an unavoidable reduction in habitat available to the local reptile population during construction activities.

8.1.66. Following the implementation of mitigation residual effects upon the reptile population will remain temporary, short-term negative effects significant at the Site scale.

BREEDING BIRDS (EXCLUDING BARN OWL)

Assessment of Effects

8.1.67. The hedgerows, woodland, trees, arable and scrub on Site provide the most valuable habitat for nesting birds. The majority of hedgerows and a high proportion of the trees and habitat currently present on Site will be retained and protected during the construction phase including a high proportion of mature trees and the majority of native hedgerow habitat. To facilitate construction some suitable nesting habitat will be removed, in the form of trees and scrub, and adjacent habitat may be subject to visual and noise disturbance, resulting from construction activities in close proximity.

8.1.68. It is considered that the noise and visual impact associated with the construction activity may impact the Schedule 1 (*i.e.* those species afforded additional protection from disturbance at the nest) and notable nesting birds recorded in and around the Site, in particular Cetti's warbler which was recorded breeding or possibly breeding in an area close to the south of the Application Site. The sensitivity of breeding birds will increase immediately before and during the breeding period (March – August for most species). It is considered that the majority of the breeding / foraging opportunities at the Site for these species are limited to the southern extent of the Proposed Bypass (south of Black Ditch), although the remaining habitat on Site offers nesting opportunities for a wide variety of species.

8.1.69. In the absence of mitigation and taking a worst-case scenario approach (which would involve uncontrolled site clearance during the nesting season) the construction effects upon breeding birds would likely result in short term temporary, direct and indirect negative effects of significance at the Local level. There would also be the potential for associated legal implications, since the damage or destruction of birds' nests whilst they are in use, is an offence under the Wildlife and Countryside Act, 1981. It is also an offence to disturb bird species listed under Schedule 1 of the Act during breeding (including disturbance of any dependent young).

Mitigation / Enhancement

8.1.70. To avoid adverse effects to nesting birds during the construction phase of the Proposed Bypass in accordance with the Wildlife and Countryside Act, 1981, where practicable site clearance works will be undertaken outside of the bird nesting season which generally runs from March to August

inclusive. If this is not possible, Site clearance will proceed under the supervision of a suitably qualified ecologist in accordance with a precautionary working method statement and may require the installation of exclusion zones so as not to disturb Schedule 1 species during development. Such methods can be successfully implemented for localised activity but are generally not suitable for large-scale Site clearance.

8.1.71. As noted above with respect to bats, measures will be taken to conserve and protect retained trees, shrub and hedgerow habitat which provide a nesting resource for birds. This will include the installation of protective fencing in line with BS5837:2012. Appropriate good practice measures will also be implemented to reduce noise, dust and vibration during construction.

Residual Effects

8.1.72. The above mitigation will reduce the risk of increased injury and/or mortality of nesting birds associated with construction activities, and levels of disturbance of adjacent retained habitat. There will still be an unavoidable reduction in suitable nesting habitat during the construction phase. Following the implementation of mitigation, the Proposed Bypass will result in short term temporary direct and indirect negative effects upon the breeding bird assemblage significant at the Site scale.

BARN OWL

Assessment of Effects

8.1.73. Barn owls have not been recorded nesting within the Application Site, however they do use the Site for commuting and foraging purposes. During the construction phase due to the clearance of habitat suitable for foraging, there will be a short term temporary indirect negative effect significant at the Site scale.

Mitigation / Enhancement

8.1.74. Appropriate good practice measures will be implemented to reduce noise during construction and no night work will occur unless specifically required to avoid disturbance on adjacent retained habitat that is likely to be in use by foraging barn owls, however there will be a reduction in suitable foraging habitat during the construction phase.

8.1.75. The detailed lighting strategy for the construction phase of the Proposed Bypass has not yet been progressed. However, during the construction phase, the principles set out in Section 7.3 regarding lighting will be applied. This includes keeping lighting to a minimum and where it is utilised, either low or high-pressure sodium lights are use, or directional light accessories (shields, hood or cowls) are employed to ensure that light spillage is kept to a minimum.

Residual Effects

8.1.76. With the adoption of the above measures, direct effects to foraging barn owls will be reduced, however an overall reduction in suitable foraging habitat will remain. This will result in a short-term temporary residual negative effect significant at the Site level.

INVERTEBRATES

Assessment of Effects

8.1.77. Approximately 14,800m^2 of grazing marsh habitat will be removed to facilitate the Proposed Bypass; the habitat type of greatest value to the invertebrate community present on Site. Within this area however, the quality of habitat varies, and the majority of this area is subject to grazing pressures

which reduce its suitability to support a diverse invertebrate assemblage. In addition to habitat loss, there is also the risk that pollution events may occur that could affect the ecological integrity of this area, which may negatively affect invertebrate populations. Although it is unlikely to occur, it could alter the chemical and hydrological integrity of the waterbodies. The loss of habitat and potential degradation of retained habitat, in the absence of mitigation, is likely to result in medium-term temporary, direct negative effects upon invertebrate populations significant at the Site scale.

Mitigation / Enhancement

8.1.78. During the construction phase, fencing will be installed to prevent encroachment and good practice pollution prevention measures will be implemented and works will be avoided within the vicinity of watercourses as far as possible, with precautions taken (i.e. no fuel or other potential pollutants stored within 20m) to minimise the likelihood of pollutants entering the watercourse. Additionally, where bare earth is exposed close to watercourses, matting will be placed down to prevent sediment run-off.

8.1.79. The proposed landscaping plans include the creation of an area of 14,920m^2 wet grassland/scrub habitat and approximately 6800m^2 of wildflower grassland habitat which will provide suitable habitat for invertebrates and improve the integrity of the habitat currently available to invertebrates by providing a more ecologically diverse habitat.

Residual Effects

8.1.80. With the adoption of the above measures, direct effects to notable invertebrate populations of Site value will be avoided and potential disturbance effects will be minimised resulting in a long-term residual neutral effect.

EUROPEAN EEL

Assessment of Effects

8.1.81. From records provided in the desk study and the Environment Agency, the Black Ditch is known to support a population of European eel, which is a species sensitive to changes in water flow rate, preferring rich, muddy slow-flowing environments. Although no records for eels in the Brookfield Stream are provided, it supports suitable habitat for eels. However, this watercourse is currently obstructed by a 900mm piped section below the existing road.

8.1.82. The proposed viaduct will require the construction of abutments, at least 5m from the top of the bank and therefore result in increased noise and vibration during these works. A ‘cattle drinking area’ is currently on the south side of the Black Ditch, directly in line with the proposed viaduct. It is proposed that this area is filled in and the bank reinstated.

8.1.83. Although unlikely, potential impacts could therefore occur to eel and elvers migrating upstream, if the cattle drinking area is used as a refuge or a rest area. No direct impacts to the ditch basin or opposite side of the ditch are envisaged.

8.1.84. In the absence of mitigation, the Proposed Bypass may result in short term temporary, direct negative effects upon European eel populations, of significance at up to a Site level.

Mitigation

8.1.85. Eels / elvers migrate upstream late spring / early summer. Where possible, piling works and culvert construction to be timed to avoid the key migration period (late spring / early summer). Where this is

not possible, other mitigation measures such as the use of sensitive piling methods should be discussed and agreed with the Environment Agency.

8.1.86. The culvert to be installed at the Brookfield Stream should be set below the level of the existing stream bed so not to create a stepping effect and therefore restrict passage during low flow.

8.1.87. As set out previously, pollution prevention measures will be put in place and detailed in the CEMP.

Residual Effects

8.1.88. The above mitigation will ensure the protection of Eels / elvers as they are migrating upstream. Furthermore, the new culvert at Brookfield Stream will open up this watercourse for migrating eels. Therefore, the residual effect of the Proposed Bypass during the construction phase is considered to be a long term permanent positive effect significant at the site level.

OTHER SPECIES OF PRINCIPAL IMPORTANCE

Assessment of Effects

8.1.89. Four SPI (common toad, brown hare, hedgehog and harvest mouse) not considered elsewhere were either recorded within the Survey Area incidentally during the protected species surveys (common toad), or records were returned in the desk study.

8.1.90. Suitable habitat for these species will be removed during the construction phase. In the absence of mitigation, the construction effects upon these SPI would likely result in temporary, direct and indirect negative effects at the Site level. This is a precautionary assessment as with the exception of common toad, it is not known whether the other species listed are present within the Application Site.

Mitigation / Enhancement

8.1.91. The habitats utilised by these SPI are the same as those utilised by some breeding birds and reptiles. Therefore, the mitigation measures described above for breeding birds and reptiles regarding sensitive habitat clearance will be sufficient for these species also.

Residual Effects

8.1.92. The sensitive habitat clearance carried out at an appropriate time of year will reduce the risk of injury and/or mortality of these SPI associated with construction activities, and levels of disturbance of adjacent retained habitat. However, there will still be an unavoidable reduction in suitable habitat during the construction phase therefore the residual effects upon SPI (should they be present) will remain temporary, negative effects significant at the Site scale.

JAPANESE KNOTWEED

Assessment of Effects

8.1.93. In the absence of mitigation, construction has the potential to cause the spread of Japanese knotweed. This species is present in two areas within the Application Site, one to the south of the Application Site on top of an embankment adjacent to the North Littlehampton development and one area to the north of the Site on a bund within the southern plantation woodland on the eastern side of the A284 Lyminster Road. Japanese knotweed is listed on Section 9 of the Wildlife and Countryside Act 1981 (as amended) under which it is an offence to cause this species to spread in the wild. Disturbance during construction could cause sections of rhizome to be spread both around

the Site and offsite into localised areas through removal of waste material. Japanese knotweed is very vigorous and dominates at the expense of native vegetation. Consequently, if this occurs it will result in a permanent direct negative effect of significance at the Site level.

Mitigation / Enhancement

8.1.94. A Japanese knotweed control and removal programme will be instigated by an appropriately qualified contractor, prior to commencement of ground works.

Residual Effects

8.1.95. Following implementation of mitigation Japanese knotweed will be controlled on-site or removed in a controlled manner and disposed of appropriately; thereby avoiding spreading this species in the wild as a result of construction. Consequently, a negligible residual effect is anticipated.

8.2. OPERATIONAL PHASE

OTHER HABITAT OF CONSERVATION VALUE

Assessment of effects

Coastal and floodplain Grazing Marsh

8.2.1. During the operational phase, access will be required within this habitat area by maintenance vehicles, specifically to the water treatment pond, however this access is understood to be relatively infrequent with a dedicated access track to be constructed which all vehicles will keep to.

8.2.2. Additionally, the landscape proposals show a significant area (14,920m^2) of wet grassland and scrub habitat will be created towards the south of the site to enhance the current habitat on site, which will become established during the operational phase and should improve the integrity of the HPI.

Deciduous Woodland

8.2.3. Whilst the landscape proposals do not include areas of woodland, 38 individual trees and native tree belts comprising ten species and covering an area of 1,745m is proposed as part of the landscaping.

Hedgerow

8.2.4. 1,650m of hedgerow comprising five native species will be planted as part of the landscaping proposals, providing significantly more hedgerow than is currently present within the Application Site.

Rivers and Streams

8.2.5. An extensive drainage strategy has been prepared including the following which have been incorporated into the design of the Proposed Bypass as part of the soft landscaping; attenuation pond, water treatment pond, sumps and swale. The drainage strategy (Capita 2018b) details the measures that have been put in place to ensure discharge rates to green field levels are maintained. These will ensure the existing water courses are protected from pollution which would otherwise cause changes to water quality.

Mitigation / Enhancement – all habitats

8.2.6. No further mitigation is proposed.

Residual effects – all habitats

8.2.7. During the operational phase, the extensive native hedgerow planting which forms part of the Proposed Bypass will become established. This will expand the existing hedgerow network and result in a permanent, long-term positive effect significant at the Site scale.

8.2.8. For the remaining habitats (coastal and floodplain grazing marsh, deciduous woodland and rivers and streams) the Proposed Bypass is considered likely to have a long term neutral effects as although there will be some loss in area for certain habitats, there will be an increase in the quality of retained habitat and as newly created habitat becomes established the reduction in habitat area will be minimised.

BATS

Assessment of Effects (Roosting)

8.2.9. The number of bat boxes proposed will not only replace the number of PRFs lost as a result of the removal of three trees with moderate potential to support bat roosts but will provide additional PRFs therefore increasing the number of roosting opportunities available to bats during the operational phase. Additionally, the confirmed roost identified is along the existing A284. The transport assessment (WSP 2018) has predicted that there will be a reduction in the number of vehicle movements that could potentially cause a disturbance along this road due to an increase in traffic flow along the Proposed Bypass. This will result in a long-term positive effect significant at the Site scale.

Assessment of effects (Foraging and commuting)

8.2.10. Although a detailed lighting strategy is not currently available, it is anticipated that during the operational phase permanent artificial lighting will be required alongside the carriageway for safety reasons. However, a dark corridor will be created across the length of the new viaduct where no artificial lighting is proposed.

8.2.11. Lighting could attract insects from adjacent retained habitat, resulting in their supporting reduced numbers of insects. Although certain species of bat (e.g. common and soprano pipistrelle, noctule, serotine etc) tolerate relatively high light levels, the loss of insects from nearby areas will create an impact on the ability of light-avoiding bats (e.g. barbastelle, Myotis bats, brown long-eared bats etc.) that were recorded during the activity surveys to feed in these areas.

8.2.12. Increased mortality is also a consideration of the operational phase due to the potential increased risk of collisions with vehicles. The Proposed Bypass will link to the existing A284 Lyminster Road and therefore the collision risk for bats already exists in this area. The transport assessment (WSP 2018) has identified that there will be a significant volume of traffic reassigned from the existing A284 route onto the Proposed Bypass but not a significant increase in traffic flows overall. However, the existing road ranges from 30-40mph whilst the Proposed Bypass has a speed limited of up to 50mph therefore increasing the potential collision risk to what is currently present.

8.2.13. During the operational phase, landscaping created during the construction phase will become established. Tree belt and shrub planting (assuming the use of transplants (typically 60–80cm high) will reach a height of approximately 7-7.5m after 15 years. The individual tree planting, as shown on the landscaping plans will be planted at a height of 4-5.5m and at a diameter of 0.2-0.25m dependent upon the species. These will therefore reach maturity at a faster rate. This will provide an increased area of woodland and shrub habitat available to foraging bats connected to established

hedgerows and existing retained woodland running parallel to the Proposed Bypass. Furthermore, approximately 1.5km of native hedgerow planting is proposed as part of the landscaping scheme, which upon establishment will provide a commuting and foraging corridor along the route of the Proposed Bypass, linking the Application Site to the wider area.

8.2.14. Additionally, the proposed wet grassland / scrub habitat, particularly in the vicinity of the viaduct will encourage bats to cross the road beneath the viaduct, which in combination with no artificial lighting around the viaduct will improve this area as a foraging and commuting feature for bats. Through appropriate management, as set out in Sections 7.3, the diversity and abundance of invertebrates associated with newly created habitats will be maximised providing a food source for bats.

8.2.15. As a result of habitat creation beneficial to bats comprising 6,781m^2 area of wildflower grassland, 14,920m^2 of wet grassland/scrub habitat, 1,745m^2 of native tree belt, over 1.5km of native hedgerow and 38 trees, upon establishment during the operational phase, the Proposed Bypass will increase the extent and connectivity of suitable foraging and commuting habitat for bat species. The design of habitat creation will encourage bats to utilise new habitat which replaces arable land which the bat activity surveys identified as being of lower value to support foraging and commuting bats in comparison to the north of the Proposed Bypass. Additionally, the proposed landscaping will provide continuous high-quality foraging and commuting habitat across the whole of the Application Site as the large expanse of arable habitat of low quality will be replaced.

8.2.16. Collectively, during the operational phase it is concluded that the Proposed Bypass will have negligible effects upon the local bat population.

Mitigation / Enhancement (Roosting)

8.2.17. Replace any bat boxes that become damaged. This will be carried out as part of general maintenance with the integrity of the boxes checked for health and safety purposes.

Mitigation / Enhancement (Foraging and commuting)

8.2.18. Ensure the sensitive use of lighting is utilised across the Scheme. In addition to the requirements set out in Section 7.4.5 to ensure that light spill is kept to a minimum, any LED lighting along the carriageway will follow the specification below, unless otherwise required for safety reasons:

- narrow spectrum light sources are used to lower the range of species affected by lighting;
- lights that peak higher than 550 nanometres are used; and
- lights that emit white and blue wavelengths of the light spectrum are avoided to reduce insect attraction and where white light sources are required in order to manage the blue short-wave length content they should be of a warm/neutral colour temperature <4,200 kelvin (BCT, 2014).

Residual Effects (Roosting)

8.2.19. During the operational phase, the Proposed Bypass is considered likely to have long-term positive effect significant at the Site scale.

Residual Effects (Foraging and commuting)

8.2.20. During the operational phase, the Proposed Bypass is considered likely to have negligible effects upon the local bat population.

BADGER

Assessment of effects

8.2.21. Landscaping created during the construction phase will become established during the operational phase, and through appropriate management, increased shrub, grassland and hedgerow habitat will be available to badgers.

8.2.22. It is known that badgers use the majority of the Site due to the location in which the setts and field signs were recorded Therefore, there is the potential risk for increased traffic collisions as badgers continue to attempt to forage on both sides of the Proposed Bypass. Two badger crossing points, with badger fencing and mesh either side of each crossing point have been proposed in order to provide safe places for badgers to cross the road. These have been positioned close to existing badger foraging / commuting routes as identified during the 2017 badger survey. At least 100m of badger mesh fencing will be placed either side of the crossing to encourage use of these designated safe crossing points.

Mitigation / Enhancement

8.2.23. No further mitigation is proposed.

Residual Effects

8.2.24. During the operational phase, the effects on badgers are likely to be of negligible significance as a result of the Proposed Bypass.

WATER VOLE

Assessment of effects

8.2.25. The construction of a new viaduct will create permanent shading over the Black Ditch, reducing the amount of emergent vegetation required by water voles for cover and as a food source, however they will still be able to move through this area to suitable habitat either side of the viaduct, as well as being able to reach the new ditch and pond, which provides a net increase of approximately 550m^2 of suitable water vole habitat.

8.2.26. The removal of trees next to the Brookfield Stream will result in reduced shading along this watercourse. If plug planting within the watercourse takes place to enable emergent vegetation to colonise, this will also enhance the stream for water voles. Additionally, the construction of a new culvert will allow easier passage along the Brookfield Stream promoting habitat connectivity.

8.2.27. The Proposed Bypass is considered likely to have negligible effects upon the local water vole population in the long-term during the operational phase, because overall a slightly larger area of suitable habitat will be present specifically managed to benefit this species.

Mitigation / Enhancement

8.2.28. It is understood that an access track will be constructed around the perimeter of the pond in order to allow access to maintenance vehicles. The regularity of the pond maintenance is currently not known; however, this should be carried out on a ‘need only’ basis rather than on a regular basis. A management plan will be produced for the pond to ensure the safeguarding of any water vole during the maintenance works.

8.2.29. Consideration for the planting of shade tolerant emergent vegetation within the Black Ditch to create cover for water voles.

Residual Effects

8.2.30. During the operational phase, the Proposed Bypass is considered likely to have negligible, long-term effects upon the local water vole population.

OTTER

Assessment of effects

8.2.31. Should otters utilise the Black Ditch or the Brookfield Stream for foraging and commuting purposes, as the bridge spanning the Black Ditch is a viaduct, specifically designed for a critical flood event, the risk of otters crossing the Proposed Bypass is negligible. Additionally, the new culvert (with mammal ledges at a height of 0.5m above substrate) proposed for the Brookfield Stream will enable otters to pass underneath the road, which is not currently possible due to the size of the existing piped culvert. The Proposed Bypass is considered likely to have negligible effects upon the local otter population (should they utilise the area) in the long-term during the operational phase.

Mitigation / Enhancement

8.2.32. No further mitigation is proposed.

Residual Effects

8.2.33. During the operational phase, the Proposed Bypass is considered likely to have negligible effects upon the local otter population should they utilise the area as habitat connectivity will be maintained.

REPTILE

Assessment of effects

8.2.34. The establishment of an enhanced, increased area of wet grassland / scrub habitat, suitable for reptiles during the operational phase will result in permanent direct positive effects upon the reptile population significant at the Site scale.

Mitigation / Enhancement

8.2.35. No further mitigation is proposed.

Residual Effects

8.2.36. During the operational phase, the Proposed Bypass is considered likely to have permanent, direct positive effects upon the reptile population significant at the Site scale.

BREEDING BIRD (EXCLUDING BARN OWL)

Assessment of effects

8.2.37. The Proposed Bypass, once operational, will result in increased noise levels compared to the current baseline. Whilst it is possible that road noise will affect bird breeding behaviour the extent to which this is likely to occur in association with a 50mph road is poorly understood, and in the absence of mitigation it is considered unlikely that effects would extend far from the carriageway.

8.2.38. During the operational phase, effects of habitat removal during the construction phase will remain for species which occupy arable habitat such as skylark and grey partridge, as this habitat has not been

compensated for within the Landscape Design. However, habitat suitable for a large number of other breeding bird species will be created to mitigate and compensate for the loss of habitat as a result of the Proposed Bypass. Additionally, the loss of arable habitat as a result of the Proposed Bypass will only result in the loss of a relatively small area of the overall amount of this type of habitat available in the immediate and wider area.

8.2.39. Due to the extensive amount of landscaping providing suitable nesting opportunities for breeding birds, which will become established through the operational phase, negligible effects are anticipated on the overall breeding bird population.

Mitigation / Enhancement

8.2.40. No further mitigation is proposed.

Residual Effects

8.2.41. During the operational phase, the Proposed Bypass is considered likely to have negligible effects upon breeding bird populations.

BARN OWL

Assessment of effects

8.2.42. Barn owl were recorded crossing the route of the Proposed Bypass for foraging purposes, at two locations, along the Black Ditch and towards the north of the route. Due to their hunting behaviour and poor peripheral vision, barn owls are at risk of vehicle collisions on roads, particularly with high-sided vehicles. The current landscaping plans show grassland planting along the side of the new road which barn owl are likely to use as foraging ground and therefore potentially increasing the collision risk. The dark corridor created at the viaduct may encourage barn owl to cross under the viaduct rather than over the road, which will help to reduce, but not eliminate this risk.

8.2.43. Due to the collision risk for barn owl during the operational phase, the Proposed Bypass is considered likely to have a permanent direct negative effect significant at the Site level.

Mitigation / Enhancement

8.2.44. At least two barn owl boxes will also be installed in a suitable location at a minimum distance of 1.5km from the Proposed Bypass to help maintain the local barn owl population to help mitigate the potential impact of road deaths. The location of these will be agreed with the Sussex Ornithological Society due to their current work to increase the carrying capacity of Sussex for barn owls and their established relationships with landowners.

Residual Effects

8.2.45. Due to the increased collision risk to barn owl which will still remain despite the mitigation set out above, there will remain a permanent direct negative effect significant at the Site level during the operational phase.

INVERTEBRATES

Assessment of Effects

8.2.46. As set out for bats. it is anticipated that during the operational phase permanent artificial lighting will be required alongside the carriageway for safety reasons. Lighting could attract insects from further

afield, resulting in adjacent habitats supporting reduced numbers of insects, and disruption to natural behaviours reducing survival rates.

8.2.47. As part of the landscaping plans, areas of wet grassland, wet grassland / scrub mosaic and wildflower grassland habitat will be created and established providing suitable habitat for a range of invertebrates. Once this new habitat is established, providing valuable habitat for invertebrate populations, negligible effects are anticipated on the overall invertebrate population during the operational phase.

Mitigation / Enhancement

8.2.48. Ensure the use of directional light accessories (shields, hood or cowls) are employed to ensure that light spillage is kept to a minimum. Principles set out in Section 7.5 with regards to sensitive lighting will also be employed.

Residual Effects

8.2.49. With the adoption of the above measures, direct effects to notable invertebrate populations of Site value will be avoided and potential disturbance effects will be minimised resulting in a residual negligible effect.

FISH

Assessment of Effects

8.2.50. Measures will be put in place as part of a drainage strategy to ensure the watercourses are protected from surface-water run-off during the operational phase.

Mitigation / Enhancement

8.2.51. No further mitigation is proposed.

Residual Effects

8.2.52. During the operational phase, the Proposed Bypass is considered likely to have negligible effects upon the migrating eels/elvers.

OTHER SPECIES OF PRINCIPAL IMPORTANCE

Assessment of Effects

8.2.53. The establishment of the proposed landscaping will provide suitable habitat for these species / scrub habitat, suitable for common toad, hedgehog and harvest mouse during the operational phase. Although there will be an overall loss of arable / open habitat suitable for brown hare as a result of the Proposed Bypass it will only result in the loss of a relatively small area of the overall amount of this type of habitat available in the immediate and wider area. Therefore, overall it will result in permanent, direct positive effects upon these populations (should they be present) significant at the Site scale.

Mitigation / Enhancement

8.2.54. No further mitigation is proposed.

Residual Effects

8.2.55. During the operational phase, the Proposed Scheme is considered likely to have long term permanent, direct positive effects upon these populations significant at the Site level should they be present in the Application Site.