Cottam Parkway Railway Station

Environmental Statement

Volume 2: Main Statement

Chapter 6: Ecology

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6 Ecology

6.1 Introduction

6.1.1 This chapter presents the Ecological Impact Assessment (EcIA) for the proposed Cottam Parkway Railway Station Scheme (hereinafter referred to as 'the Scheme'). The EcIA is undertaken to assess the potential ecological impacts of the Scheme through determination of likely significant effects on important ecological features (IEFs).

6.1.2 The EcIA described within this chapter comprises the following key stages:

1. Establishment of the ecological baseline through desk study review, Extended Phase 1 Habitat Survey and subsequent detailed surveys for habitats and species;
2. Determination of the value of ecological features (protected areas or designated sites), habitats and species within the study area;
3. Identification of likely significant effects;
4. Incorporation of the key principles of EcIA, including avoidance, mitigation, or compensation to address likely significant effects;
5. Consideration of ecological enhancement measures including biodiversity net gain; and,
6. Assessment of the significant residual effects of the development.

6.1.3 Initially the features of interest are identified and their baseline condition detailed in the absence of proposed activities. The feature is then evaluated to establish a level of importance. The likely impacts to the ecological features, during construction and operation, are then established and characterised, and their effect on the ecological feature in question identified. Any mitigation measures (i.e., avoidance, minimisation restoration and compensation) or enhancement measures to be implemented are then identified along with a

description and assessment of any remaining residual effects. Finally, any future management and monitoring requirements are identified.

6.1.4 As indirect effects on ecological features can occur through changes in hydrology, air, water quality and disturbance levels (noise, lighting and activity), this chapter is supported by information considered within other Environmental Statement (ES) chapters where relevant. These include:

- Chapter 5 'Landscape and Visual Impact';
- Chapter 8 'Air Quality';
- Chapter 9 'Noise and Vibration';
- Chapter 11 ‘Water Environment'; and
- Chapter 14 'Traffic and Transport'.

6.1.5 A suite of technical reports have been prepared to inform and accompany this ES. These reports are presented in Appendices 6.2 – 6.16 in volume 3 of this ES (refer to Table 6.1.1). They include a detailed description of the survey methodologies, desk study and field survey findings, limitations and evaluations. A summary of the significant findings of these reports is provided in this chapter.

Table 6.1.1. Appendix numbers for the technical reports

ES Chapter Number	Environmental Topic	Relevant Appendices
6	Ecology	Appendix 6.1: Ecology Chapter Figures Appendix 6.2: Extended Phase 1 Habitat Survey Report Appendix 6.3: Hedgerow Survey Report Appendix 6.4: Aquatics Survey Report Appendix 6.5: Common Toad Assessment Report. Appendix 6.6: Great Crested Newts Survey Report

ES Chapter Number	Environmental Topic	Relevant Appendices
		Appendix 6.7: Breeding Birds Survey Report Appendix 6.8: Wintering Birds Survey Report Appendix 6.9: Barn Owl Survey Report Appendix 6.10: Preliminary Bat Roost Assessment Report Appendix 6.11: Bat Activity Survey Report Appendix 6.12: Water Vole and Otter Survey Report Appendix 6.13: Badger Survey Report Appendix 6.14: Priority Species Survey Report Appendix 6.15: Habitats Regulations Assessment Screening Report Appendix 6.16: Biodiversity Net Gain Report

Study Area

6.1.6 The spatial scope (or study area) for this EcIA has been established in consideration of the Zone of Influence (ZoI) for all likely significant ecological effects. These effects (and therefore the ZoI) vary for each ecological feature (i.e., designated sites, habitats and species).

6.1.7 The ZoI and defined study areas are further detailed in the relevant technical reports (refer to Appendices 6.2-6.16). In general, the spatial scope for this EcIA is summarised as follows:

- Designated sites for Nature Conservation (International and European sites up to 5km and all other sites up to 1km);
- Desk study for records of protected and notable species up to 1km; and,
- Field surveys for habitats and species up to 500m from the Scheme boundary including any temporary working areas.

6.1.8 The spatial scope was also informed by good practice guidance and professional judgment. Professional judgment requires a trained and appropriately experienced individual to apply their skills and knowledge to reach an informed decision, as per British Standard 42020:2013 (British Standards Institution (BSI), 2013)).

6.2 Relevant Legislative, Plans, Policies and Background

6.2.1 A summary of all relevant legislation, planning policy and guidance that relates to the assessment of potential ecological impacts is given below. Further detailed information can be found in the Planning Policy Reference Report (Appendix 1-3.2)

Legislation

6.2.2 In addition to the inherent biodiversity value for ecological features of importance, a number of these features are also afforded legal protection under the following key pieces of legislation:

- The Conservation of Habitats and Species Regulations 2017 (as amended);
- The Eel (England and Wales) Regulations 2009;
- The Marine and Coastal Access Act 2009;
- Natural Environment and Rural Communities (NERC) Act 2006;
- Countryside and Rights of Way (CRoW) Act 2000;
- The Hedgerows Regulations 1997;
- Wild Mammals Protection Act 1996;
- The Environment Act 1995;
- Protection of Badgers Act 1992;

- Wildlife and Countryside Act 1981 (as amended);
- Salmon and Freshwater Fisheries Act 1975;
- Weeds Act 1959; and,
- National Parks and Access to the Countryside Act 1949.

6.2.3 In addition to the above legislation, the Environment Act 2021 has brought into UK law additional environmental protections and targets which are to be implemented within the wider legal framework (secondary legislation or regulations). For example, a mandatory biodiversity net gain of 10% as set out in the Environment Act is to apply in England through amendments to the Town and Country Planning Act 1990 and the Planning Act 2008. This 10% biodiversity net gain requirement was a prerequisite of the Scheme design in advance of the passing of the Environment Act and its implementation into UK law.

National Planning Policies

National Planning Policy Framework

6.2.4 The National Planning Policy Framework (the NPPF) (MHCLG, 2021) sets out the Government's view on how planners should balance nature conservation with development and helps ensure that Government meets its biodiversity commitments with regard to the operation of the planning system.

6.2.5 The NPPF states that the planning system should minimise impacts on biodiversity, provide net gains in biodiversity where possible and contribute to the government's commitment to halt the overall decline in biodiversity. This includes the establishment of coherent ecological networks that are more resilient to current and future pressures. Planning permission should not be granted if significant harm to biodiversity cannot be avoided, adequately mitigated, or as a last resort compensated for.

6.2.6 Development resulting in the loss or deterioration of irreplaceable habitats should be refused unless the need for, and benefits of, the development in that location clearly outweigh the loss. Whilst consideration should be given to the presence of local biodiversity sites, their presence should not be used to refuse development consent.

Planning Practice Guidance

6.2.7 The Government has produced several pieces of Planning Practice Guidance (Ministry of Housing, Communities & Local Government) relating to the natural environment. The Planning Practice Guidance of particular relevance to Ecology and Nature Conservation includes:

- Planning Practice Guidance on the 'Natural Environment' (published 21 January 2016 and last updated 21 July 2019) (Ministry of Housing, Communities and Local Government, 2019) explains key issues in implementing policy to protect biodiversity, including local requirements. It includes separate guidance on 'Landscape', 'Biodiversity geodiversity and ecosystems', 'Green Infrastructure' and 'Brownfield land, soils and agricultural land of environmental value'; and

- Planning Practice Guidance on 'Environmental Impact Assessment (EIA)' (Ministry of Housing, Communities and Local Government, 2020) explains the requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (published 6 March 2014 and last updated 13 May 2020).

Local Planning Policy

Central Lancashire Adopted Core Strategy

6.2.8 The Central Lancashire Core Strategy (Preston City Council et al., 2012) identifies three Core Strategy Policies that are pertinent to biodiversity for the Scheme:

Policy 18: Green Infrastructure

6.2.9 Policy 18 outlines the Central Lancashire approach to managing green infrastructure, to create habitat linkages and reduce population fragmentation. The aims of this policy are to manage and improve environmental resources through a green infrastructure approach, allowing the council to protect and enhance the natural environment in areas where it is already significant, so it continues to provide economic, social, and environmental benefits.

6.2.10 In areas where green infrastructure is deficient, the council will aim to invest in and improve the natural environment, particularly the river valley networks as well as improving the canal network (including Lancaster Canal).

6.2.11 Finally, the policy seeks to secure mitigation and/or compensatory measures where development would lead to the loss of, or damage to, part of the green infrastructure network.

Policy 22: Biodiversity and Geodiversity

6.2.12 Policy 22 outlines the council's aims to conserve, protect and seek opportunities to enhance and manage the biological and geological assets of the area. This will include promotion of the conservation and enhancement of biological diversity, with particular regard to priority habitats and species populations. The policy aims to seek opportunities to conserve, enhance and expand ecological networks, whilst safeguarding geological assets that are of importance.

6.2.13 This policy also underpins the Biodiversity and Nature Conservation Supplementary Planning Document (Preston City Council *et al.*, 2015) which focuses on the Lancashire Ecological Network which seeks to identify linkages between known wildlife sites, using existing data on wildlife sites, habitats and species preferences to identify areas of high landscape integrity with relatively low levels of human modification.

6.2.14 Many designated sites within Lancashire form the core part of the ecological network e.g. Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), Biological Heritage Sites (BHS) and Local Nature Reserves (LNRs). Corridors between core areas are continuous stretches of permeable habitat that allow species movement between core areas, containing features that can act as stepping stones. Corridors of 3km or less are considered most likely to contribute to species movement as it represents an intermediate dispersal capability. Stepping stone habitats include: district level wildlife sites, LNRs (of district importance) and important road verges. Also included are areas of priority habitat outside protected sites but at least partially within the ecological network corridor.

Preston Local Plan 2012-2026

6.2.15 The adopted Preston Local Plan 2012 – 2026 (Preston City Council, 2015) also includes the following policies:

Policy EN10: Biodiversity and Nature Conservation

6.2.16 In Preston, biodiversity and ecological network resources will be protected, conserved, restored and enhanced. Priority will be given to all designated sites of nature conservation value and habitats of principal importance (NERC Act, 2006) as well as protecting, safeguarding and enhancing habitats for protected and notable species. The policy also provides provisions which must be adhered to by developments.

Policy EN11: Species Protection

6.2.17 Planning permission will not be granted for development which would have an adverse effect on a protected species unless the benefits of the development outweigh the need to maintain the population of the species in situ.

Lancashire Woodland Vision

6.2.18 The Lancashire Woodland Vision (Lancashire County Council, 2006) is a long term strategy for woodland planting and management to enhance the woodland in 22 different character areas throughout Lancashire. The plan identifies opportunities and challenges for woodland management and improvement in each habitat area, as well as prioritising areas for new woodland growth. The Scheme is within 'The Fylde' Character Area of the Lancashire Woodland Vision for Coastal Plain.

Biodiversity Framework

Habitats and Species of Principal Importance

6.2.19 The NERC Act 2006 requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. There are 56 habitats and 943 species of principal importance which were initially identified as requiring conservation action under the UK Biodiversity Action Plan (BAP) and which continue to be regarded as priorities under the UK Post-2010 Biodiversity Framework (JNCC and Defra, July 2012). The England Biodiversity Strategy describes how England will implement these commitments at a national level (Defra, August 2011).

6.2.20 Part 3 Section 40 the NERC Act 2006 imposes a duty to conserve biodiversity and states 'Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.' The duty aims to raise the profile of biodiversity, to clarify existing commitments and to make biodiversity an integral part of policy and decision-making.

6.2.21 Habitats of principal importance are of potential relevance to the Scheme include ponds, hedgerows and deciduous woodland. Species of principal importance of potential relevance to the Scheme include:

- Barn owl (*Tyto alba*);

- Bat species including Daubenton's bat (*Myotis daubentonii*), noctule (*Nyctalus noctula*) and brown long-eared bat (*Plecotus auritus*);
- Bird species including but not limited to: lapwing (*Vanellus vanellus*), skylark (*Alauda arvensis*), song thrush (*Turdus philomelos*), house sparrow (*Passer domesticus*);
- Brown hare (*Lepus europaeus*);
- Common toad (*Bufo bufo*);
- European eel (*Anguilla anguilla*);
- Great crested newt (GCN) (*Triturus cristatus*);
- Hedgehog (*Erinaceus europaeus*);
- Otter (*Lutra lutra*); and,
- Slow worm (*Anguis fragilis*).

The Local Biodiversity Action Plan (BAP)

6.2.22 The Local BAP for Lancashire (Lancashire BAP) contains 11 habitat and 39 species action plans for ecological features considered to be of local nature conservation concern. The Lancashire BAP includes all relevant habitats and species of principle importance as listed above.

6.3 Methodology

Overview and Approach

6.3.1 The approach to the EIA and the methodologies applied are in accordance with the requirements of The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017.

6.3.2 The EcIA was undertaken following the methodology in the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for EcIA in

the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018). As the Scheme also involved the construction of a road, the EcIA has also been produced with reference to guidance set out in the Design Manual for Roads and Bridges (DMRB) 'Sustainability and Environment Appraisal' publications regarding Environmental Impact Assessment (LA 101 to LA 104) (Highways England, 2019a, 2019b, 2020a, 2020b) and Biodiversity (LA 108) (Highways England, 2020c).

6.3.3 The EIA comprises the key stages: identified in Table 6.3.1.

Table 6.3.1 Key stages of EcIA

Key Stage	Description of process
Screening	The project proposer may seek a formal screening opinion from the competent authority to determine the need for EIA under the EIA Regulations.
Scoping	Scoping is the process of determining the ecological issues to be addressed in the EcIA. It sets out the methods and resources to be used and establishes the spatial and temporal limits for surveys and assessments.
Establishing the baseline	Information collection and description of Important Ecological Features (IEFs) is collected through desk study and field surveys as reported in the individual technical reports to inform the impact assessment.
Identification of IEFs	The nature conservation value/biodiversity importance of each ecological feature should be assessed and the level at which effects to ecological features would be considered significant then established. All ecological features with a baseline conservation value above the minimum threshold are then identified as IEFs.
Determining Values for IEFs	
Identification of the threshold level for IEFs	
Identification and characterisation of potential impacts	The impacts with the potential to affect IEFs during the construction and operational phases of the development are identified.
Identification of integral mitigation	Mitigation included within the proposed design and any mitigation implemented in line with construction good practice is identified, together with any effects this mitigation is likely to negate.

Key Stage	Description of process
Assessment of potential ecological impacts	The characterisation of each impact is assessed (taking account of the likelihood, reversibility, duration, timing and frequency) for each IEF followed by the significance of its effect on the IEF. This is undertaken for both the construction phase and operational phase.
Avoidance, mitigation, compensation, and enhancement.	The relevant avoidance, mitigation and compensation, required to reduce any significant effects is identified along with any enhancement measures (including biodiversity net gain).
Consideration of cumulative impacts	The potential for cumulative impacts and any associated significant effects arising from the proposed development is identified.
Determination of significant residual effects	Any significant residual effect on IEFs is identified.
Identification of monitoring and management requirements	Required monitoring and management measures to identify whether the mitigation, compensation, and/or enhancement measures are effective, and management to keep them such, is assessed.
Limitations to the EcIA	Any significant limitations within an assessment are identified.

Establishing the Baseline Conditions

6.3.4 The establishment of an accurate ecological baseline has been undertaken via the collation of information obtained during desk study exercises and field surveys undertaken between 2019 and 2021. The methodologies for this are summarised below. Please refer to the technical reports in Appendices 6.1 - 6.16 for further detail.

Desk Study

6.3.5 The desk study exercise included desk top study review and data gathering. This was undertaken in March 2020. Lancashire Environmental Records Network (LERN) were contacted to obtain records for protected and notable species up to 1km from the Scheme. In addition, the Ecology and Fish Data Explorer (Environment Agency, 2021) was used to identify if any Environment

Agency freshwater macro-invertebrate data had been collected within a 250m buffer of the Scheme boundary between 2010 to 2021.

6.3.6 A review of the *Preston Western Distributor and East West Link Road Environmental Statement* Volume 2, Chapter 6 and Appendices (Jacobs, 2017) was undertaken and includes a full suite of ecological surveys which were completed between 2014 and 2016. The Preston Western Distributor (PWD)/East West Link Road (EWLR) Scheme is located adjacent to and within the Cottam Parkway Scheme boundary. Update/pre-construction survey reports for the PWD/EWLR Scheme were also reviewed. All references to the pre and post planning ecology reports for PWD/EWLR are provided within the relevant technical reports (Appendices 6.2-6.16).

6.3.7 A search of the following online resources was also undertaken:

- MAGIC (www.magic.defra.gov.uk);
- Google Maps (www.google.co.uk);
- Ordnance survey maps;
- Historical maps and aerial photography from the Lancashire MARIO website (http://mario.lancashire.gov.uk/agsmario); and,
- Local planning applications and documents.

Field Surveys

6.3.8 The scope for field surveys was determined through consideration of the likelihood that a habitat and/or species was present within the study area and that was likely to be affected by the proposed Scheme. This was refined through desk study, consultation and field survey. Only those habitats and species considered important, present and likely to be affected by the development were taken forward in this impact assessment.

6.3.9 Field surveys were undertaken by Jacobs UK Ltd. All field surveys were undertaken in consideration of good practice guidelines in recognised, published survey methodologies and were led by suitably qualified and experienced ecologists holding relevant survey licences. Where deviations to standard survey methodologies took place, these have been justified in the technical reports in Appendices 6.2 – 6.16.

6.3.10 A list of the surveys undertaken is presented in Table 6.3.2. Detailed descriptions of the methodologies used for each ecological feature are provided within the relevant technical reports in Appendices 6.2 - 6.16.

6.3.11 Field surveys were not carried out for certain species/species groups such as polecat (*Mustela putorius*), dormouse (*Muscardinus avellanarius*), terrestrial invertebrates, white-clawed crayfish (*Austropotamobius pallipes*) and notable plants. This was due to a low likelihood of their presence, from results of the desk based study and from field surveys in the area and/or a very low probability of populations of these species/species groups being significantly affected by the proposed Scheme.

6.3.12 Therefore, these species are not considered further in this assessment since there is no potential for significant impacts and therefore no requirement for specific mitigation measures. However, it is important to note that the proposed mitigation and enhancement measures that would be implemented as part of the proposed Scheme to address specific negative effects on other habitats or species would protect and/or benefit a variety of wildlife.

Specific field surveys for brown hare, hedgehog and reptiles (primarily slow worm) were not undertaken. It was considered that sufficient information could be gathered from the desk study and/or by adapting certain field survey methods to account for such species to ensure a sufficient baseline of ecological data was gathered to inform the EcIA. These species have been scoped into this assessment and a precautionary approach has been taken in the evaluation and impact assessment for these species.

Table 6.3.2. List of surveys undertaken for the Scheme

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
Extended Phase 1 Habitat Survey (EP1HS)	All habitats within 500m were subject to survey (where access was granted). Access was not obtained within residential areas and areas in which development was to be undertaken (e.g., the PWD/EWLR Scheme).	February and July 2020.	Surveys were undertaken with reference to: • Joint Nature Conservation Committee (JNCC, 2010) Handbook for Phase 1 Habitat Survey; and, • CIEEM (2017) Guidelines for Preliminary Ecological Appraisal.	Cottam Parkway Railway Station Extended Phase 1 Habitat Survey Report (Jacobs, 2020a) Appendix 6.2
Hedgerow Survey and Assessment	All hedgerows location within the Scheme boundary and a 50m buffer area from the Scheme boundary were assessed. Assessments were made of the species richness of each hedgerow and whether each hedgerow reached the threshold level to be classed as 'Important' in accordance with The Hedgerows Regulations 1997.	May 2020	Hedgerow Survey Handbook: A standard procedure for local surveys in the UK (Defra, 2007).	Cottam Parkway Railway Station Hedgerow Survey and Assessment Report (Jacobs, 2020b) Appendix 6.3
Aquatics Survey	Freshwater macro-invertebrate communities were surveyed from all	September 2020 and March 2021	• Freshwater macro-invertebrate sampling in rivers. Operational	Cottam Parkway Railway Station Aquatic Ecology

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
	watercourses (streams and ditches) within 250m of the Scheme boundary. Ponds and canals within 250m of the Scheme boundary were surveyed using the Predictive SYstem for Multimetrics (PSYM) methodology.		instruction. Document no. 018_08 (Environment Agency, 2012); and • A guide to monitoring the ecological quality of ponds and canals using PSYM (Pond Action, 2002).	Survey and Assessment Report (Jacobs, 2021) Appendix 6.4
Common Toad Survey	Following a common toad risk assessment, six ponds within 1km of the Scheme boundary were identified as having a medium to high risk of common toad being impacted. The survey area subject to field surveys was defined as all land which incorporated the six ponds and any potential migration routes.	February, March and April 2021.	• Amphibian and Reptile Conservation (2011). Common toads and roads; Guidance for planners and highway engineers in England. • Gent, T. and Gibson, S. (2003). *Herpetofauna Workers' Manual.* Joint Nature Conservation Committee.	Cottam Parkway Railway Station Common Toad Survey Report (Jacobs, 2021) Appendix 6.5
GCN Habitat Suitability Index (HSI) and desk-based assessment of previous	Following a review of the Extended Phase 1 Habitat Survey data collected in February and March 2020 along with an examination of online aerial and OS mapping, a total of 27	March 2020.	• Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*) (Oldham *et al*., 2000); and • Great Crested Newt Mitigation Guidelines (English Nature, 2001); and,	Cottam Parkway Railway Station Great Crested Newt Survey Report (Jacobs, 2020h) Appendix 6.6

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
surveys carried out in the area.	ponds were identified to be potentially viable for use by GCN. These ponds were subject to a HSI assessment.		• Great Crested Newt Conservation Handbook (Langton *et al*., 2001).	
GCN Environmental DNA (eDNA) surveys	An eDNA survey was completed on all potentially suitable ponds for GCN within the survey area (15 ponds in total).	April 2020	Analytical and methodological development for improved surveillance of the Great Crested Newt; Appendix 5 Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus)* environmental DNA (Biggs *et al*., 2014).	Cottam Parkway Railway Station Great Crested Newt Survey Report (Jacobs, 2020h) Appendix 6.6
GCN presence/absence surveys	Surveys to determine the presence or likely absence of GCN were carried out on four ponds. Additionally, due to a positive eDNA result, a further additional pond was subject to a population size class assessment. Survey methods used a combination of bottle trapping, torch surveys, egg searching, netting and a terrestrial search.	April to June 2020	Great Crested Newt Mitigation Guidelines (English Nature, 2001).	Cottam Parkway Railway Station Great Crested Newt Survey Report (Jacobs, 2020h) Appendix 6.6

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
Birds - Breeding Bird Surveys	Two transect routes were devised to cover the study area which extended up to 500m from the Scheme boundary covering a variety of habitats.	April to June 2020	A bespoke survey methodology, tailored to the survey area based on a combination of; • Common Bird Census (CBC) which was devised jointly by the British Trust for Ornithology (BTO) and Joint Nature Conservation Committee (JNCC); and, • Breeding Bird Survey (BBS) method devised jointly by BTO, the Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservancy Council (JNCC) (Gilbert *et al*., 1998).	Cottam Parkway Railway Station Breeding Bird Survey Report (Jacobs, 2020f) Appendix 6.7
Birds - Wintering Bird Surveys	A transect route was devised to cover the study area which extended up to 500m from the Scheme boundary covering a variety of habitats.	October 2019 to March 2020	As above.	Cottam Parkway Railway Station Wintering Bird Survey Report (Jacobs, 2020g) Appendix 6.8
Barn owl roost inspections of structures and trees.	All buildings and trees within 500m of the proposed Scheme were assessed for their potential to support barn owl. One building group at Highfield Farm, located approximately 710m north	December 2019 and June 2020	• The Barn Owl Conservation Handbook (The Barn Owl Trust, 2012); and, • Barn Owl *Tyto alba*: Survey Methodology and Techniques for use in Ecological Assessment (Shawyer, 2011).	Cottam Parkway Railway Station Barn Owl Report (Jacobs, 2020c) Appendix 6.9

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
	of Scheme, was also included as conversations with the property owner suggested the location was used as a breeding site by barn owls. Highfield Farm had also previously been identified as a roost site as part of the PWD/EWLR surveys.			
Bats - Preliminary Bat Roost Assessments (trees and structures)	All trees and structures located within proposed Scheme boundary and a 50m buffer area from the Scheme boundary were assessed from the ground for their potential to support roosting bats. Structures with low, moderate or high bat roost potential were considered for further survey (see below). Trees with moderate or high potential were considered for further survey (see below). Trees/structures with negligible bat roost	May 2020	• Bat Tree Habitat Key (BTHK, 2018); • Surveying for Bats in Trees and Woodland BS 8596 (BSI, 2015); and, • Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) (Collins, 2016).	Cottam Parkway Railway Station Preliminary Bat Roost Assessment (Jacobs, 2020d) Appendix 6.10

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
	potential were screened out from further assessment.			
Bats - Aerial inspection of trees	Trees were subject to a close visual examination of all potential roost features which were identified to have moderate to high bat roost potential during the ground-based assessments. Low potential trees were not subject to aerial inspections in accordance with good practice guidance.	May to August 2020	As above.	Cottam Parkway Railway Station Bat Activity Survey Report (Jacobs, 2020e) Appendix 6.11
Bats - Emergence/re-entry bat surveys	Dusk emergence surveys were carried out on three trees and 12 structures.	May to October 2020	As above.	Cottam Parkway Railway Station Bat Activity Survey Report (Jacobs, 2020e) Appendix 6.11

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
Bats - Transect Surveys	Two transect routes were designed to cover the study area. All transect surveys were undertaken at dusk and continued for at least two hours after sunset for each transect. Two surveyors walked the transect routes at a steady pace, pausing and recording bat activity at pre-determined 'listening points' for five-minute periods along each transect route. Surveyors recorded all aspects of bat activity.	May to September 2020	As above.	Cottam Parkway Railway Station Bat Activity Survey Report (Jacobs, 2020e) Appendix 6.11
Bats - Static Detector Surveys	Automated static detectors were deployed at eight locations on linear features throughout the Scheme that were likely to be of most value to bats (i.e., treelines and hedgerows).	May to September 2020	As above.	Cottam Parkway Railway Station Bat Activity Survey Report (Jacobs, 2020e) Appendix 6.11

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
Otter and Water Vole – Presence/Absence Surveys	A total of four watercourses were identified within close proximity to the Scheme. Watercourses surveyed were Lancaster Canal, Halsall's Farm Ditch, Lady Head Runnel and an unnamed watercourse in the mid-western section of the Scheme. The distance of the survey area for each watercourse was varied as the watercourses varied in their suitability for survey due to culverting and/or dense scrub cover.	May and August 2020	• Otter (National Rivers Authority, 1993); and, • Water Vole Conservation Handbook (Strachan *et al*., 2011) and in consideration of Dean *et al*., (2016).	Cottam Parkway Railway Station Otter and Water vole Survey Report (Jacobs, 2020i) Appendix 6.12
Badger (Meles meles)	All land within the Scheme boundary and 50m buffer area from the Scheme boundary was subject to survey to record evidence of badgers and badger setts.	March and July 2020	• Surveying badgers (Harris et al., 1989); and • Best Practice Guidance - Badger Surveys (Scottish Natural Heritage, 2003).	Cottam Parkway Railway Station Badger Survey Report (Jacobs, 2020k). Appendix 6.13.

Survey Type	Study Area and Details	Date	Good Practice Guidance	Technical Report Reference
Priority species	All incidental observations of priority species were recorded during all ecology surveys undertaken for the Scheme. The extent of the data collection for incidental records varied per field survey type and covered up to a 500m radius from the Scheme boundary.	October 2019 to– October 2020	No defined methodology was followed. However, the breeding and wintering bird surveys undertaken for the Scheme also included the recording and mapping of brown hare and hedgehog sightings. The recording of mammals was introduced by the British Trust for Ornithology for use during their breeding bird survey methods as a way of collecting data on the distribution and population trends of common mammals.	Cottam Parkway Railway Station Priority Species Report (Jacobs, 2020j). Appendix 6.14.

Determining Values for Important Ecological Features

6.3.13 The ecological features were evaluated based on the methodology outlined in the Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018) and with reference to the guidance outlined in LA 108 'Biodiversity' (Highways England, 2020c). The value/importance of biodiversity resources within the study area are assessed according to a geographical framework as defined within these guidance documents. The geographic categories stated in the two sets of guidance differ very slightly but are largely comparable (see below). Therefore, the value/importance of biodiversity resources within the study area was assessed according to the geographical framework given in Table 6.3.3.

6.3.14 This evaluation is based on an understanding of the biodiversity value/importance of an ecological feature and how the potentially affected population or habitat contributes to the conservation status or distribution of the species or habitat at a particular geographic scale. The valuation is independent from a species legal status, although there may be similarities because threatened species are often selected for legal protection (an exception being the badger).

6.3.15 A number of factors are taken into consideration during this process including but not limited to:

- Geographic context (e.g. differences in value may be apparent depending on whether the feature is being assessed in the south of England or the north of Scotland);
- Professional judgment and advice from local specialists;
- Animal or plant species, subspecies or varieties that are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems and their component parts, which provide the habitats required by the extant species, populations and/or assemblages;

- Endemic species or locally distinct sub-populations of a species (Local BAP and/or habitats/species of principal importance);
- Habitat diversity, connectivity and/or synergistic associations;
- Notably large populations of animals or concentrations of animals considered uncommon or threatened in a wider context;
- Plant communities (and their associated animals) that are considered to be typical of valued natural/semi-natural vegetation types;
- Species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change;
- Species-rich assemblages of plants or animals; and,
- Typical faunal assemblages which are characteristic of homogenous habitats.

6.3.16 The Lancashire BHS selection criteria (Lancashire County Planning Department, 1998) provides criteria to indicate habitats (and some species populations) of **County** importance for biodiversity and this document has also been used to inform the evaluation process.

6.3.17 Opinions may differ slightly between professionals as to the value of ecological features / biodiversity resources; therefore, a clear explanation is provided to justify how the evaluation category has been assigned.

Table 6.3.3. Typical descriptions for the levels of ecological importance used in this assessment

CIEEM Scale of Importance[1]	DMRB Scale of Importance[2]	Examples/Typical Descriptions
International and European	**International or European (Very High)**	*Very high importance and rarity, international scale and very limited potential for substitution.* **Sites/Habitats** Internationally designated sites or candidate sites (i.e., SPA, potential SPA (pSPA), SAC, candidate SAC (cSAC), Ramsar, Biogenetic/Biosphere Reserve, World Heritage Site or an area which meets the published selection criteria for such designation. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. **Species** Regularly occurring populations of a species, large enough in number to be of international importance where: • The loss or degradation of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or, • The population forms a critical part of a wider population at an international level; or, • The species is at a critical phase of its life cycle at this scale.

[1] Based on the CIEEM geographical frame of reference (CIEEM, 2018).
[2] Based on geographical frame of reference within LA108 Biodiversity (Highways England, 2020c). Equivalent environmental value within brackets and as per LA104 Environmental assessment and monitoring (Highways England, 2020b).

CIEEM Scale of Importance[1]	DMRB Scale of Importance[2]	Examples/Typical Descriptions
National (UK)	**UK or National (High)**	*High importance and rarity, national scale, and limited potential for substitution.* **Sites/Habitats** A nationally designated site such as Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve, or an area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a Habitat of Principal Importance as listed on Section 41 of the NERC Act 2006 or smaller areas of such habitat essential to maintain the viability of a larger whole. Habitats considered to be irreplaceable such as ancient woodland, ancient and veteran trees, blanket bog and limestone pavement. **Species** Resident, or regularly occurring, populations of species, significant at an International, European, UK or National level where: • The loss of these populations would adversely affect the conservation status or distribution of the species at a national level; or, • The population forms a critical part of a wider population at this scale; or, • The species is at a critical phase of its life cycle at this scale.
Regional **(North-West England)**	**Regional (Medium/High)**	*Medium or high importance and rarity, regional scale, limited potential for substitution*. **Sites/Habitats** Areas of habitat identified in the Natural England North-West Natural Area Profile (i.e., Meres and Mosses Natural Area). Sites which exceed the county-level designations (e.g., Biological Heritage Sites) but fall short of SSSI selection criteria.

CIEEM Scale of Importance[1]	DMRB Scale of Importance[2]	Examples/Typical Descriptions
		Species Resident, or regularly occurring populations of species, significant at an International, European, UK or National level where: • The loss of these populations would negatively affect the conservation status or distribution of the species at a regional scale; or, • The population forms a critical part of a wider population at this scale; or, • The species is at a critical phase of its life cycle at this scale. This may include regularly occurring, locally significant population of a species listed as being nationally scarce (occurs in 16 % or fewer 10 km squares, is listed as a Species of Principal Importance or is identified in a Regional BAP).
Metropolitan, County, Vice-County or other Local Authority-wide area.	**County or equivalent authority (Medium)**	**County - Lancashire** **Sites/Habitats** Designated Sites that are recognised by local authorities such as BHS and County sites that the designating authority has determined meet the published ecological selection criteria for designation, including LNRs in the county authority context. Areas which meet the published selection criteria for county site designations, but which are not themselves designated as such. A viable area of habitat identified in County BAP or in the relevant Natural England area profile. **Species** Resident, or regularly occurring populations of species which may be considered at an International, European, UK or National level where: • The loss of these populations would negatively affect the conservation status or distribution of the species at a county level; or,

CIEEM Scale of Importance[1]	DMRB Scale of Importance[2]	Examples/Typical Descriptions
		• The population forms a critical part of a wider population at this scale; or, • The species is at a critical phase of its life cycle at this scale. This may include locally significant populations of a species listed in a County BAP on account of its regional rarity or localisation.
River Basin District and Estuary System/Coastal Cell. **District is used herein as a geographic frame of reference e.g. Preston.**	**No DMRB equivalent.**	**District – Preston** **Sites/Habitats** Designated Sites that are recognised by local authorities in Lancashire and District sites that the designating authority has determined meet the published ecological selection criteria for designation, including LNR in the unitary authority context. Areas which meet the published selection criteria for district site designations, but which are not themselves designated as such. A viable area of habitat identified in the District BAP or in the relevant Natural England area profile. **Species** Resident, or regularly occurring populations of species which may be considered at an International, European, UK, National, or County level where: • The loss of these populations would negatively affect the conservation status or distribution of the species at a district level; or, • The population forms a critical part of a wider population at this scale; or, • The species is at a critical phase of its life cycle at this scale. This may include locally significant populations of a species listed in a County/District BAP on account of its regional rarity or localisation.
Local	**Local (Low or Lower)**	*Low or medium importance and rarity, local scale.*

CIEEM Scale of Importance[1]	DMRB Scale of Importance[2]	Examples/Typical Descriptions
Immediate local area, for example within 2km of the Scheme.		**Sites/Habitats** Areas of habitat considered to appreciably enrich the habitat resource within the local context (e.g., species-rich hedgerows, ponds etc.). It may also include sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats within the local area are not considered for local designations. **Species** Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context. Populations of county level important species that are not threatened or rare in the county and are not integral to maintaining those populations.
Less than Local	**N/A (Negligible)**	*Very low importance and rarity, local scale.* **Sites/Habitats** Habitats and/or species that are of limited ecological importance due to their size, species composition or other factors. Areas of heavily modified or managed vegetation of low species diversity. **Species** Low or moderate numbers of common and widespread species.

Identification of the Threshold Level for Important Ecological Features

6.3.18 In accordance with the EIA Regulations (2017), this EcIA is targeted towards those ecological features which are considered to be sufficiently valuable; i.e. assessed as IEFs and for which there may be 'likely significant effects'. It is considered impractical and inappropriate for an assessment of the ecological effects of a proposed development to consider in detail every site, species, and habitat that may be affected.

6.3.19 For the purposes of this assessment, the threshold level of geographical value above which ecological features are deemed 'important' and which qualify for inclusion within this assessment is classified using the CIEEM geographical frame of reference (refer to Table 6.3.4). Features considered to be Less than Local value are not considered further within the assessment. However, all habitats considered to be of Less than Local value will be considered within biodiversity net gain calculations.

Identification and Characterisation of Potential Impacts on IEFs

6.3.20 The likely impacts and effects on IEFs as a result of the development were systematically identified by experienced ecologists using published literature and professional judgment. This required a review of the available information on the proposed Scheme layout, likely construction methods, duration of construction, and information on the operational phase of the proposed Scheme. This was considered in combination with the ecological requirements of the IEF, to make a professional judgment on all activities that could potentially result in impacts on IEFs.

6.3.21 All potential construction and operational impacts were assessed for each IEF by considering the characteristics of the relevant potential ecological impact. The principal aim was to identify and quantify potential impacts on the conservation status or value/importance of the feature at the level of geographic importance assessed above. In accordance with the Guidelines

for EcIA (CIEEM, 2018) and LA 108 Biodiversity (Highways England, 2020c) impacts were characterised by considering the following attributes:

- Sign: Positive (beneficial) or Negative (adverse);
- Extent: The spatial or geographical area over which the impact/effect may occur;
- Magnitude: Refers to size, amount, intensity and volume;
- Duration: defined in relation to ecological characteristics (e.g., species lifecycle). This may differ from the duration of the resulting effect;
- Frequency and Timing: the number of times an activity may occur and important seasonal and/or life cycle constraints and any relationship with frequency considered; and,
- Reversibility: recovery possible within a reasonable timescale or there is no reasonable chance of an action to reverse it.

Determining the Significance of the Impact on Important Ecological Features

6.3.22 CIEEM EcIA guidelines defines a significant impact as ‘an effect that either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general’ (CIEEM, 2018). The guidelines also state that ‘A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project.’ In addition, the guidelines state that the significant effects should be qualified with reference to an appropriate geographic scale. An impact can therefore be significant at the Local, County, Regional, National, UK or International levels.

6.3.23 The concept of ‘conservation status’ is used to determine whether an impact on a habitat or species is likely to be ecologically significant. The CIEEM

guidelines provide the following definition for evaluating the effects of impacts and assessing significance:

- For habitats: 'conservation status is determined by the sum of influences on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area'; and,
- For species: 'conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area'.

6.3.24 Assessment of significance is undertaken based on the absence of any integral mitigation measures and represents the 'worst case' potential impacts of the proposed Scheme. In cases of reasonable doubt where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed (i.e., the precautionary principle).

Avoidance, Mitigation, Compensation and Enhancement

6.3.25 It is important as part of any EcIA, wherever possible, to clearly differentiate between avoidance, mitigation, compensation and enhancement and these terms are defined for this ES as follows (CIEEM, 2018):

- Avoidance refers to avoiding impacts, for example by deciding not to locate a project in a particular area or making a change to proposed Scheme layout to ensure no negative impacts. Avoidance can also be part of mitigation.
- Mitigation is used to refer to measures designed to avoid or reduce any negative effects of a Scheme, (e.g., adjusting the location of certain activities or careful timing of an activity to prevent an impact occurring);
- Compensation is used to refer to measures where there may be significant residual adverse ecological effects despite the mitigation proposed. Compensation is only required for negative impacts assessed

as being significant or where required to ensure compliance with legislation and policy. Compensatory measures may include offsite options; and,

- Enhancement is used to refer to measures that seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation.

Integral Mitigation within Scheme Design

6.3.26 Ecological advice has been provided in the very earliest stages of the initial Scheme design and potential ecological constraints have been continually fed into the assessment process of the initial Scheme design.

6.3.27 The protection and retention of habitats/ecological features is integral within the design of the Scheme which has been designed to avoid or minimise impacts to ecologically sensitive areas through careful siting and design, such as:

- To avoid ecological impacts during construction, temporary construction areas (e.g., site compound locations, soil storage areas) would be located outside of notable habitats and areas identified as suitable habitat for notable and protected faunal species where possible;
- Avoiding impacts to ponds and mature trees where possible;
- Reducing the extent of impacts to hedgerows;
- Sensitive drainage design, that is compliant with Water Framework Directive (2000) would be in place to maintain or improve optimal conditions for local hydrology and surface water run-off (quality and volume) entering watercourses and other habitats to a negligible level; and,
- Habitats of value (e.g., individual trees, hedgerows, works around waterbodies and watercourses) would be protected during construction

by appropriate mitigation methods. Ecological supervision would be undertaken to further protect habitats where appropriate. This would be detailed within a Construction Environmental Management Plan (CEMP).

6.3.28 As part of the integral mitigation to avoid/reduce the effects of local compaction of ground within the root protection zones of retained trees/hedgerows or other accidental damage, appropriate tree protection measures would be implemented in accordance with BS 5837:2012 'Trees in relation to design, demolition and construction. Recommendations' (BSI, 2012) and following additional arboricultural advice (Refer to Appendix 5.5 Arboricultural Impact Assessment Report)

6.3.29 As part of the integral mitigation, standard pollution prevention guidelines to reduce/avoid impacts to the water quality of watercourses and waterbodies would be followed. These methods would adhere to legislative requirements outlined in Chapter 11 'Water Environment'. It is predicted that this would be sufficient to prevent any impacts caused by accidental pollution incidents.

Determination of Significance of Residual Effects

6.3.30 The residual effects are those remaining impacts predicted after mitigation has been undertaken. This takes into account confidence in the success of the mitigation measures proposed and identifies those impacts which cannot be avoided or mitigated. Residual impacts are assessed against the same criteria set out for the impacts before mitigation.

Consideration of Cumulative Impacts

6.3.31 Impacts on IEFs as a result of the development cannot be viewed in isolation, the potential cumulative impacts from different developments, in combination with the proposed Scheme have been considered, as other developments within the vicinity of the Scheme may have impacted the IEFs considered here.

6.3.32 The assessment of cumulative impacts on ecology and nature conservation has taken into account the developments within 1km of the proposed Scheme boundary that have the potential to be developed at a similar time. This includes relevant developments that have either been granted with planning permission or are undecided.

6.3.33 Lancashire County Council identified 18 such developments within 2km of the proposed Scheme. A summary of these developments and the environmental assessment information obtained from these development is provided in Chapter 17, 'Cumulative Impacts'. In addition, Section 6.11 provides an assessment of the cumulative impacts on ecology and nature conservation.

Limitations to Ecological Impact Assessment

6.3.34 This impact assessment is based on a professional judgment of the potential impacts on the IEFs of habitats and species using all available sources of data (desk-study and field based empirical survey evidence). Opinions may differ slightly between professionals as to the value of ecological features and the likely impacts that would generate significant effects to that specific feature. Furthermore, additional sources of baseline information may become available to alter that opinion.

6.3.35 This assessment is based on the most up to date proposed Scheme design available and has taken account of a reasonable limit of deviation for elements that are subject to detailed design. A compliant ES requires an assessment of the reasonable worst-case outcome for the IEFs and for any outstanding design matters for this proposed Scheme to fall within the spatial extent of this assessment.

6.4 Consultation

6.4.1 The Scheme plans and a draft version of the ecology chapter were subject to a stakeholder consultation exercise which is documented in Appendix 4.1

'Consultation Statement'. Table 6.4.1 below provides details of the consultation responses of most relevance to ecology.

Table 6.4.1. Stakeholder consultation comments outline.

Stakeholder	Comment	LCC Response
Campaign for the Protection of Rural England (CPRE)	CPRE does not support the creation of the proposed new road for Station access as it impacts the wildlife corridor. The proposed new road crosses over the Wildlife Corridor. It also crosses an area designated by Natural England as a Habitat Network Enhancement Zone, with part of it in an Expansion Zone. Even with a bridge over it as proposed, the building work would negatively impact the species relying on this corridor and its buffer zone. The proposed new road would also remove the fields to the left of the proposed Station site – those fields are the Habitat Network Enhancement Zone and act as a buffer zone for wildlife. The proposed new road into the Station therefore disrupts and in the case of the fields and hedgerows on the left of the Station, removes some of the 'existing infrastructure network' that is Preston's wildlife corridor and corridor buffer.	The access road and bridge is considered to be an essential component of the Scheme as a Park and Ride facility and is part of the wider transport and access strategy for the area. This is confirmed variously in the documents of the County Council and the City Council. The reasoning for these aspects is set out in both the Planning and the Design and Access Statements. As discussed in Section 6.9, tree and hedgerow planting has been sited to achieve beneficial habitat connections to the wider landscape. Extensive linear and scrub habitats are to be created along the new road layout, along the northern boundary of the car park and to the west and south-west of the Scheme. As new planting matures this will offset the hedgerow removal. Such enhancements will provide a biodiversity net gain in line with impending legal requirements. There are considered to be no significant barriers to the movement of the identified important ecological features that may use the Proposed Wildlife

Stakeholder	Comment	LCC Response
	Furthermore, CPRE policies prioritise hedgerows as a key nature based solution to carbon capture and the restoration of biodiversity. Your report identifies the removal of habitats including hedgerows, resulting in negative impacts to a broad range of species including priority species such as bats, brown hares, and otters. We support a gain in biodiversity, but I do not support the unnecessary loss of established hedgerows and the disruption of wildlife corridor Proposed Wildlife Enhancement Area is not linked to the existing wildlife corridor or its buffer zone.	Enhancement Area. In addition, the proposed wildlife enhancement area adjoins the railway corridor, which provides connectivity to habitats in the wider landscape. The wildlife enhancement area would be accessible to species, such as slow worm, which are known to occupy habitats along the railway corridor.
Canal and Rivers Trust	The new permanent highway bridge over the canal would still continue to have an impact beyond the design year timeframe which would not be able to be mitigated. In terms of the proposed landscaping shown this would be acceptable and in terms of the species. We would welcome reviewing further details on the landscape strategy as the scheme progresses.	Biodiversity net gain for habitats and linear habitats is to be achieved within the boundary of the Scheme which includes planting of trees and shrubs to the immediate north and south of the canal crossing as well as ponds close to the canal as compensation for unavoidably affected canal margins.

Stakeholder	Comment	LCC Response
	We would welcome sight of the various ecological studies and reports before commenting further on this matter. To achieve a biodiversity net gain of a minimum of 10%, if this is not possible on the site, we would welcome hedgerow improvements along the canal corridor here in terms of laying and planting.	
General public comments	There are many mature trees that will need to be felled at your proposed location, at a time when we need to be planting and protecting trees. It also represents another loss of natural environment in the area.	Tree loss has been minimised to as much as was possible in the design process. In order to offset and enhance the tree resource in the Scheme (in line with biodiversity net gain) the Scheme is to plant native species rich hedgerows with trees, and there are to be areas of tree and scrub planting which would provide a net gain in biodiversity upon maturation.
	On your proposed site there is a population of Newts and other amphibians that live on the railway lineside.	Great crested newts and common toads have been identified in ponds outside of the site boundary and mitigation is to be applied to avoid harm to amphibians as described in this chapter.

6.5 Baseline Description and Evaluation

6.5.1 A summary of the ecological baseline status and nature conservation value for IEFs is provided below. This information is based upon the findings of the desk study and field surveys for the Scheme. The accompanying suite of

technical survey reports provide detailed descriptions of the methodologies, results and evaluations (Appendices 6.1 – 6.16).

6.5.2 Table 6.5.1 gives a summary of the designated sites for nature conservation located within a 5km (European and international sites), 2km (national, regional) and 1km (county/local sites) radius of the Scheme boundary.

6.5.3 The distances that are given between an important ecological feature and the Scheme boundary are approximate only and based on the Scheme footprint and temporary working area boundaries as per Figure 1 in Appendix 6.1. This boundary has altered from the original boundary issued in 2019. The technical reports were completed in respect of the original Scheme boundary.

Designated Sites for Nature Conservation

6.5.4 Two statutory designated sites of European and International importance were identified within 5km of the Scheme: Ribble and Alt Estuaries SPA and Ribble and Alt Estuaries Ramsar (Refer to Figure 1 in Appendix 6.15). It should be noted that the SPA and Ramsar designated areas also overlap with Ribble Estuary SSSI and Ribble Estuary NNR designated areas.

6.5.5 The Scheme also falls within the Natural England Impact Risk Zones (IRZs) for the Ribble Estuary SSSI and Newton Marsh SSSI (located 3.4km south-west). Newton Marsh SSSI has been designated for its bird interests. Consultation with Natural England would be required as a result of the Scheme's location within these IRZs.

6.5.6 Two further statutory designated sites were identified within 2km of the Scheme: Ribble Estuary Marine Conservation Zone (MCZ) located approximately 1.4km south of the Scheme and, Haslam Park LNR located approximately 1.9km east of the Scheme. These sites are of National and District importance respectively.

Non-Statutory Designated Sites for Nature Conservation

6.5.7 There is one non-statutory designated site within 1km of the Scheme: Lancaster Canal (whole length in Lancashire Including Glasson Branch) BHS.

Table 6.5.1. Statutory and Non-Statutory Designated Sites for Nature Conservation of Relevance to the Scheme

Site Name	Designation	Distance/Direction to Scheme (at closest point)	Size (ha)	Description	Evaluation
Statutory Designated International and/or European Sites within 5km					
Ribble and Alt Estuaries	SPA	3.7km south-west	12447.14	The SPA and Ramsar sites comprise two estuaries, extensive areas of sand, mudflats and saltmarsh. Areas of coastal grazing marsh are also present. The sites support internationally important populations of water-birds in winter, including swans, geese, ducks and waders. They are also of major importance during migration periods, especially for wader populations moving along the west coast of Britain. The larger expanses of saltmarsh and areas of coastal grazing marsh support breeding birds, including large concentrations of gulls and terns. The area also supports up to 40% of the British population of Natterjack toad (*Epidalea (Bufo) calamita*).	**European**
	Ramsar	3.7km south-west	13488.48		**International**
Statutory Designated National Sites within 2km					
The Ribble Estuary	MCZ	1.4km south	1542.79	The Ribble Estuary MCZ is an inshore site that covers an area of approximately 15km². The protected feature of the MCZ comprises smelt (*Osmerus eperlanus*). The nearest section to the Scheme boundary is	**National**

Site Name	Designation	Distance/Direction to Scheme (at closest point)	Size (ha)	Description	Evaluation
				a section of Savick Brook (a tributary of the River Ribble).	
Statutory Designated Regional Sites within 2km					
Haslam Park	LNR	1.9km east	17.5	Haslam Park LNR is a Victorian influenced town park with many of the original features still in place and is situated 1.9 km east of the Scheme. The reserve includes a lake, pine and deciduous woodland, seasonally flooded water meadows and hedgerows.	**District**
Non-Statutory Designated Sites within 1km					
Lancaster Canal (Whole Length in Lancashire Including Glasson Branch)	BHS	Under Scheme footprint	179.52	The canal is the largest and most species rich waterbody in the county, supporting a large assemblage of plant and animals associated with slow flowing water.	**County**

Habitats

6.5.8 The majority of the study area was dominated by agriculturally improved grassland fields. There were occasional areas of arable, amenity grasslands, species poor semi-improved grasslands, and broad-leaved and/or mixed woodlands. Other habitats which were present to a lesser extent include ponds and minor watercourses, areas of scrub and tall ruderal vegetation. Hedgerows, often with mature trees, formed the majority of the field boundaries, a number of which were species-rich and/or meet the criteria for 'Important' hedgerows under the Hedgerows Regulations 1997.

6.5.9 Other notable features within the study area included the Lancaster Canal (designated as a BHS – See Table 6.5.1) and the Preston to Blackpool railway line. In addition, Ashton and Lea Golf Course formed the southern boundary of the study area.

6.5.10 A summary of the habitat types within the study area and whether or not they met the criteria as a habitat of principal importance, Lancashire BAP and/or Lancashire BHS selection criteria is provided in Table 6.5.2. This table also provides an evaluation of the intrinsic value of each habitat type and deliberately does not include an evaluation based on the fauna it may support. Populations of notable/protected fauna have been assessed separately.

6.5.11 Further information of the habitats within the study area is provided in full in the Extended Phase 1 Habitat Survey report (Appendix 6.2). The habitats present are illustrated on Figure 3 of the report.

Table 6.5.2 Summary and Evaluation of Habitats recorded within the Study Area (within 500m of the Scheme boundary)

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
Broad-leaved semi-natural woodland (A1.1.1).	The study area included a total of four relatively small areas of broad-leaved semi-natural woodland. These include an area of woodland to the north of the University of Central Lancashire (UCLAN) land bordering the south of the canal (2.3ha); an area of woodland to the south of the UCLAN land bordering the north of the railway line (0.85ha); a small woodland on the western aspect of Lea Road (0.25ha) and a small area of wet woodland (habitat of principle importance) (0.45ha) to the south of the Lancaster Canal.	**No**	**Yes**	**Yes** One area at SD49551 31320 measuring 0.25ha and a second area at SD48651 31537 measuring 0.45ha. The latter is 'wet woodland'.	**County**
Broad-leaved plantation woodland (A1.1.2)	Plantation woodland was found within Aston and Lea Golf Club and UCLAN land. The majority of this woodland type is used as screening within the grounds of the Ashton and Lea Golf Course and sports field where in parts, better represents scattered trees due to the lack of canopy cover. Within these screening areas, the dominant canopy species included	**No**	**No**	**No**	**Local**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	pedunculate oak (*Quercus robur*), silver birch (*Betula pendula*), rowan (*Sorbus aucuparia*) and wild cherry (*Prunus Avium*).				
Dense/continuous scrub (A2.1)	Several areas of dense continuous scrub were present across the study area. These generally occurred around ponds/watercourses and along linear features such as the railway line, roadsides and field boundaries. The continuous scrub in the study area included thickets of bramble (*Rubus fruticosus agg.*) and other shrub species such as hawthorn, blackthorn (*Prunus spinosa*) and elder (*Sambucus nigra*).	**No**	**No**	**No**	**Less than local**
Scattered scrub (A2.2)	This habitat type predominantly occurred around ponds or watercourses within the study area. Typical species included holly (*Ilex aquifolium*), hawthorn and blackthorn.	**No**	**No**	**No**	**Less than local**
Scattered broad-leaved trees (A3.1)	Mature standard trees were present throughout the study area, often marking the locations of former hedgerows when present in open fields and on the banks of	**No**	**No**	**No**	**District**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	watercourses/ponds. Species most commonly recorded included pedunculate oak, sycamore (*Acer pseudoplatanus*) and ash (*Fraxinus excelsior*). Alder (*Alnus glutinosa*) and willow (*Salix sp.)* were also recorded in damper areas of the study area such as on the banks of watercourses.				
Improved grassland (B4)	Improved grassland was the predominant habitat type within the study area and the grassland was either intensively grazed and/or managed for silage production. The fields were dominated by perennial rye-grass (*Lolium perenne*) and meadow foxtail (*Alopecurus pratensis)* with frequent meadow grass species including rough meadow-grass (*Poa trivialis*) and creeping bent (*Agrostis Stolonifera*). As is typical for such habitat types, the herb content in this habitat was very low and restricted to species tolerant of agricultural improvement such as white clover (*Trifolium repens*), dandelion (*Taraxacum officinalis* agg.), creeping buttercup (*Ranunculus repens*)	**No**	**No**	**No**	**Less than local**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	and common mouse ear (*Cerastium fontanum*).				
Marshy Grassland (B5)	Marshy grassland was located in one isolated area within a field depression and categorised due the dominance of hard rush (*Juncus inflexus*). Other species present included reed canary-grass and floating sweet grass (*Glyceria fluitans*).	**No**	**No**	**No**	**Less than local**
Poor semi-improved grassland (B6)	Across the study area several small isolated species-poor semi-improved grassland fields were recorded. The species composition was similar across the sites with the dominant grass species including abundant perennial rye-grass, Yorkshire fog (*Holcus lanatus*), creeping bent, meadow foxtail, occasional marsh foxtail (*Alopecurus geniculatus*) and red fescue (*Festuca rubra*). The herb layer was generally indicative of more nutrient enriched grassland habitat with species such as occasional broad-leaved dock (*Rumex obtusifolius*), common sorrel (*R. acetosa*), lesser spearwort (*Ranunculus*	**No**	**No**	**No**	**Less than local**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	flammula), creeping buttercup and meadow buttercup (*Ranunculus acris*).				
Tall ruderal (C3.1)	This habitat was common across the study area and was characterised by tall, unmanaged vegetation usually resulting from some degree of ground disturbance. This comprised common species such as common nettle, great willowherb (*Epilobium hirsutum),* broad-leaved dock and common hogweed (*Heracleum sphondylium*).	**No**	**No**	**No**	**Less than local**
Swamp (F1)	One small (<0.1ha) area of reedbed (habitat of principal importance) was located in close proximity to Lancaster Canal where it transitions from wet woodland to swamp habitat. The area was overwhelmingly dominated by common reed with scattered young willow trees throughout.	**No**	**Yes**	**Yes**	**District**
Standing water (G1)	Ponds were frequent throughout the study area. Temporary waterbodies were also recorded. These features are distributed intermittently across the Scheme within	**No**	**No**	**Yes - Two ponds qualify as habitats of principle**	**District**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	improved grassland grazing/silage fields. Little to no aquatic vegetation was recorded within these temporary waterbodies with occasional tussocks of rushes fringing the margins. The majority of the more permanent waterbodies were present within grazing fields and have little aquatic vegetation. In areas which were less intensively grazed, the pond margins comprised species such as yellow flag iris (*Iris pseudacorus*) and reedmace (*Typha latifolia*). The margins of other ponds were sparsely vegetated with occasional rushes due to cattle poaching. One pond located south of the wet woodland area was observably more botanically diverse compared to the rest of the surrounding waterbodies; with species comprising branched bur-reed (*Sparganium erectum*), water plantain (*Alisma plantago-aquatica*), common water crowfoot (*Ranunculus aquatilis*), marsh bedstraw (*Galium palustre*) soft rush (*Juncus effuses*) and			**importance due to their breeding common toad populations (Appendix 6.5).** **No – All other standing waterbodies**	

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	celery leaved buttercup (*Ranunculus sceleratus*). The Lancaster Canal passes through the centre of the study area. The canal has a low earth bank, mainly present on the north side. There was a good diversity of marginal vegetation throughout, including hemlock water dropwort (*Oenanthe crocata*), yellow flag-iris (*Iris pseudacorus*), lesser pond sedge (*Carex acutiformis)* hard rush, water mint (*Mentha aquatica*), reed canary-grass, brooklime *(Veronica beccabunga),* water forget-me-not *(Myosotis aquatica*), common skull cap *(Scutellaria galericulata*), meadow sweet (*Filipendula ulmaria*), reedmace and localised stands of common reed. Aquatic vegetation present includes greater duckweed (*Spirodela polyrhiza*), common duckweed (*Lemna minor*), common arrowhead (*Sagittaria sagittifolia*) and fringed water lily (*Nymphoides peltata*). Only a relatively small section of the canal was located within the study area and this				

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	has been factored into the evaluation process. Three seasonally wet ditches were recorded along field boundaries. The ditches held varied levels of water and ranged from approximately one to two metres wide.				
Running water (G2)	Running water was mostly limited to heavily-shaded, small streams and ditches. The banks of the watercourses contained woodland flora such as red campion, native bluebell, lesser celandine, common male fern (*Dryopteris filix-mas)* and broad buckler-fern (*Dryopteris dilatata*), herb-Robert, common nettle and hemlock water-dropwort. Water depth was typically very shallow (less than 15cm) with steep narrow (less than 1m) embankments. In parts, particularly for the watercourse following the western margin of the golf course was dominated by Himalayan balsam (*Impatiens glandulifera*).	**No**	**No**	**No**	**Local**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
Arable land (J1.1)	One area of arable land was recorded within the area of study. A very thin field margin containing nutrient favouring species such as cock-foot, cow parsley (*Anthriscus sylvestris*) common nettle and common cleaver (*Galium aparine*) bordered the field.	**No**	**No**	**No**	**Less than local**
Amenity grassland (J1.2)	The majority of this habitat was found within Aston and Lea Golf Club and UCLAN Sports Arena. This grassland is maintained (short, compact turf) for amenity purposes and contained very limited botanical diversity. An update survey conducted in July recorded the areas of amenity grassland within UCLAN land has become unmanaged and held a higher species diversity. This area is better represented as species poor semi-improved grassland; however, it is likely to return to managed amenity grassland in the future.	**No**	**No**	**No**	**Less than local**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
Species-rich intact hedge (J2.1.1)	Species-rich hedgerows accounted for much of the boundary habitat within the study area. These observably well-established hedgerows contained at least four woody species including a combination of hawthorn, hazel (*Corylus avellana*), holly, elder, pedunculate oak, ash, native rose species (*Rosa* sp.), wych elm (*Ulmus glabra*) and blackthorn. The ground flora comprised predominantly nutrient enriched ruderal species with occasional. localised native bluebell coverage.	**No**	**No**	**Yes**	**District**
Species-poor intact hedge (J2.1.2)	This habitat was common within the study area and consisted of often heavily trimmed hedges composed of hawthorn and blackthorn. The ground flora was generally species-poor and restricted to common grasses and herbaceous species. Typical species included Yorkshire fog, cock's-foot, false oat-grass and cleavers.	**No**	**No**	**Yes**	**District**
Species-poor defunct hedge	There were a small number of species-poor defunct hedgerows present in the study area. These hedgerows contained	**No**	**No**	**Yes**	**District**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
(J2.2.2)	significant gaps, leggy in parts and were no longer stock proof. Most of these hedgerows were dominated by hawthorn with little to no ground flora.				
Species-rich hedge and trees (J2.3.1)	There were also several species-rich hedgerows with trees present within the study area which were similar in composition to the species-rich intact hedge but incorporate mature trees species such as pedunculate oak, ash and sycamore.	**No**	**No**	**Yes**	**District**
Species-poor hedge and trees (J2.3.2)	Several species-poor hedgerows with trees were present in the study area. Most of these hedgerows were dominated by hawthorn with trees species predominately pedunculate oak, ash and sycamore.	**No**	**No**	**Yes**	**District**
Dry ditch (J2.6)	Many of the field drains along the field boundaries in the study area were dry. These ditches were typically up to one metre wide and one metre deep depending on topography. The bank flora also	**No**	**No**	**No**	**Less than local**

Habitat type (JNCC Phase 1 Habitat Survey Code)	Description, Distribution within the study area and Rationale for Evaluation	Qualifies under Local Wildlife Site Selection Criteria	Local Biodiversity Action Plan (Lancashire BAP habitat/species	Habitat or Species of Principal importance NERC Act 2006)	Evaluation
	supported hedgerow species, as most ditches were associated with hedgerows.				
Hard standing (non-standard addition)	This feature was principally associated with roads, houses and farm buildings.	**No**	**No**	**No**	**Less than local**
Veteran trees (non-standard addition)	A potential veteran oak tree was located at the end of a species rich hedgerow, adjacent to a watercourse (Grid Ref- SD 4884 3142), is considered to be of National importance for biodiversity. Veteran trees are regarded as 'irreplaceable' habitat under the NPPF (2019) and may meet the Lancashire BHS selection criteria.	**Yes**	**No**	**Yes**	**National**

Species

6.5.12 A concise summary of the desk study and field survey results for protected and notable species are presented below in ascending taxonomic order. Further detailed information is provided in the technical reports found in Appendices 6.1 - 6.16.

Aquatics (Macro-invertebrate and macrophyte communities)

Desk Study

6.5.13 No records of freshwater macro-invertebrates were identified following a search using The Ecology and Fish Data Explorer (Environment Agency, 2021). In addition, no records of freshwater macro-invertebrates and macrophytes were held by LERN within the 1km search radius.

Field survey

6.5.14 A total of three watercourses (one stream and two ditches) were identified within the study area and targeted for freshwater macro-invertebrate surveys in September and March 2021. Species identified were ubiquitous to aquatic habitats with indistinct habitat preferences. Pollution tolerant species were prevalent in the community, and no species of conservation interest were identified.

6.5.15 Twelve ponds were subject to PSYM survey. All ponds were classified as Poor or below in terms of their ecological quality.

6.5.16 The Lancaster Canal was subject to PSYM survey. Although classification of the ecological status of the canal was not possible the results available suggest that macro-invertebrate community present was comprised of families which are tolerant to pollution.

Evaluation

6.5.17 The macro-invertebrate communities at the stream and both ditches surveyed have been evaluated as of **Less than local** importance.

6.5.18 Macro-invertebrate and macrophyte communities at all surveyed ponds have been evaluated as of **Less than local** importance.

6.5.19 The macro-invertebrate community identified from the reach of Lancaster Canal within the study area has been evaluated as of **Less than local** importance.

Common Toad

Desk Study

6.5.1 A total of 137 records for common toad were provided by LERN. Numerous records for common toad fell within the western extent of the 1km search radius with several records located adjacent to the railway line and Lancaster Canal.

Field Survey

6.5.2 Common toad survey methods included the monitoring of potential spring migration routes and breeding population counts within six ponds scoped in for field surveys. No common toads were identified during the first visit along any potential migration routes or within any of the six ponds. During the second visit, there were no common toads identified along any potential migration routes; however, 57 common toads were recorded in P23 and four toads were recorded in P24.

6.5.3 In total, 266 adult common toads were recorded during the breeding pond surveys (246 in P23 and 20 in P24). Toad spawn strings were observed in Pond 23 during April 2021.

6.5.4 Common toad counts recorded during both the initial torch surveys and the breeding pond surveys were used to inform the population size class

assessment. A total peak count of 159 adult common toads was recorded within the ponds (144 adults in P23 and 15 in P24) with all peak count records obtained from one survey visit on 29th March 2021. This equates to a 'good' (100 1000) population size class.

Evaluation

6.5.5 In consideration of the desk study and field survey results, alongside the conservation value of common toad, the common toad population associated with the survey area was considered to be of **District** importance.

6.5.6 As both P23 and P24 support common toad, both ponds qualify as a habitat of principal importance. are considered to be of **District** importance.

Great Crested Newt

Desk Study

6.5.7 A total of 105 recent (post-2009) records for GCN were provided by LERN. No records of GCN were located within the Scheme boundary.

6.5.8 A search of MAGIC produced 21 European Protected Species (EPS) mitigation licence returns for GCN between 2014 and 2018 within 1km of the Scheme boundary. The majority were located in and around the residential land east of Lea Lane, over 500m from the Scheme. This area has been subject to large residential developments within this time which have resulted in the need for GCN mitigation licencing. Three of the records fell within or just beyond a 250m buffer area from the Scheme; all were located to the west of the PWD/EWLR Scheme. A further location of a GCN mitigation licence was situated on Sidgreaves Lane approximately 275m to the north of the Scheme.

6.5.9 Ten ponds within the GCN survey area for the Scheme were also present within the PWD and EWLR study areas. These ponds were originally surveyed in 2015, with update surveys also carried out in 2018. Three of these ponds were confirmed to contain GCN. These ponds were denoted as P14, P15 and

P22 within the GCN survey for the Scheme in 2020 (Refer to Figure 1: Appendix 6.6).

6.5.10 P14 (located 455m south of the Scheme) had a peak count of one adult GCN in 2015, with no signs of breeding recorded. This pond also returned a peak count of one adult GCN in 2018. The pond was dry for two of the six survey visits in 2018.

6.5.11 P15 (435m south of the Scheme) was found to support two immature GCN on one occasion in 2018. This species was recorded as likely absent from the pond in 2015.

6.5.12 Both P14 and P15 were recorded as dry during the GCN surveys completed for the Scheme in 2020 (see below) and therefore, no eDNA assessment was undertaken.

6.5.13 P22 (located 275m north of the Scheme), was found to support a peak count of one adult GCN in 2015. This pond was subsequently found to support a peak count of two adult GCN in 2018 with evidence of breeding also recorded.

Field Survey

6.5.14 A HSI assessment was undertaken in March 2020 on 27 ponds (P1 to P27) located within the study area to assess their suitability to support GCN. Following this assessment, 18 ponds out of 27 were classed as having at least average suitability to support GCN (Refer to Figure 1; Appendix 6.6).

6.5.15 Of the 27 ponds, eDNA assessments were carried out on 15 ponds to test for the presence of GCN. A further 11 ponds were not subject to eDNA assessments as they were completely dry. A further pond in which GCN were confirmed to be present (P22), formed part of an ongoing Natural England EPS mitigation licence and was not available to access. This pond was located in excess of 320m from the Scheme boundary.

6.5.16 One pond (P6) returned a positive eDNA result (albeit with a trace amount of eDNA), and one pond (P21) returned an inconclusive result on two occasions, likely due to contaminants in the water. P21 was discounted from further survey due to the poor suitability rating for GCN and previous negative findings from GCN surveys associated with the PWD/EWLR Scheme.

6.5.17 A population size class assessment of P6 was undertaken. No GCN were identified within P6 and the pond was found to be dry during the fourth visit. This pond is located approximately 180m east of the Scheme boundary across Lea Road.

Evaluation

6.5.18 GCN receives comprehensive legal protection via the Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended) and is included as a species of principal importance listed as a Lancashire BAP priority species. The north-west of England is a stronghold for GCN, and a large number of GCN populations occur in the county due its high pond density. An audit of 487 ponds carried out in the north-west in 1995/1996 found the species to be present in 26% of ponds. However, it is acknowledged that this audit is dated and the number of ponds in Lancashire and England is gradually decreasing (Lancashire Biodiversity Partnership, 2001).

6.5.19 In consideration of the desk study and field survey results alongside the conservation value of GCN, the GCN population associated with the field study area was considered to be of **Less than Local** importance.

<u>Slow Worm</u>

Desk Study

6.5.20 All reptile records provided by LERN were of slow worm. Five records were located along the edge habitats of the Preston to Blackpool rail line. Three of

these records related to the same location and were recorded during reptile surveys conducted for the PWD/EWLR Scheme (see below). The other records relate to land within Springfield's Fuels approximately 1.2km west of the Scheme footprint.

6.5.21 A single slow worm was recorded during reptile surveys for the PWD/EWLR Scheme in 2015. The slow worm was found under an artificial refuge tile placed within scrub habitat to the immediate south of the railway line on three separate occasions.

Field Survey

6.5.22 Slow worm were included in the scope for recording incidental field sightings during the range of ecology surveys undertaken for the Scheme (refer to Appendix 6.14).

6.5.23 One record of a slow worm was recorded during a climb and inspect tree survey conducted in August 2020. The slow worm was found under a discarded large plastic container within woodland to the east of Lea Road. This location is approximately 20m from the Scheme boundary.

6.5.24 Due to the intensive management of the pasture fields, the vast majority of the land within the Scheme is of low suitability for slow worm. However, the habitats both on and immediately adjacent to the Scheme boundary, particularly along the rail line, do provide suitability to support this species as is reflected by the desk study records.

Evaluation

6.5.25 Within the Scheme, the vast majority of the land is sub-optimal for use by slow worm. However, the woodland, hedgerows and scrub habitats on Scheme boundary present suitable locations to support the species.

6.5.26 At a County level, under Lancashire BHS selection criteria Re1, any site which regularly supports a population of native reptiles (other than common lizard

(*Zootoca vivipara*) should be put forward for consideration as a BHS (Lancashire County Council Planning Department, 1998). It is considered that the records for slow worm within the Scheme and 50m radius do not constitute BHS site selection; however, in consideration of the number and distribution of records, the slow worm population associated with the study area is considered to be of **Local** importance.

Breeding Birds

Desk Study

6.5.27 Five statutory designated sites which include breeding bird interests within their reasons for designation were identified within 5km of the Scheme boundary. These were:

- Ribble and Alt Estuaries SPA;
- Ribble and Alt Estuaries Ramsar;
- Ribble Estuary SSSI;
- Newton Marsh SSSI; and,
- Ribble Estuary NNR.

6.5.28 A total of 656 records of 40 bird species within 1km of the Scheme were returned from LERN. It is plausible all species could breed within 1km of the Scheme. Of these species there were:

- Three qualifying species for the Ribble and Alt Estuaries SPA;
- No qualifying species for the Ribble and Alt Estuaries Ramsar;
- Four notable species for the Ribble Estuary SSSI;
- Five qualifying species Newton Marsh SSSI;
- Thirteen species of principal importance;

- Six species listed in the Lancashire BAP;
- Fifteen Red listed species in the Birds of Conservation Concern (BoCC) 4 (Eaton et al., 2015); and,
- Twenty Amber listed species in the BoCC 4 (Eaton et al., 2015).

6.5.29 A total of 74 bird species were recorded during field surveys for the PWD/EWLR Scheme in 2015 (Jacobs, 2017). Of the 74 species, 27 were likely to be breeding including 16 species of conservation importance. The utilisation of the PWD/EWLR field study area (of which there is some crossover with the Schemes study area) by the 27 breeding bird species was considered to be likely given the habitats present.

Field Survey

6.5.30 A total of 65 bird species were recorded within the study area during the breeding bird surveys and included the following notable records:

- Three qualifying species for the Ribble and Alt Estuaries SPA;
- No qualifying species for the Ribble and Alt Estuaries Ramsar (although two 'noteworthy' species included in the citation were identified during the surveys but were not breeding);
- Three qualifying species for the Ribble Estuary SSSI;
- Nine qualifying species for the Newton Marsh SSSI;
- One species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended);
- 11 species of principal importance;
- 11 Red listed species on the BoCC 4 (Eaton et al., 2015);
- 17 Amber listed of the BoCC 4 (Eaton et al., 2015); and,
- Six Lancashire BAP species.

6.5.31 Three breeding qualifying species of the Ribble and Alt Estuaries SPA and Ribble Estuary SSSI; black-headed gull (*Chroicocephalus ridibundus*), common tern (*Sterna hirundo*) and lesser black-backed gull (*Larus fuscus*) were recorded during the breeding bird surveys but they were not considered to be breeding within the study area. Black-headed gull and common tern are also cited as 'noteworthy' species in section 20 of the Ramsar information sheet.

6.5.32 No breeding bird populations associated with Newton Marsh SSSI were present within the study area.

6.5.33 Of the 11 species of principal importance bullfinch (*Pyrrhula pyrrhula*), curlew (*Numenius arquata*), dunnock (*Prunella modularis*), grey partridge (*Perdix perdix*), herring gull (*Larus argentatus*), house sparrow, lapwing, reed bunting (*Emberiza schoeniclus*), skylark (*Alauda Arvensis*), song thrush (*Turdus philomelos*) and starling (*Sturnus vulgaris*) five were recorded as probable breeding species due to the regularity on which they were recorded or habitats they were recorded in. These five species are: dunnock, house sparrow, lapwing, song thrush and starling.

6.5.34 Six Lancashire BAP species were recorded during the breeding bird surveys. These were: grey partridge, house sparrow, lapwing, reed bunting, skylark and song thrush.

Evaluation

6.5.35 A range of common bird species and a limited number of notable species were recorded displaying breeding activity during surveys undertaken in 2020.

6.5.36 SPAs are designated based on regularly supporting qualifying species in numbers which reach 1% of the UK population. In order to determine the importance of the study area to the qualifying species for the Ribble and Alt Estuaries SPA population, estimates were taken from BTO Bird facts (August,

2015) and compared to the peak counts of each species recorded over the survey period.

6.5.37 Numbers of breeding species recorded throughout the survey period were generally not considered to represent a significant proportion of the UK or local populations (based on comparisons with the relevant species atlases (Musgrove *et al*., 2013; and White, *et al*., 2013) and/or were considered to be using the study area on an occasional and transitory basis. However, it should be noted three species exceeded the 1% threshold (none of which were listed on the SPA designation). These species are great black-backed gull (*Larus marinus*), for which the population recorded within the study area is 10% of the entire Lancashire breeding population; hobby (*Falco Subbuteo*) where a single non-breeding bird was recorded during the third visit and so accounts for 3.3% of the entire Lancashire breeding population; and mute swan where a record of six birds accounts for 1.57% of Lancashire's breeding population. Only mute swan was presumed to have bred within the study area. No suitable habitat was identified within the study area that could support breeding great black-backed gull and no nests identified to be used by hobby.

6.5.38 Generally, the bird species recorded within the study area are considered to be a typical assemblage for the county and local area given the habitats present. However, due to mute swan exceeding the 1% threshold, the breeding bird assemblage recorded within the study area is considered to be of **County** importance.

Wintering Bird Surveys

Desk Study

6.5.39 Five Statutory Designated Sites designated due to their wintering bird populations were identified within 5km of the Scheme boundary. These were;

- Ribble and Alt Estuaries SPA;
- Ribble and Alt Estuaries Ramsar;

- Ribble Estuary SSSI;
- Newton Marsh SSSI; and,
- Ribble Estuary NNR.

6.5.40 A total of 626 records for 38 species categorised as wintering, passage, migrant or vagrant bird species was provided by LERN. Of these, there were;

- Two qualifying species for the Ribble and Alt Estuaries SPA;
- Two qualifying species for the Ribble and Alt estuaries Ramsar;
- Five notable species for the Ribble Estuary SSSI;
- 14 species of principal importance;
- Seven of the 13 bird species in the Lancashire Local BAP;
- 15 species on the Red List BoCC (Eaton et al., 2015); and,
- 18 species on the Amber List BoCC (Eaton et al., 2015).

6.5.41 A review of the wintering bird survey information from the PWD/EWLR Scheme was undertaken. A total of 76 wintering bird species were recorded during field surveys within the PWD/EWLR study area between 2014-2015 (Jacobs, 2017). The utilisation of the PWD/EWLR field study area (of which there is some crossover with the Cottam Parkway study area) by waders, gulls, winter thrushes, passerines and other bird species groups was considered to be typical of the habitats present. However, larger numbers for some species were recorded during the PWD/EWLR wintering bird surveys.

Field Survey

6.5.42 A total of 63 bird species were recorded within the study area and included:

- Three qualifying species for the Ribble and Alt Estuaries SPA;
- Three qualifying species for the Ribble and Alt Estuaries Ramsar;

- Six qualifying species for the Ribble Estuary SSSI;
- Four qualifying species Newton Marsh SSSI;
- Ten species of principal importance (Section 41 listed species on the NERC Act 2006);
- Six Lancashire BAP species;
- 11 Red listed species on the BoCC 4 (Eaton et al., 2015); and,
- 20 species on the Amber List of the BoCC 4 (Eaton et al., 2015).

6.5.43 Three species; oystercatcher, pink-footed geese (*Anser brachyrhynchus*) and teal (*Anas crecca*) were recorded during the field survey and all qualify under the SPA wintering bird criteria.

6.5.44 Two oystercatchers were recorded on the sixth visit in March 2020. The species is Amber listed and is also listed as a notable assemblage species for the Ribble Estuary SSSI.

6.5.45 Pink-footed geese were seen flying high over the study area and no grounded birds were recorded. Pink-footed goose is Amber listed and also Ramsar and SSSI qualifying species.

6.5.46 Generally, low number of teal were found to be using the ponds scattered throughout the study area. However, a notable peak count of 102 teal was recorded on a pond to the north of Earl's Farm. Teal are a qualifying species for the Ribble and Alt Estuaries SPA and Ramsar as well as an assemblage species for both the Ribble Estuary SSSI and Newton Marsh SSSI.

6.5.47 Six species mentioned in the citation for the Ribble Estuary SSSI were recorded. These were: curlew, lapwing, mallard, oystercatcher, pink-footed geese and teal.

6.5.48 Two single curlew were recorded during two visits. Curlew is Red listed and a species of principle importance. It is also listed within the assemblage

qualification for the Ribble and Alt Estuaries SPA. The assemblage qualification refers to the 20,000 or more waterbirds which use the SPA during the non-breeding season. There are an additional 22 species of birds in addition to curlew in this assemblage. Curlew is also listed as one of the waterfowl species within the Ribble Estuary SSSI citation.

6.5.49 The maximum count for lapwing during the surveys was 16. Lapwing were recorded during four of the six surveys. Lapwing is a Red Listed, a species of principle importance and a Lancashire BAP species.

6.5.50 Mallard were recorded using the various waterbodies found throughout the study area. They were one of a few species recorded during all six survey visits with a peak count of 30. Mallard is Amber listed and is listed in the bird assemblages for both Ribble Estuary SSSI and Newton Marsh SSSI.

Evaluation

6.5.51 The utilisation of the study area by wintering birds as a foraging and roosting resource is typical in respect to the habitat types found within the study area i.e. intensively managed agricultural land (improved grassland and arable fields). Generally, numbers of both resident and wintering species recorded throughout the survey period were not considered to represent a significant proportion of their UK or county populations. The exceptions to this were as follows:

- Redwing, where 5.33% of the Lancashire wintering population was recorded during the surveys;
- Fieldfare, where 1.09% of Lancashire's wintering population was recorded; and,
- Teal, where 1.02% of Lancashire's wintering population was recorded, as well as 1.33% of the total Ribble and Alt Estuaries SPA population (7,641 individuals) and 1.99% of the total Ramsar population (5,107 individuals).

6.5.52 SPA's are designated based on regularly supporting qualifying species in numbers which reach 1% of the UK population. In order to determine the importance of the study area to the qualifying species for the Ribble and Alt Estuaries SPA population, estimates were taken from BTO Bird facts (August 2015) and compared to the maximum number of each species recorded over the survey period.

6.5.53 With regards to the large number (102) of teal recorded during the fourth visit in January, this is likely due to the highly transitory nature of this migratory species (Drewitt *et al.,* 2015, White *et al.,* 2013). Teal numbers recorded in other months were significantly less. However, the January total indicates that the wintering teal population associated with the study area is of **County** importance.

6.5.54 Furthermore, the other wader, wildfowl, gulls, passerines and other species of conservation concern are likely to utilise additional habitats outside the study area for foraging and roosting and are not solely reliant on those habitats within the study area as such habitats (i.e., improved agricultural grasslands) are prevalent within the wider district (Jacobs, 2020a). However, the larger numbers for redwing and fieldfare (and teal discussed above) have been noted to be of **County** importance.

6.5.55 Overall, wintering birds within the study area are therefore considered to be of **County** importance due to significant numbers of redwing, fieldfare and teal.

Barn owl

6.5.56 Due to the confidential nature of barn owl records, all location specific information is provided only within the barn owl report (Appendices 6.7).

Desk Study

6.5.57 Six records of barn owl were received from LERN within 1km of the Scheme boundary, the records were as follows:

- A breeding pair located 200m south-west of the Scheme boundary (dated 2014);
- Two records of breeding pairs 880m north-west of the Scheme boundary (dated 2014); and,
- Field records (presumed to be sightings) approximately 700m north-west of the Scheme boundary; 1km north of the Scheme boundary; and adjacent to Savick Brook approximately 800m south of the Scheme boundary.

6.5.58 Described in the ecology chapter of the PWD/EWLR Environmental Statement (ES) (Jacobs, 2017) there were three 'likely breeding sites', one 'regular roost' and one 'occasional roost' identified during barn owl surveys conducted in 2014 and 2015. These records are within 1km of the Scheme boundary.

Field Survey

6.5.59 A total of ten sites/building groups were subject to a field survey over two visits in December 2019 and May 2020. No mature trees were noted as having the potential to support roosting barn owls and/or evidence of use were identified. The field survey confirmed that the study area supported:

- One occupied breeding site;
- Eight potential nest sites; and,
- Two active roost sites.

Habitat Suitability Assessment

6.5.60 An assessment of habitats which may be considered suitable for foraging barn owl was undertaken across the study area. Habitat types located within the study area were categorised and mapped using suitability definitions derived from Shawyer (2011), which grades the habitat suitability in terms of its optimal/high value (Type 1), sub-optimal/intermediate value (Type 2) and low value (Type 3).

6.5.61 Type 1 grassland habitat was found in scattered locations across the study area but was relatively limited in extent (13ha). There were much larger areas of Type 2 sub-optimal grassland habitats across the study area (123ha). Type 1 and Type 2 linear habitats were also present, such as intensively managed hedgerows and species-poor hedgerows.

Evaluation

6.5.62 Barn owls are not listed as a species of principal importance for England (NERC Act, 2006) or on the Lancashire BAP. They are included in the Green list for BoCC (Eaton *et al*., 2015). The Green list applies to all regularly occurring species that do not qualify under red and amber criteria and also includes those species which are recovering from historical decline. Barn owls have shown a decline of between 20 and 50% in half of the European countries where data is available (Shawyer, 1998). In the UK it has suffered a 25-50% reduction in its range of distribution (Baillie *et al.,* 2012). It is also a Schedule 1 bird species on Wildlife and Countryside Act 1981 (as amended) which is indicative of its need for additional protection during the breeding season.

6.5.63 The State of Lancashire's Birds: An atlas of the breeding and wintering birds of Lancashire and North Merseyside 2007-2011 (White *et al*., 2013) states that the breeding population in this region was 275 pairs (2011 estimate), with the wintering population estimated at approximately 700 individuals. Evidence to indicate the presence of one occupied breeding site was found in the study area. Therefore, a predicted maximum site population at a precautionary level of two pairs is equivalent to 0.72% of the county breeding population. This population does not exceed the 1% threshold of a 'significant' population at county level.

6.5.64 Nonetheless, barn owl is a species recovering from significant declines in the UK and given the presence of the barn owl population associated with the study area, it is considered to be of **District** importance.

Bats

Desk Study

6.5.65 LERN provided 66 records of bats within the 1km search area; of these, 59 were records of bat roosts/possible roosts and seven were of bats recorded in flight. The large majority of these records were of common pipistrelle (*Pipistrellus pipistrellus*) along with a small number of brown long-eared bat, *Nyctalus* species (likely to be noctule) and unidentified bat species records. Of these records, two roosts were located within the Scheme boundary.

6.5.66 A review of the PWD/EWLR bat survey reports identified a total of 32 roosts/possible roosts within 1km of the Scheme. One record was from within the Scheme boundary.

6.5.67 In addition to the records listed above, a data search revealed the presence of one EPS mitigation licence for bats within 1km of the Scheme. The mitigation licence covered impacts to a common pipistrelle maternity roost located approximately 880m south-west of the Scheme boundary.

Field Survey

a) Habitats

6.5.68 The land use within the study area was dominated by agriculturally improved pasture land. This type of land is not typically associated with significant concentrations of bats although bats do forage across cattle grazed land. The main feature within the study area of value to bats comprised Lancaster Canal which provides an important foraging and commuting resource (Refer to Transect (Bat Activity) Surveys below). The study area was also traversed by a network of hedgerows with many hedgerows containing mature trees. Other features of value to bats included the ponds and the two relatively small stands of broadleaved woodland. One woodland was located within the south-eastern corner of the study area and one woodland was located towards the north-western corner of the study area.

6.5.69 The wider landscape to the west, north-west and south of the study area comprised a similar land use. The area to the east and north-east was a mix of new housing developments and woodland belts associated with Westleigh Conference Centre and the sports pitches of the University of Central Lancashire.

b) Preliminary Roost Assessment - Structures

6.5.70 A total of 28 structures were subject to assessment (Refer to Figure 1.1-1.2; Appendix 6.10). The structures included three culverts (Culvert 1 to 3), Quaker's Bridge located on the Lancaster Canal, farm buildings, stable blocks and several residential properties.

6.5.71 A total of three structures were categorised as high bat roost potential, one as moderate bat roost potential, eight as low and 16 as negligible. Only three structures with low to high bat roost potential (Quaker's Bridge, Culvert 1, and Culvert 2) and one complex of terraces houses (Railway Cottages with two associated garages) are located within or immediately adjacent to the Scheme footprint.

6.5.72 During the preliminary roost assessment, one structure (Culvert 2), was confirmed as a Daubenton's bat roost. An individual bat was identified via an endoscopic and torchlight search.

6.5.73 There were also two housing developments which were identified to be within the 50m buffer area but scoped out from the preliminary roost assessment. These comprised The Shires and Cotty Brook which were relatively new housing Schemes (i.e., constructed within the last five years) and both were located within the 50m buffer area from the Scheme on the opposite side of Lea Road. Both developments were considered highly unlikely to have the potential to support bats due to their modernity.

c) Dusk Emergence Surveys - Structures

6.5.74 The following bat roosts were confirmed within the structures subject to dusk emergence surveys:

- Quaker's Bridge - Daubenton's bat day roost (two bats);
- Railway Cottages - Four common pipistrelle day roosts (one bat per roost); and,
- Halsall's Farm (Building B1) - Common pipistrelle day roost (two bats).

6.5.75 As described above, Culvert 2 was also confirmed as a Daubenton's bat day roost (two bats) via the torchlight and endoscopic searches undertaken on the structure.

d) Preliminary Roost Assessment - Trees

6.5.76 A total of 63 trees (labelled T1 to T63) within the study area were assessed as having bat roost potential during the preliminary roost assessment (Refer to Figure 2.1-2.2; Appendix 6.10).

6.5.77 Nine trees were categorised as having high suitability to support roosting bats, 28 were of moderate suitability with the remaining 26 having low suitability.

e) Climb and Inspect Surveys - Trees

6.5.78 All trees of high to moderate bat roost potential were subject to climb and inspect surveys. No evidence of a bat roost was identified during the climb and inspect surveys. A total of 34 trees were subject to survey and a further three trees (T13, T16 and T33) were deemed unsuitable for climb surveys so were subject to dusk emergence surveys.

6.5.79 After the first climb and inspect survey, the potential of each tree to support roosting bats was re-categorised based on the findings. A total of six trees were categorised as high bat roost potential and 22 trees with moderate bat roost potential. The remaining six trees were re-classified as low bat roost potential and not subject to any further inspections (i.e., T5, T17, T36, T37, T52 and T56).

f) Dusk Emergence Surveys - Trees

6.5.80 No evidence of a bat roost was identified during the dusk emergence surveys on trees T13, T16 and T33.

g) Transect (Bat Activity) Surveys

6.5.81 Two transect routes were designed to cover the study area. These transect routes are referred to as Transect 1 and Transect 2 and included the use of 'listening points' to monitor bat activity across each transect (Refer to Figure 3; Appendix 6.11). The transect surveys were completed on three occasions in May, June and September 2020.

6.5.82 Transect 1*:* Overall, bat activity was low across the whole transect and dominated by common pipistrelle with relatively low use by noctule and *Myotis* sp. Typically, activity comprised one to two bats foraging on an occasional to frequent basis. The most frequent activity was centred on the Lancaster Canal with a maximum of five bats recorded at one location comprising three common pipistrelle, two noctule and one *Myotis* sp. (likely to be a Daubenton's bat). The lowest levels or absence of bat activity were recorded in areas of open pasture with limited linear features present.

6.5.83 Transect 2*:* Bat activity was also relatively low across the whole transect and dominated by common pipistrelle with occasional foraging by noctule and a single pass by *Myotis* sp. The majority of listening points recorded just one or two bats during each listening period. The main areas of activity were habitats which provided sheltered foraging opportunities and commuting links to the wider area.

6.5.84 No significant commuting routes (e.g., a large number of bats flying to / from with a nearby maternity colony) or high numbers of foraging bats were recorded. The highest number of bats observed was four common pipistrelle, recorded foraging in the treeline by the railway bridge adjacent to Railway Cottages.

6.5.85 The remaining listening points across the survey visits recorded low numbers of passes. The lowest levels or absence of bat activity were in areas of horse

grazed pasture devoid of any hedgerows or trees. However, noctule were typically recorded in hawking flights over the grazed pasture across the study area.

h) Automated Static Detector Surveys

6.5.86 Automated static detectors were deployed at eight locations within the study area (labelled as SD1 to SD8) over three periods in May, June/July and September 2020. The automated static detectors were positioned on linear features throughout the Scheme that were likely to be of most value to bats (i.e., treelines and hedgerows) (Refer to Figure 3; Appendix 6.11). The automated static detector surveys were used to supplement the transect survey data and provide a greater level of information on bat activity.

6.5.87 The results of the automated static detector surveys largely align with transect survey results with common pipistrelle being the most recorded species by a significant margin. Detectors placed adjacent to the Lancaster Canal recorded the most bat activity with a higher frequency of *Myotis* sp. (almost exclusively Daubenton's bats).

6.5.88 Collectively, the automated static detectors recorded the most passes in May (14,708), followed by June/July (8,139) and September (6,161).

6.5.89 Very low levels of brown long-eared bat passes were recorded but the collected data does suggest the utilisation of the site by low numbers with no particular area of notable activity.

6.5.90 Soprano pipistrelle (*Pipistrellus pygmaeus*) were found to be largely absent from the study area with only seven passes recorded in total which is considered a very low prevalence of this species as compared to regional and national populations.

Evaluation

6.5.91 At least five species were recorded during the bat surveys undertaken within the study area including common pipistrelle, soprano pipistrelle, noctule, *Myotis* sp. and brown long-eared bat. Table 6.5.3 provides context to the findings and an evaluation of the importance of the bat populations recorded. The Myotis species recorded within the study area was almost exclusively Daubenton's bats. However, a very low prevalence of other Myotis species (whiskered/Brandt's bats *M. mystacinus/M. brandtii* bats or Natterer's bats (*M. nattereri*)) is also likely and has been taken into account within the evaluation.

6.5.92 Population data is adapted from the National Bat Monitoring Programme Annual Report 2019 (Bat Conservation Trust, 2020), the desk study results from the preliminary roost assessment and the field survey results. This evaluation also takes into account the common pipistrelle bat roosts recorded at Railway Cottages and Halsall's Farm along with the Daubenton's roosts recorded at Quaker's Bridge and Culvert 2.

6.5.93 There have been significant historical declines in bat populations dating back to at least the start of the 20th century (Bat Conservation Trust, 2020). Currently, indications from the bat monitoring programme are that this decline is being arrested and even reversed which is likely due to current legislation and conservation action. Some species shown to have a stable population trend include Daubenton's bat, whiskered/Brandt's bat, noctule, and brown long-eared bat. In addition, species considered to have increased in comparison to the baseline year of monitoring (1999) include Natterer's bat[3] and common pipistrelle. There is also provisional evidence that the population of soprano pipistrelle may have increased in comparison to the baseline year.

6.5.94 At a county level, under Lancashire BHS selection criteria Ma1(b), any site which regularly supports a roost of any species of bat, as included in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) should be put forward for consideration of a BHS (Lancashire County Council Planning

[3] The population trend for Natterer's bat should be treated with caution until the effect of this species' roost switching behaviour on the Roost Count trend is better understood (Bat Conservation Trust, 2020).

Department, 1998). It should be noted that this does not extend to roosts located within domestic or industrial structures. However, consideration may be given to certain types of artificial structures including culverts and bridges. Therefore, BHS site selection for the Daubenton's bat roosts located within Culvert 2 and Quaker's Bridge can be considered. The BHS selection criteria also suggests that any type of roost (nursery, hibernation, etc.) may be selected. It must be noted that the guidelines for BHS selection criteria was first published in 1998 and bat roosts and their locations were much less understood and under recorded. In accordance with widely adopted guidance (Mitchell-Jones, 2004), greater conservation significance is given to roosts of rare and rarest species along with the type of roosts (i.e., maternity roosts are generally the most significant); therefore the type of roost (day and hibernation) and conservation significance of the national and local population has also to be factored in when considering the importance of the Daubenton's bat population within the study area.

6.5.95 Collectively, the bat population within the study area is considered to be of **District** importance. Table 6.5.3 sets out the biodiversity importance of the population of each bat species recorded within the study area and takes into account the considerations listed above.

Table 6.5.3 Conservation Status and Evaluation of the Bat Populations Recorded within the Study Area

Species	UK Conservation Status	County and Local Distribution	Site Activity	Biodiversity Importance
Common pipistrelle	Widespread and common	Common pipistrelle is the most common species found within Lancashire and at the local level. Many activity and roost records provided by LERN	The most prevalent species recorded during all surveys. Day roosts of common pipistrelle recorded at Halsall's Farm and Railway Cottages.	**Local**

Species	UK Conservation Status	County and Local Distribution	Site Activity	Biodiversity Importance
Daubenton's bat	Widespread and common	Poor distribution data available at a county and local level. All Myotis populations likely to be reflective of the UK population trends.	Frequently recorded on Lancaster Canal. Lancaster Canal provides an important foraging and commuting linkage for this species. Two day/hibernation roosts located within the study area.	**District**
Noctule	Widespread and common	Poor distribution data available at a county and local level. County and local distribution may be reflective of the UK population trends although the relatively lower woodland coverage in Lancashire may lead to a more localised distribution.	Low numbers frequently recorded across the study area.	**Local**
Brown long-eared bat	Widespread and common.	Relatively widespread and common at a county level. Several records provided by LERN.	Very low number of records. Partly attributed to low detectability rate.	**Local**

Species	UK Conservation Status	County and Local Distribution	Site Activity	Biodiversity Importance
Soprano pipistrelle	Widespread and common	Poor distribution data available at a county and local level. County and local distribution may be reflective of the UK population trends although the relatively lower woodland coverage in Lancashire may lead to a more localised distribution.	Recorded very rarely with seven passes only.	**Less than Local**
Other Myotis species.	Natterer's bat and whiskered/Brandt's bat UK wide populations uncommon but widespread with stable populations	Poor distribution data available at a county and local level. County and local distribution may be reflective of the UK population trends although the relatively lower woodland coverage in Lancashire may lead to a more localised distribution.	A number of Myotis species could not be attributed to Daubenton's bat; therefore, low levels of other Myotis species assumed.	**Less than Local**

<u>Hedgehog</u>

Desk Study

6.5.96 Twelve records of hedgehog were obtained from LERN. All records were sightings from in and around residential and farm properties within 500m of the Scheme. A total of four records of hedgehog across the PWD/EWLR Scheme fell within 1km of the Cottam Parkway Scheme. These were recorded at three properties. The nearest record of hedgehog was 120m north of the Scheme footprint.

Field Survey

6.5.97 Hedgehog were included in the scope of recording incidental field sightings during the range of ecology surveys undertaken for the Scheme (Refer to Appendix 6.14). Two incidental sightings of hedgehog were recorded within pastures fields to the north and south of the Lancaster Canal, both of which are within the Scheme footprint. The hedgerows, treelines, small woodlands and pasture within the Scheme boundary provides suitable habitats for this species.

Evaluation

6.5.98 Hedgehog populations nationwide are in decline with a more notable declines in rural populations (People's Trust for Endangered Species, 2018). They are not part of the considerations for Lancashire BHS selection criteria (Lancashire County Council Planning Department, 1998). Hedgehogs are species of principal importance although they are not Lancashire BAP species. The habitats within the Scheme including hedgerows, woodland and pasture land provide a valuable resource for hedgehogs and the population associated with the study area is considered to be of **Local** importance for biodiversity.

6.5.99 There is currently no recognised method for establishing the population size or abundance of hedgehogs within a given area and this assessment is therefore undertaken from a purely qualitative perspective.

Water Vole

Desk Study

6.5.100 The only records of water vole in the search area were from 1972. These records were not site specific (i.e., four figure grid references) and could not be attributed to any specific watercourse.

Field Survey

6.5.101 No evidence of water vole was identified within the study area. Generally, the watercourses and riparian habitat within the study area were considered to be of low suitability for water vole, with limited suitable burrowing and feeding opportunities. Suitable locations were limited to the Lancaster Canal and a section of a ditch located within the Scheme (Halsall's Farm Ditch). The presence of American mink (*Neovison vison)* (as identified via the desk study records) also reduces the likelihood of water vole being present. Overall, water vole are considered to be absent from the study area.

Evaluation

6.5.102 Due to absence of a water vole population within the study area, no evaluation is provided for this species.

Brown hare

Desk Study

6.5.103 Thirty-one records of brown hare were returned from LERN within 1km of the Scheme boundary. Only one record was identified to be within the Scheme boundary.

6.5.104 A total of 25 of the 45 incidental brown hare records across the PWD/EWLR Scheme between 2014 and 2015 fall within 1km of the Cottam Parkway

Scheme (Jacobs, 2017). The nearest record in relation to the Scheme is a sighting within an area of woodland immediately south of Lancaster Canal.

Field Survey

6.5.105 Brown hare sightings were recorded on most visits during the wintering and breeding bird surveys and were often sighted incidentally during other ecology field surveys conducted for the Scheme. A peak count of 14 were recorded in October 2019 during a wintering bird survey visit. Generally, sightings were scattered throughout the study area. However, a higher concentration of the species was noted in the pasture land to the south of the Scheme off Darkinson Lane. Brown hare numbers reduced during the breeding bird surveys with frequent sightings of between one to four individuals. However, this is likely to be due to a reduction in visibility due to increased ground cover.

6.5.106 Within the Scheme footprint and a 50m buffer area, incidental sightings of between one and four brown hares were recorded during ecology surveys conducted for the Scheme.

Evaluation

6.5.107 The open, grazed pasture bordered by hedgerows, along with isolated woodland blocks provides optimal habitat for brown hare. The suitability of the pasture land within the Scheme for breeding populations would be largely dependent on the field grazing and field management regime in any given year. However, based on the frequency of recordings, the land within the study area supports multiple numbers of breeding brown hare.

6.5.108 Brown hare is a species of principal importance. Brown hare populations at a County level have declined and a species action plan for brown hare was produced (Lancashire Biodiversity Partnership, 2001). The North West Brown Hare Project (NWBHP) was also launched to arrest the declines in the north-west at a landscape scale (NWBHP, 2013). Brown hare are not part of the

considerations for Lancashire BHS selection criteria (Lancashire County Council Planning Department, 1998).

6.5.109 Given the notable distribution of brown hare within the study area and taking account of the species conservation significance, the brown hare population associated with the study area is considered to be of **Local** importance for biodiversity.

Otter

Desk Study

6.5.110 No records from within 1km of the Scheme boundary were provided by LERN for otter. However, a review of the ecology chapter of the PWD/EWLR Environmental Statement (Jacobs, 2017) and the update/pre-construction survey reports (Jacobs, 2018a; Jacobs, 2019b) revealed seven records of otter within 1km of the Scheme. Four of these records originated from otter surveys of Lancaster Canal and included an otter spraint found at Quaker's Bridge (within the Scheme footprint).

Field Survey

6.5.111 Evidence of otter was confirmed on the Lancaster Canal during otter surveys undertaken on all watercourses which ran within and/or adjacent to the Scheme. This included otter spraints found under all three bridges which cross the Lancaster Canal. In addition, an incidental sighting of an adult otter was observed during a dusk emergence bat survey of Quaker's Bridge.

6.5.112 No potential holts or evidence of couches was recorded on any watercourse. The potential for resting sites on the Lancaster Canal was limited to a single area of dense vegetation. This area was considered to have some suitability for use as a couch. All other watercourses comprise drainage ditches or small streams and were limited for use by otter due to barriers (primarily culverting)

and general lack of connectivity along with low water levels and an absence of fish.

Evaluation

6.5.113 The Lancaster Canal provides a likely commuting corridor and foraging habitat for otters. It is considered that the use of the Lancaster Canal by otter is frequent and sustained, due to the presence of otter field signs along the canal in this area since at least 2014.

6.5.114 Otters are afforded the highest level of legal protection via the Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended). Otters are also a species of principal importance and a Lancashire BAP Species. There was a significant decline in otter numbers and the distribution of otters in England in the 1950s and 1960s which has largely been attributed to pesticide use and other pollutants (Chanin, 2003). Improvements in water quality and a ban on the pesticides along with legal protection has led to the recovery of populations throughout most of England (Crawford, 2011). The otter population in the north west of England has significantly increased and otters are now present on most catchments throughout the county including the Lune, Wyre and Ribble.

6.5.115 The field survey and desk study results indicate that the canal is likely to form an important foraging resource for otters, functioning as a connective corridor between other watercourses in the wider area. The level of otter activity recorded may meet the Lancashire BHS selection criteria as otter '…are of restricted distribution, and have suffered a drastic decline in abundance, both nationally and within Lancashire. There is either a national or international obligation to secure the conservation of these species and their habitats.' (Lancashire County Council Planning Department, 1998). However, as stated above, otter populations have significantly increased throughout the region in recent years including the intervening years since the Lancashire BHS selection criteria was published.

6.5.116 Overall, the otter population associated with the study area (up to 250m from the Scheme) is considered to be of **District** importance for biodiversity.

Badger

Desk Study

6.5.117 No records of badgers within the search area were returned by LERN. No evidence of badgers was found during the surveys to inform the PWD/EWLR Scheme which included badger surveys in 2016 and 2019.

Field Survey

6.5.118 No evidence of badgers was recorded in the February/March survey and the update July survey. All mammal tracks and 'push through' gaps under fences were attributed to rabbit which were distributed throughout the study area.

6.5.119 The study area was dominated by relatively flat, intensively managed pasture land which is suboptimal habitat for badger sett locations. However, there were occasional suitable locations for badger setts within the study area including two broadleaved woodland areas. These woodlands comprised a small willow (*Salix* sp.) copse which is located on steep, vegetated earth bunds to the direct south of the Lancaster Canal within the north-west corner of the site and, a small, mature broadleaved woodland area in the south-east corner of the study area adjacent to Lea Road. Other suitable locations included the banks of a small watercourse which ran in a north to south direction through the study area and within the network of dense hedgerows within the study area.

Evaluation

6.5.120 Due to absence of a badger population within the study area, no evaluation is provided for this species and badgers are not considered further within this assessment. However, recommendations for pre-construction surveys for

badger and other species are provided in Section 6.12 to account for potential changes in ecological conditions.

Future Baseline Conditions and Climate Change

Future Baseline Conditions

6.5.121 The information given within the previous sections describes the baseline conditions as they were during the period that field surveys and assessments were carried out (i.e., 2019 to 2021). The following section gives consideration to future changes in the baseline conditions.

6.5.122 As the study area is mainly in agricultural use and dominated by improved grassland for grazing, ecological conditions are not anticipated to change significantly in the immediate future, particularly within the footprint of the Scheme. Changes in farming practices could occur in response to changes in agricultural economics, farming policy and agri-environment Schemes. It is not possible to accurately predict farming practices in the study area in the long term. Although distribution and abundance of fauna are likely to fluctuate it is assumed that there would be no significant changes to the status of habitats or species in the longer-term due to changes in agricultural practices.

6.5.123 However, within the locality and wider area, the land has and is likely to undergo significant changes as a result of development activities associated with the North West Preston Masterplan. This includes PWD/EWLR Scheme which was under construction at the time of writing (early 2021) and also, housing developments that are proposed (Refer to Section 6.11 Cumulative Impacts).

6.5.124 A withdrawal of current field management practices may occur prior to the construction of the Scheme. The cessation of grazing or mowing may cause an improvement in the structural composition of grassland areas increasing their value for protected and notable species such as foraging barn owl and bats. Pre-construction surveys and/or vegetation management would

therefore be undertaken prior to construction in respect to due diligence measures. This is considered further within Section 6.12 (Monitoring and Management).

Climate Change

6.5.125 In Britain, it is anticipated that climate change will bring a possible 2 to 4°C increase in mean summer temperatures, milder winters, changes in rainfall distribution and seasonality, more extremes of weather and sea level rise in the longer term. The effects of these changes on biodiversity are uncertain and may occur as sudden and unexpected step changes. They may affect species ranges, population sizes, timing of biological events such as flowering and increased sea levels (Defra, 2011).

6.5.126 A key approach to mitigate the effects of climate change is to establish and maintain coherent ecological networks. The Scheme incorporates this rationale with further details of mitigation and enhancement proposals provided in Section 6.9.

Summary of Important Ecological Features and Evaluation

6.5.127 Table 6.5.4 summarises the IEFs and the evaluation with regards to importance for biodiversity, based on the criteria set out in Section 6.3.

6.5.128 As stated in Section 6.3, the threshold level of importance that an ecological feature needs to meet or exceed to be considered for detailed assessment is Local Importance. As such, any ecological feature that was assessed as **Less than Local** importance are greyed out and are not considered further within this assessment.

Table 6.5.4. Summary of Ecological Features and Evaluation.

Ecological Feature		CIEEM Geographic Scale of Evaluation						
		Less Than Local	Local	District*	County	Regional	National/UK	International
Statutory Designated Sites								
Ribble and Alt Estuaries SPA (within 5km)								Y
Ribble and Alt Estuaries Ramsar (within 5km)								Y
The Ribble Estuary MCZ (within 2km)							Y	
Haslam Park LNR (within 2km)				Y				
Non-Statutory Designated Sites								
Lancaster Canal (Whole Length in Lancashire Including Glasson Branch)					Y			
Habitats within the study area								
Woodland	Broad-leaved semi-natural woodland				Y			
	Broad-leaved plantation woodland		Y					
Scrub	Scrub (continuous and scattered)	Y						
Trees	Scattered trees (excluding veteran trees)			Y				
Trees	Veteran trees						Y	
Hedgerow	Collective Hedgerow Network including: • Native species-rich hedgerow; • Native species-rich hedgerow and trees;			Y				

Ecological Feature		CIEEM Geographic Scale of Evaluation						
		Less Than Local	Local	District*	County	Regional	National/UK	International
	• Native species-poor hedgerow; • Native species-poor hedgerow and trees; and. • Species-poor defunct hedgerow.							
Grassland and farmland	Improved grassland	**Y**						
	Marshy grassland	**Y**						
	Poor semi-improved grassland	**Y**						
	Arable land	**Y**						
	Amenity grassland	**Y**						
Water bodies	Standing water			**Y**				
	Running water		**Y**					
Swamp	Swamp			**Y**				
Other habitats	Tall ruderal	**Y**						
	Dry ditch	**Y**						
	Hard standing	**Y**						
Protected and Notable Species								
Aquatics (Macro-invertebrate and macrophyte communities)		**Y**						
Common toad				**Y**				
Great crested newt		**Y**						

Ecological Feature	CIEEM Geographic Scale of Evaluation						
	Less Than Local	Local	District*	County	Regional	National/UK	International
Slow worm		Y					
Breeding birds				Y			
Wintering birds				Y			
Barn owl			Y				
Common pipistrelle		Y					
Soprano pipistrelle	Y						
Daubenton's bat			Y				
Brown long-eared bat		Y					
Noctule		Y					
Other *Myotis* species	Y						
Hedgehog		Y					
Water vole	Y						
Brown hare		Y					
Otter			Y				
Badger	Y						

6.6 Screening of Likely Significant Effects

6.6.1 IEFs which are likely to be subject to significant effects are discussed in detail within the impact assessment in Sections 6.7 (Construction Impacts) and 6.8 (Operational Impacts).

6.6.2 IEFs which are not considered likely to be subject to significant effects due to a lack of source of impact or pathway from the source of impact (including impacts which are mitigated through integral mitigation as part of the Scheme design) or for which the magnitude of impact is not considered sufficient to have a likely significant effect on the ecological feature are not considered further within this chapter. Table A.1 in Appendix A provides further detail for all impacts on IEFs that have been considered at the construction and operational stages (i.e., habitat loss; severance and/or fragmentation; disturbance and changes in environmental conditions; mortality). The impacts that have been screened out are in grey cells and a rationale for the approach taken is provided.

6.6.3 Section 6.7 and 6.8 describe the likely significant impacts that have passed through the screening process which is tabulated in Appendix A and covers those impacts during the construction phase (i.e., when the Scheme is being built) and the operational phase (i.e., when the Scheme is built and is being used) respectively. These sections assess whether these impacts are likely to result in significant effects on IEFs once integral mitigation has been considered, but in the absence of any additional mitigation. Habitat loss is included within Section 6.7 (Construction Impacts) only; however, in this case, the impacts of habitat loss are assessed throughout the lifespan of the Scheme. An EcIA Summary Table is provided in Section 6.11 (Residual Impacts).

6.7 Impacts – Construction

Introduction

6.7.1 This section describes the likely impacts during the construction phase and assesses whether these impacts are likely to result in significant negative effects in the absence of mitigation not integral to the design. An EcIA Summary Table is provided in Section 6.12 (Residual Impacts).

6.7.2 It is understood that the construction period is anticipated to be approximately 24 months in duration. The potential construction impacts identified in the absence of mitigation comprise:

- Habitat loss through permanent and temporary land-take (i.e., road, car park and train station construction, siting of construction compounds etc.);
- Severance/fragmentation of existing habitats or wildlife corridors (i.e., hedgerows, treelines and watercourses);
- Changes in environmental conditions - habitats and species both within and beyond the Scheme boundary, could be impacted by changes in environmental conditions (i.e., lighting, noise, vibration, air quality and water quality);
- Disturbance (i.e., increases in vehicle movements, human presence, lighting etc.); and,
- Mortality (i.e., less mobile species, animals that are young or hibernating or those that commute to foraging areas are likely to be those most vulnerable to direct mortality during construction).

6.7.3 Only the impacts likely to significantly affect an IEF in the absence of mitigation have been assessed below. Impacts which are not applicable to the IEF in question have not been included.

6.7.4 Refer to Table A.1 (Appendix A) for a concise rationale of why certain features have been screened out of the assessment for construction impacts. For clarity, Table 6.7.1 provides a list of all IEF's screened out from further assessment.

Table 6.7.1 List of IEFs Screened Out From Further Assessment

Impacts - Construction
Broad-leaved semi-natural woodland
Broadleaved plantation woodland
Veteran trees
Swamp
Standing water
Running water
Aquatics (Macro-invertebrate and macrophyte communities)
Barn owl

Habitats

6.7.5 The construction of the Scheme would result in the loss of semi-natural terrestrial habitat through permanent and temporary land-take.

6.7.6 The permanent land take includes all habitats within the permanent boundary of the proposed Scheme including the link road, car park, railway station and attenuation areas (refer to Figure 6.1). The temporary land take requirements are those which would be restored to their former land use once the Scheme is operational and are only used during the construction phase. The temporary land take includes areas required for compounds, access tracks and all aggregate/material storage areas. These areas have been primarily confined to areas of limited ecological value (e.g., agriculturally improved grasslands).

6.7.7 The temporary working areas are bound by hedgerows; however, it is anticipated that all hedgerows which bound temporary working areas would be retained and their root protection areas excluded from the working area.

6.7.8 The location, and extent of the temporary and permanent land take is shown on the Ecological Constraints Plan (Appendix 6.1).

6.7.9 Table 6.7.2 shows the approximate permanent and temporary land-take measured in units of length (metres) for hedgerows and numbers of individual/scattered trees outside of hedgerows.

6.7.10 Construction impacts are largely confined to habitats of limited ecological value with significant impacts limited to: hedgerows, treelines and scattered broad-leaved trees which are considered as IEFs. Refer to Table A.1 (Appendix A) for a concise rationale for why constructional impacts have been screened out of the assessment for specific habitats.

6.7.11 The Biodiversity Net Gain (BNG) metrics (Appendix 6.16) account for permanent and temporary losses of all habitats located within the Scheme boundary including the Scheme footprint and temporary working areas (i.e., all land within the red line boundary). The implications for these losses are captured within the calculations. For the purpose of this assessment, Phase 1 habitat types (Appendix 6.2) were converted to classifications defined within the UK Habitat (UKHab) Classification User Manual (UK Habitat Classification Working Group, 2018). Table 6.7.2 provides these corresponding habitat types from UKHab and Phase 1 classifications.

Table 6.7.2 Summary of habitat loss (important ecological features only)

Broad Habitat Types	UKHab Habitat Type	Phase 1 Habitat Type	Permanent Land-Take	Temporary Land-Take
Scattered trees	w1g - Other woodland; broadleaved	A3 Parkland and	3 Trees	0 Trees

Broad Habitat Types	UKHab Habitat Type	Phase 1 Habitat Type	Permanent Land-Take	Temporary Land-Take
		scattered trees		
Hedgerows and treelines	Linear habitats: h2a - Hedgerow (priority habitat); and w1g6 - Line of trees	J2.1.1 - Intact hedge - native species-rich	220m	0m
		J2.1.2 - Intact hedge - species-poor	360m	0m
		J2.3.1 - Hedge with trees - native species-rich	250m	0m
		w1g6 - Line of trees	140m	0m
		Linear Habitats: TOTAL	970m	0m

Scattered Trees

Habitat Loss

6.7.12 The Scheme would result in the direct loss of two mature oak trees. There is also a further free standing dead tree (unknown species) which will require felling. Further tree loss is covered in hedgerows and treelines below.

Summary of Impacts

6.7.13 Whilst the loss of three (including the dead tree) native mature broadleaved trees would represent a minimal loss to the existing tree resource within the study area, mature trees represent a locally and nationally declining resource. The loss of these trees would be **significant at the Local level.**

Hedgerows and Treelines

Habitat Loss and Severance/Fragmentation

6.7.14 As listed in Table 6.7.2, the construction of the Scheme would result in a loss of approximately 970m of hedgerows comprising a mix of species rich and species poor hedgerows along with hedgerows which contain mature broadleaved trees. There is also to be a loss of a line of mature trees on the boundary between the rail line and the proposed car park within the Scheme. This is 140m in length equating to approximately 15 standard (mature) trees. This tree loss has been reduced from 30 trees during the detailed design process. It has been confirmed that a further 15 mature trees (approximate) can be retained with the implementation of arboricultural good practice measures. Outside of this treeline, a further 8 mature trees (approximate) located within hedgerows are to be lost. There is to be no loss of hedgerows within any temporary working areas.

Summary of Impacts

6.7.15 Given the scale and nature of the likely impacts on the hedgerow network (including treelines) across the Scheme, the likely construction impacts would be **significant at the District level.**

Protected and Notable Species

Common toads

Habitat Loss and Severance / Fragmentation

6.7.16 Whilst the two recorded breeding common toad ponds (P23 and P24) are to be retained, the Scheme would result in a loss of suitable terrestrial habitat for common toads, particularly for one breeding pond (P24) located on the edge of a temporary working area and 50-60m from the Scheme footprint. Temporary habitat loss extends to improved grassland only (which is to be reinstated); however, permanent habitat loss in the surrounding area includes suitable habitats for common toads such as grasslands, hedgerows and

treelines. Ground clearance works undertaken during the spring migration period (February – April) will have the greatest adverse impact on the toad population associated with P24 in terms of severance and fragmentation. The other breeding pond (P23) is located 340m west of the Scheme and impacts to toads associated with this pond would not be significant. In addition, both confirmed common toad breeding ponds are located to the west of the Scheme and there are to be no direct severance effects between both ponds.

Mortality

6.7.17 Toads would be at risk from direct mortality or injury caused by construction machinery and vehicles and the construction of compounds. This is a particular risk when toads are hibernating (October to February) or migrating from their hibernation sites to breeding ponds (February - April). The removal of refuge and hibernation features such as hedgerows and trees may result in the killing and injury of toads.

Summary

6.7.18 The construction impacts relating to terrestrial habitat loss, severance / fragmentation impacts and risk of mortality are considered to be **significant at the Local level.**

Slow Worm

Habitat Loss and Severance/Fragmentation

6.7.19 The construction of the Scheme would result in the loss of a section of treeline, scrub and hedgerows. Of most relevance is the loss of these habitats along the existing rail line where there are several records of the species.

6.7.20 The loss of linear habitats to accommodate the car park, station and road along with the construction of the Scheme would remove connective linkages for the species and create potential barriers to movement.

Mortality

6.7.21 Tree felling and vegetation clearance along with movement of heavy plant within areas of suitability for slow worm poses a significant mortality risk to slow worm. This risk would be exacerbated if such works are undertaken during the hibernation period (November to March).

Summary

6.7.22 Habitat loss and fragmentation would result in significant impacts to slow worm. In addition, there would be significant mortality risk, particularly during tree felling and vegetation clearance. Overall, the construction impacts on slow worm are considered to be **significant at the Local level.**

Breeding Birds

Habitat Loss

6.7.23 A variety of common bird species and a relatively low number of notable breeding birds were recorded throughout the Scheme footprint and adjacent land. The construction of the Scheme would result in the loss of improved grassland, poor semi-improved grassland, scattered trees and hedgerows. No open-ground nesting species were recorded within or adjacent to the Scheme footprint. Whilst intensively managed agricultural grasslands provide a feeding resource for several species (e.g., barn swallow (*Hirundo rustica*) and house martin (*Delichon urbicum*)), the loss of the hedgerows and trees would have the greatest impact on the breeding bird population as they provide cover, suitable breeding habitat and important food sources.

Mortality

6.7.24 Felling of trees along with removing scrub and hedgerows is likely to result in the destruction of nests and the direct killing of birds, young and eggs if these activities are undertaken during the main breeding bird season. This is likely to have a significant effect on breeding success for breeding birds identified within or close to the proposed Scheme in the short term.

Summary of Impacts

6.7.25 Habitat loss would result in significant impacts to breeding birds. Mortality, particularly during vegetation clearance, may also significantly affect the local breeding bird population. Overall, the construction impacts on the breeding bird population are considered to be **significant at the Local level.**

Wintering Birds

Habitat Loss

6.7.26 Wintering birds were recorded throughout the Scheme footprint and wider landscape. The construction would result in the loss of improved grassland, poor semi-improved grassland, scattered trees and hedgerows. During the winter, such grasslands provide good winter foraging habitat for gulls, waders and species such as starlings. No such species were observed in significant numbers and given the availability of such land in the wider area, the loss of grassland habitat (which represents a very small area of the available resource in the locality) is not likely to significantly affect species which utilise such habitats.

6.7.27 Hedgerows, particularly those which are less intensively managed and allowed to bear fruit, are an important foraging habitat in winter. The study area was found to support large numbers of redwing and other winter thrushes as well as other notable species (e.g., house sparrow). The loss of hedgerows and trees would result in impacts to the distribution of birds and remove a foraging resource of significant value to wintering birds.

Summary of Impacts

6.7.28 There would be significant habitat losses for wintering birds particularly due to hedgerow and tree loss. The impact of habitat loss is therefore anticipated to be **significant at the Local level.**

Bats

Habitat loss - Severance/Fragmentation of Habitats

6.7.29 Day roosts of common pipistrelle and Daubenton's bat were found within four buildings/structures within the study area; however, due to their locations, the Scheme would not result in direct loss of these confirmed bat roosts. No evidence of a bat roost in trees was recorded; however, it is acknowledged that the felling of mature trees during construction would reduce the potential available roosting resource in the immediate area. This would comprise approximately six trees of low bat roost potential (T17, T20, T44, T46, T47 and T48) and one tree of moderate bat roost potential (T45) (refer to the Constraint Plan and Appendix 11 for further details). Given the low number of such trees to be felled and their bat roost potential categories, this is unlikely to be a significant loss.

6.7.30 The loss of hedgerows and treelines would result in the loss and severance/fragmentation of sheltered commuting and foraging links for bats. The data collected suggests that low numbers of common pipistrelle frequently utilise linear features throughout the study area. Other species including brown long-eared bats were recorded rarely; however, such species would also predominantly use linear features when commuting/foraging. Whilst the width of the road construction is not expected to significantly sever connective habitats, the loss of linear habitat (hedgerows containing several mature trees) along Sidgreaves Lane and a section of the mature tree line along the railway is likely to cause severance/fragmentation impacts. The distribution of foraging common pipistrelle within the study area in particular is likely to be adversely affected.

6.7.31 The common pipistrelle day roosts (four separate roosts of individual bats) within Railway Cottages are located approximately 30m from the road footprint of the Scheme and habitat loss is likely to reduce the foraging resource for bats roosting within these dwellings. Noctule bats typically forage and commute over treelines and open habitats. The loss of treelines, hedgerows

and grasslands would therefore reduce the available foraging resource for the species.

Changes in Environmental Conditions/Disturbance

6.7.32 The Daubenton's day roost (two bats) within Quaker's Bridge is within 30m of the road and bridge footprint over the Lancaster Canal. Construction related activities for the road/bridge construction are likely to be under this distance. Bats present within the roost may be affected by high impact noise, vibration (particularly if piling is required) and artificial lighting which may cause temporary roost abandonment. The Daubenton's bat day roost (two bats) within Culvert 2 is approximately 120m west of the Scheme footprint and would therefore remain unaffected by construction disturbance.

6.7.33 The common pipistrelle day roosts (four separate roosts of individual bats) within railway Cottages are located approximately 30m from the road footprint of the Scheme and not likely to be significantly impacted by the Scheme in terms of disturbance due to the location and Scheme construction requirements. Foraging bats may be impacted by construction noise if night time work is required. This has potential to deter bats from commuting and foraging within habitats where noise levels are increased, as this can affect their ability to hunt, particularly for species which rely on passive listening for their prey such as brown long-eared bats (Siemers and Schaub, 2011).

6.7.34 Artificial lighting (particularly strong, directional lighting such as spotlights) during night time working hours may disturb foraging and commuting bats. Whilst species such as common pipistrelle and noctule are relatively tolerant of lighting, the use of strong directional lighting is likely to disturb these species whilst commuting and foraging. Daubenton's bats and other *Myotis* species along with brown long-eared bats are intolerant of increased lighting, and as such, these species are likely to reduce their use of key foraging and commuting resources such as hedgerows and watercourses (e.g., Lancaster Canal) within and close to the Scheme.

Mortality

6.7.35 Climb and inspect surveys and dusk emergence surveys of trees did not record any evidence of a bat roost following a standard survey effort (refer to Appendix 6.11). However, it is extremely difficult to provide conclusive proof of absence of bats within trees due to frequent roost switching behaviour of bats which roost within trees (e.g., common pipistrelle). Without mitigation, the felling of trees with bat roost potential may result in the death and injury of bats. Mortality of bats due to collisions with vehicles during the construction of the Scheme is highly unlikely due to the required low speed of the construction traffic on site.

6.7.36 Table 6.7.2 presents a summary of likely significant impacts on bat populations relating the construction phase of the Scheme for each bat species (evaluated as of local importance or above) along with the significance of the effect.

Table 6.7.2 Summary of likely significant impacts to bats as a result of the proposed Scheme during construction

Species	Importance of the Study Area Population	Impact	Significance of Effect (in Absence of Mitigation)
Common pipistrelle	Local	**Habitat Loss and Severance/Fragmentation** • Loss of foraging habitats. • Loss of potential roosting habitats. • Severance/fragmentation of foraging/commuting habitats.	Low numbers of common pipistrelle were recorded utilising the linear habitats within the Scheme on an occasional to frequent basis. Five day roosts were recorded within 50m of the Scheme boundary. Construction impacts are considered to be **significant at the Local level.**
		Changes in Environmental Conditions/Disturbance • Noise and lighting causing disturbance to foraging and commuting bats.	
		Mortality • Felling of potential tree roosts.	
Daubenton's bat	District	**Habitat Loss and Severance/Fragmentation** • Loss of foraging habitats. • Loss of potential roosting habitats. • Severance/fragmentation of foraging/commuting habitats.	Daubenton's bat are highly associated with watercourses, a fact reflected in the bat activity field survey data. Two day roosts for the species were recorded in Culvert 2 (adjacent to the Lancaster Canal) and one day roost in

Species	Importance of the Study Area Population	Impact	Significance of Effect (in Absence of Mitigation)
		Changes in Environmental Conditions/Disturbance • Noise and lighting causing disturbance to foraging and commuting bats and the identified bat roost within Quaker's Bridge.	Quaker's Bridge over the Lancaster Canal. Construction impacts are considered to be **significant at the Local level.**
		Mortality • Felling of potential tree roosts.	
Noctule	Local	**Habitat Loss** • Loss of foraging habitats. • Loss of potential roosting habitat (trees).	Low numbers (1-2) of noctule were recorded foraging over the grassland, treelines and on the canal in the study area on an occasional to frequent basis. Noctule foraging ranges are relatively large - they could fly over 10km from roosts to feeding areas and the study area would form part of the foraging range. Construction impacts are considered to be **significant at the Local level.**
		Mortality • Felling of potential trees roosts.	
Brown long-eared bat	Local	**Habitat Loss** • Loss of foraging habitats. • Loss of potential roosting habitat (trees).	Brown long-eared bats are strongly associated with woodland habitats and they also utilise hedgerows. Very limited levels of brown long-eared bat

Species	Importance of the Study Area Population	Impact	Significance of Effect (in Absence of Mitigation)
		Severance/Fragmentation • Brown long-eared bats rarely cross open habitat and severance of commuting and/or foraging routes are likely to prevent this species moving across the landscape.	activity were recorded. Due to their quiet echolocation calls, brown long-eared bats are often under-recorded. Therefore, as with the evaluation for this species, a precautionary approach to the assessment of likely significant effects has been adopted with regards to the stated impacts. Construction impacts are likely to be **significant at the Local level.**
		Changes in Environmental Conditions/Disturbance • Noise and lighting causing disturbance to foraging and commuting bats.	

Hedgehog

Habitat Loss

6.7.37 Within the Scheme boundary, there would be a loss of suitable habitat for hedgehogs including grasslands, hedgerows, treelines and scattered trees which provide suitable foraging habitats and have the potential to provide suitable summer and winter nesting sites.

Severance/Fragmentation of Habitats

6.7.38 The road construction (including the bridge approach embankments) would provide a semi-permeable barrier to movement and potentially lead to fragmentation of suitable habitat located to the east of the Scheme (comprising two large fields located either side of the Lancaster Canal).

Mortality

6.7.39 Construction and vegetation clearance and the movement of heavy plant across the Scheme has the potential to cause mortality of hedgehogs that may be foraging or nesting (hibernacula or summer nesting) within suitable habitats. They are particularly susceptible to mortality during the winter months whilst they are hibernating (Cresswell *et al.*, 2012). Hedgehogs may also be exposed to dangers associated with active construction sites such as open excavations.

Summary of Impacts

6.7.40 Construction activities including vegetation clearance would result in a loss of nesting and feeding habitat for hedgehogs along with the potential fragmentation of habitats. There are also potential mortality risks associated with the construction works. These impacts during construction are considered to be **significant at the Local level.**

Brown Hare

Habitat Loss

6.7.41 There would be a loss of grassland and field margin habitats which are likely to be used by brown hare for resting and feeding. The significance of this habitat loss cannot be accurately quantified due to large variations in daily and seasonal use. However, as an average brown hare home range is generally between 20-190ha (Mammal Society, 2012) (although this varies with habitat type), this habitat loss it is considered likely to represent a small proportion of the overall home range for hares present within the study area.

6.7.42 Due to existing fragmentation of the suitable habitat within the Scheme (i.e., urban developments to the north and east and, the railway line to the direct south), the land within the proposed car park (east of Sidgreaves Lane) is not expected to form a key part of a home range and support a notable density of brown hares. No desk-study or field records were identified in this area.

Mortality

6.7.43 It is anticipated that hares would flee from any plant machinery and other construction traffic during ground clearance and construction and construction traffic speeds are unlikely to cause mortality risks. However, it is recognised that young hares (leverets) may be susceptible to construction mortality as they are left alone in shallow ground depressions (forms) during the day and may be reluctant to move.

Summary of Impacts

6.7.44 The impacts of habitat loss and fragmentation are not considered to be significant when assessing the Scheme impacts alone. However, in terms of land loss, the cumulative impacts of habitat loss and fragmentation are considered to be most relevant to brown hare and this is further detailed in Section 6.11.

6.7.45 Mortality impacts are considered to be **significant at the Local level.**

Otter

Changes in Environmental Conditions/Disturbance

6.7.46 The bridge construction works have the potential to cause disturbance to otters which use the Lancaster Canal for foraging, commuting or dispersing. No holts or other resting sites were recorded within 250m of the proposed bridge location.

6.7.47 Disturbance during construction would include increased levels of noise, vibration and lighting which could prevent the passage of otters into the wider riparian network. As otters are likely to be largely nocturnal within the area, impacts would only occur if construction activities occur outside of daylight hours. Only a very short section of Lancaster Canal (approximately 10-15m) would be directly affected by the bridge works during construction.

Summary of Impacts

6.7.48 The construction of a bridge over the Lancaster Canal has the potential to temporarily discourage otters from using the canal if construction activities are completed at night. This may temporarily impact upon local foraging and other behavioural patterns. Due to the high value of the Lancaster Canal in terms of providing a feeding and connective corridor, disturbance impacts are assessed as being **significant at the Local level.**

6.8 Impacts - Operation

6.8.1 The following section assesses the potential impacts and whether these impacts are likely to result in significant effects in the absence of mitigation during the operational phase of the proposed Scheme. An EcIA summary table is provided in Section 6.12 (Residual Impacts).

6.8.2 The potential impacts arising from the operational phase of the proposed Scheme that could adversely affect the IEFs of the area can be summarised as:

- Continued effects relating to habitat loss and fragmentation/severance of habitats;
- Changes in hydrology (groundwater, volume and/or quality or surface run-off etc);
- Changes to air quality resulting from vehicular emissions;
- Noise and vibration levels;
- Accidental spillages on the road;
- Lighting and visual disturbance; and,
- Mortality from road vehicle collisions.

6.8.3 Only the impacts likely to affect an IEF in the absence of additional mitigation have been assessed below. Impacts which are not applicable to the IEF in question have not been included. Refer to Table A.1 (Appendix A) for a concise rationale of why certain features have been screened out of the assessment for operational impacts. For clarity, Table 6.8.1 provides a list of IEFs screened out from further assessment of impacts during the operational phase. The impacts of habitat loss are detailed in Section 6.7 and take account of the impacts throughout the construction and operational stages.

Table 6.8.1 List of IEFs screened out from further assessment

Impacts – Operation
Broad-leaved semi-natural woodland
Broadleaved plantation woodland
Veteran trees
Swamp
Standing water
Running water

Impacts – Operation
Aquatics (Macro-invertebrate and macrophyte communities)
Slow worm
Breeding and wintering birds
Barn owl
Hedgehog
Brown hare

Habitats

6.8.4 All impacts to habitats post construction are not considered to be significant (refer to Table A.1, Appendix A for further details).

Air Quality

6.8.5 With reference to Chapter 8 (Air Quality), a review has been undertaken of all the locations which were predicted to experience a change in nitrogen deposition of 1% or more in comparison to the critical load. All locations relate to two areas within the Lancaster Canal BHS; one area located adjacent to the PWDR; and the second located adjacent to Sidgreaves Lane and the proposed road for the Scheme. These areas have been classified as 'short' vegetation and 'tall' vegetation within Chapter 8. It can be confirmed that these areas coincide with the open water habitats of the canal and the associated marginal and aquatic vegetation (Table 6.5.2 provides an overview of the species present). Prior to the PWDR construction, the land adjacent to these areas comprised improved grassland fields and hedgerows. With references to the data contained within UK Air Pollution Information System (APIS) website, the locations in which the critical loads are exceeded do not coincide with the location of any habitat types or plants known to be particularly sensitive to nitrogen deposition including any of the interest features of Lancaster Canal BHS. Outside of the water environment, there are no IEFs capable of being affected by impacts in these locations. It is noted that

quantitative relationships between impacts to canals and associated vegetation and nitrogen concentrations are poorly understood. However, for canals, phosphorus has generally been considered more important than nitrogen in affecting the macrophyte community (APIS, undated). Overall, impacts of nitrogen deposition on the identified ecological feature are **not significant.**

Species

Common Toad

Mortality, Severance/ Fragmentation

6.8.6 With reference to the road and car park, the installation of raised kerbs can block movement and inadvertently guide them into gully pots from which they cannot escape (Amphibian and Reptile Conservation, 2011).

6.8.7 No evidence of use of the ponds or a migration route to the east of Sidgreaves Lane were recorded. Common toads are largely nocturnal. The night time traffic levels are estimated at 11 cars per hour between 7pm and 7am for the proposed road to the train station (see Chapter 14: Traffic and Transport). It is anticipated that this level of traffic is expected to be much lower when the trains cease operating (e.g., midnight to 6am).

Summary of Impacts

6.8.8 Due to the relatively low levels of activity and low night-time traffic levels, morality incidents due to road collisions are not expected to be significant. However, if the design includes the use of raised curbs and standard gully pots, mortality and severance/ fragmentation are considered to be **significant at the Local level.**

Bats

Severance/Fragmentation; Changes in Environmental Conditions; Disturbance

6.8.9 In the absence of mitigation, the impacts of lighting from Scheme operation are likely to be the most significant impact. Daubenton's bats and brown long-eared bats are sensitive to the impacts of artificial lighting. Whilst species such as common pipistrelle and noctule are tolerant of artificial lighting, the use of powerful lighting may adversely affect the distribution of all bat species within the study area.

Summary of Impacts

6.8.10 The introduction of strong lighting across the Scheme (road and car park) is likely to affect the distribution of bats within the landscape. These operational impacts from lighting are considered likely to be **significant at a Local level** for all bat species.

6.9 Mitigation

6.9.1 Potential ecology and nature conservation constraints have been a key consideration of the Scheme assessment process with regards to the avoidance of impacts to IEFs. The development of mitigation measures for the ecological impacts identified has been an iterative process and mitigation has been developed during the initial design and consultation process.

6.9.2 Where significant impacts to IEFs have been identified, additional measures to avoid, reduce or compensate for significant impacts have been prescribed and would be implemented. An Environmental Masterplan has been completed (Appendix 18) to show the type and location of the committed ecological mitigation measures.

6.9.3 A summary of the mitigation required for each impact on each IEF is given below for the construction and operational phases. In addition, and considered separately from mitigation, opportunities for ecological enhancement are integrated into the design process.

Habitats

6.9.4 Table 6.9.1 below presents the approximate habitat loss and gain figures for the IEFs taken through this assessment where impacts would result in significant effects at the local level or above. The habitat losses and gains are discussed in detail under each habitat type below. The Environmental Masterplan provides an illustration of the locations of habitat mitigation.

Table 6.9.1 Habitat Losses and Gains for IEFs

Broad Habitat Types	UKHab Habitat Type	Phase 1 Habitat Type	Permanent Land-Take	Habitat Creation
Scattered trees	w1g - Other woodland; broadleaved	A3 Parkland and scattered trees	3 Trees	1370m of native species rich hedgerow and native species rich hedgerow with trees + 1560m^2 of native tree and scrub planting
Hedgerows and treelines	Linear habitats: h2a - Hedgerow (priority habitat); and w1g6 - Line of trees	J2.1.1 - Intact hedge - native species-rich	220m	
		J2.1.2 - Intact hedge - species-poor	360m	
		J2.3.1 - Hedge with trees - native species-rich	250m	
		w1g6 - Line of trees	140m	
		Linear Habitats: TOTAL	970m	

Scattered Trees / Hedgerows and Treelines

6.9.5 Hedgerow and tree planting and management would compensate for habitat losses upon successful establishment and maturity of the habitats. Linear areas of habitat to be created will provide a net gain in terms of meterage and value (via appropriate management). The tree and hedgerow planting has been sited to achieve beneficial habitat connections to the wider landscape.

Linear habitats are to be created along the new road layout and along the northern boundary of the car park. This planting is also to be multi-functional as it will also mitigate for specific protected and notable species impacts.

6.9.6 Areas of retained hedgerows would be protected during construction via the adoption of good practice measures as per BS 5837:2012 '*Trees in relation to design, demolition and construction. Recommendations'*.

6.9.7 The proposals discussed above would provide robust compensation measures for mature tree loss although it is acknowledged that value of planted trees would be inferior as compared to the existing trees and would take several years to establish. The high increase in tree numbers as compared to what is currently present would also help to outweigh this limitation over time.

6.9.8 Timber from felled trees would be retained for habitat creation for protected and notable species (e.g., refugia and hibernacula for slow worm and amphibians). Five hibernacula locations are shown on the EMP. Additional log piles will be created in suitable locations identified by an ECoW during site clearance works.

6.9.9 The planting mixes include native species of local provenance. Details of the species mixes are provided within the Environmental Masterplan. A Landscape and Habitat Management Plan (or similar) will be completed to detail the habitat establishment methods, aftercare and long term management of all retained and created habitats.

Biodiversity Net Gain

6.9.10 The Scheme has used the Biodiversity Metric 3.1 Calculation Tool (Panks, *et al.,* 2022) to determine if the Scheme would result in a net gain in biodiversity. The Biodiversity Net Gain Report (Appendix 6.16) documents this process. The biodiversity net gain calculations take account of all baseline (pre-development) habitats within the red line boundary of the Scheme (including

the Scheme footprint and temporary working areas) and the post-development habitats as is illustrated within the Environmental Masterplan.

6.9.11 With the creation and management of the post-development habitats as is illustrated within the Environmental Masterplan (Appendix 18), the scheme will attain a net gain **of 18.35 habitat units (45.63%)** and **29.02 hedgerow units (29.02%).** With regards to the river metric, data is still being gathered and will be provided in supplementary information to the application.

6.9.12 The main area of habitat loss is grassland (modified grassland and other neutral grassland) along with areas of scrub. The main impacts to linear habitat features are a line of trees along the railway line and hedgerows following Sidgreaves Lane.

6.9.13 Whilst there is to be a range of created habitat types and an increase the actual linear length of hedgerows, the biodiversity metric calculations take into account factors such as habitat condition, strategic significance and the time it will take the habitats to reach a moderate to good condition. Significant habitat gain is to be achieved via the creation of a mixed scrub and neutral grassland mosaic in an area of modified grassland off Darkinson Lane to the immediate south of the rail line and station as well as an area of woodland planting to the west of Sidgreaves Lane.

Protected and Notable Species

6.9.14 This section deals with mitigation in accordance with current guidelines and is based on the latest data available for the Scheme and the Environmental Masterplan. Mitigation measures in respect to protected and notable species that would be subject to significant impacts through construction and/or operation are provided below.

<u>Common toad</u>

Habitat Loss and Severance/Fragmentation of Habitat

6.9.1 The construction and erection of the temporary site compound area located immediately adjacent to a confirmed breeding pond (P24) is to be completed outside of the spring migration period (typically February to April) to avoid potential barriers to movement.

6.9.2 Linear habitats, grasslands and scrub are to be created and managed. These habitats would provide opportunities for common toad and provide connectivity to the wider landscape. For example, an area of species rich grassland and dense species rich scrub is to be created adjoining the railway embankment to the southwest of the Scheme and a new hedgerow and a wildflower grassland verge is to be created along the northern boundary of the car park between Lea Road and Sidgreaves Lane. In addition, the wildlife enhancement area will provide suitable planting and management for common toad. Brash and log piles which are to be created during vegetation clearance works will attract prey (e.g. slugs, worms, spiders ants and other invertebrates) and enhance the refuge habitats for common toad. Five hibernacula locations are shown on the EMP. Additional log piles will be created in suitable locations identified by an ECoW during site clearance works. It is recognised that there would be a residual effect of habitat loss until vegetation reaches maturity.

Mortality

6.9.3 The construction and erection of the temporary site compound area located immediately adjacent to P24 is to be completed outside of the spring migration period and the hibernation period. Other suitable habitats outside this area that could support common toad (e.g., understorey of treelines, hedgerows, scrub) will be subject to precautionary methods of working during construction (e.g., hand searches, toolbox talks, ecological supervision). This would be undertaken during the active season for common toad i.e. between March and October (subject to minimum night -time temperatures).

6.9.4 A combination of dropped kerbs and offset gulley pots will be installed to avoid fragmentation and mortality incidents.

Slow Worm

Habitat Loss and Severance/Fragmentation of Habitat

6.9.5 Linear habitats, grasslands and dense scrub are to be created and managed which would provide suitability for slow worm and provide connectivity to the wider landscape. For example, an area of species rich grassland and native species rich scrub is to be created adjoining the railway embankment to the southwest of the Scheme and a new hedgerow and a wildflower grassland verge is to be created along the northern boundary of the car park between Lea Road and Sidgreaves Lane and along the new road. This will compensate for the loss of a section of treeline due to the railway station footprint and the loss of hedgerows along Sidgreaves Lane. In addition, the wildlife enhancement area will provide suitable planting and management for slow worm. Brash and log piles which are to be created during vegetation clearance works to enhance the foraging, refuge and hibernacula resource for slow worm in the area. It is recognised that there would be a residual effect of habitat loss until vegetation reaches maturity.

Mortality

6.9.6 Suitable habitats that could support slow worm (e.g., understorey of treelines, hedgerows, scrub) will be subject to precautionary methods of working during construction (e.g., hand searches, toolbox talks, ecological supervision). Vegetation clearance works would be undertaken during the active season for slow worm i.e. between March and October (subject to minimum night -time temperatures).

Breeding Birds

Habitat Loss

6.9.7 The loss of breeding bird habitats (hedgerows and trees) are to be compensated via the creation of extensive areas of new species-rich hedgerows and native trees and shrubs. Wildflower road verges adjacent to such hedgerows are to further enhance habitats in terms of providing cover

and a feeding resource. It is recognised that there would be a residual effect of habitat loss upon breeding birds until operation when established vegetation reaches maturity. To counter this and to enhance breeding bird opportunities, bird boxes suitable for a range of species would be erected on retained trees including a section of the treeline adjacent to the railway and the broadleaved woodland area in the south-east corner of the Scheme. A total of 12 bird boxes comprising a range of box types are proposed and such boxes will target both common and declining bird species.

Mortality

6.9.8 Precautionary working methods for breeding birds are to include the avoidance of tree felling and vegetation clearance works within the breeding bird season (March - August, inclusive) unless such clearance work is preceded by a nesting check by an ecological watching brief. If evidence of nesting is found within or immediately adjacent to the construction area, works would be delayed until the young have fledged and the nest is no longer active.

Wintering Birds

Habitat Loss

6.9.9 The loss of the hedgerow feeding/roosting resource for wintering birds is to be mitigated via the creation of extensive areas of new species-rich hedgerows and native trees and shrubs. This would include a species-rich mix of fruit and seed bearing native species. In addition, such hedgerows would be subject to appropriate management to further enhance the hedgerow network for birds. Hedgerows would be managed via sensitive cutting i.e. cutting in January or February to prolong the autumn and winter berry food source; cutting hedgerows on a two or three year rotation only; and targeting different sections each year. This management would benefit a range of species including redwing and fieldfare.

Bats

Habitat loss; Severance/Fragmentation of Habitats

6.9.10 Habitat loss and severance/fragmentation impacts to bats such as common pipistrelle, Daubenton's bat, noctule and brown long-eared bat will be mitigated via:

- The protection and retention of hedgerows and trees on the periphery of the construction footprint.
- The creation and management of significant areas of habitat including hedgerows, trees and grasslands. Connective habitats will include a new hedgerow between Lea Road and Sidgreaves Lane and a hedgerow along the new road. There are also to be wildflower verges along these hedgerows. As compared to existing conditions (i.e., species poor grassland), the creation of more species rich areas of grassland alongside sensitive management will benefit invertebrates and increase the foraging value for bats.
- Management of the existing hedgerow resource. The existing hedgerow resource is intensively managed (i.e., flailed as part of a yearly / biennial regime) and a change in the cutting regime (to increase vegetation height and extent) would provide proven beneficial effects such as increasing invertebrate species diversity and density.
- Increasing potential roost features. The loss of potential roosting habitats (e.g., trees) would be mitigated through the provision of bat boxes in areas of suitable habitat. The boxes would be located in retained habitat furthest from the Scheme and would be installed in advance of construction. A total of 12 bat boxes are proposed. Different box types will be used to suit the range of species recorded as present in the area and include boxes suitable for maternity colonies. Boxes are to be placed on the edge of a broadleaved woodland in the south-east corner of the Scheme and on mature trees within the Scheme boundary.

Changes in Environmental Conditions; and Disturbance

6.9.11 Disturbance impacts relating to artificial lighting during construction and operation will be mitigated using the following fundamental measures:

- Construction working hours are to be limited to daylight hours only.
- A lighting plan has been submitted for the Scheme the proposed road. The lighting plan has taken account of current good practice guidance measures contained within 'Bats and artificial lighting in the UK' (Bat Conservation Trust, 2018). Due to the practicalities and commitments required for pedestrians within the car park and around the train station, it would not be suitable to avoid lighting completely and there is still to be a level of increased ambient light associated with the car park and station. There are also requirement for light columns on the road. However, this light level will not significantly impact light tolerant species (e.g., common pipistrelle and noctule) and the potential impacts to brown long-eared bats (i.e., displacement of foraging land within the car park) is not considered to be significant in consideration of the other mitigation and design measures provided which includes the following:
- The luminaires of the lighting columns along the road and along Sidgreaves Lane are to be programmed to dim by 50% from 19:00 to 07:00.
- The lanterns have been set at zero degree tilt to reduce light spill and potential impacts on bats and other wildlife.
- With regards to Lancaster Canal (the area of most value to bats), all lighting columns are to face away from the canal water and rear shields are to be fitted to the columns adjacent to the canal to minimise light from the rear of the lanterns even further. This will negate significant potential impacts associated with Daubenton's bats.

- The lighting contours on the lighting plan show that ambient lighting is reduced to 1 lux outside of the road footprint. This level of lighting is equivalent to twilight conditions (Bat Conservation Trust, 2018).

- Light spill will be decreased via increasing the height and extent of the existing hedgerow resource and the created hedgerows (upon maturation). The existing hedgerow resource is intensively managed (i.e., flailed as part of a yearly / biennial regime) and a change in the trimming regime to heighten the hedgerows will provide better screening of potential light pollution sources.

6.9.12 Through the location and design of the Scheme, impacts to the confirmed Daubenton's roost within Quaker's Bridge will be minimised to disturbance only as the roost is approximately 20-25m from the new bridge and road construction. This disturbance is to be further reduced as much as reasonably practical in terms of reducing construction noise, lighting and vibration effects via the submission of a Precautionary Working Method Statement (PWMS). The Daubenton's roost is a day roost and of a lower risk to disturbance activities. Under the terms of the Conservation of Habitats and Species Regulations 2017 (as amended), such disturbance would not contravene the legislation, provided that, the hibernation period (typically November through to March) is avoided (which is to be stated in the PWMS).

6.9.13 Potential disturbance impacts to potential bat roosts in trees during construction would be mitigated through pre-construction surveys of potential bat roosts in trees which may be subject to disturbance (i.e., within a 20m - 30m buffer area from the tree). The licence process is to be followed in the event that a bat roost is identified.

Mortality

6.9.14 Potential mortality impacts to bats during construction will be mitigated through pre-construction surveys of trees to be felled. This would be undertaken for high and moderate bat roost potential trees. Where appropriate, felling operations would be conducted in accordance with a

method statement which may involve additional checks and soft felling under the supervision of a licensed bat ecologist. Where bats are found to be present within trees to be felled, works would not proceed until an EPS mitigation licence is granted by Natural England

6.9.15 Works would also be timed to avoid the seasons when bats are most likely to be present in adjacent roosts wherever possible and in accordance with the type identified.

Hedgehog

Habitat Loss/Severance, Fragmentation and Mortality

6.9.16 Habitat loss and severance and fragmentation impacts will be mitigated via the creation and management of significant areas of habitat including hedgerows, trees and grasslands. Connective habitats will include a new hedgerow between Lea Road and Sidgreaves Lane and a hedgerow along the new road. Such actions would result in notable net habitat gains in the long term and be of benefit to hedgehogs in terms of providing suitable foraging areas. In addition, construction related fencing will allow the movement of hedgehogs through the fence line (e.g. Heras style fencing upon rubber blocks to allow movement underneath).

6.9.17 Log and brash piles (approx. 5 features) are to be created during the vegetation clearance works to provide suitable refuge habitats for hedgehog. In addition, a total of two hedgehog houses are to be installed within the woodland area in the south-west corner of the Scheme.

6.9.18 Suitable habitats that could support hedgehog (e.g., understorey of treelines, hedgerows, scrub) will be subject to precautionary methods of working during construction (e.g., visual searches, toolbox talks, ecological supervision). Vegetation clearance works would be undertaken during the active season for hedgehog i.e. between March and October (subject to minimum night -time temperatures).

Otter

Disturbance

6.9.19 Disturbance impact to otters would be mitigated via the restriction of working to daylight hours. Light spill onto Lancaster Canal will be avoided during operation via a sensitive lighting design as detailed in 6.9.11 (bats) and the planting of screening belts of trees along the road to minimise lighting from night time traffic.

6.10 Enhancement

6.10.1 The Biodiversity Net Gain Report (Appendix 6.16) and the Environmental Masterplan (Appendix 18) show how enhancements of the existing habitat resource will be achieved post-development.

6.10.2 Whilst much of mitigation described above for protected and notable species is classed as compensation for temporary and permanent habitat loss impacts, there are several components of the mitigation which go beyond compensatory measures by providing ecological enhancements. This includes:

- The provision of wildlife boxes for birds, bats and hedgehogs.
- The enhancement of existing land to a wildlife enhancement area incorporating a seasonally wet pond (which is to subject to deepening via excavation), common reed planting, a managed grassland area and tree planting.
- The creation of an attenuation pond with common reed planting. This will provide a foraging habitat of high value for bats, birds and other fauna.
- The creation of species rich grassland areas.

6.10.3 The habitat enhancement measures listed above will benefit the IEFs within the Scheme (common toad, slow worm, birds, bats, hedgehog) but also other wildlife such as invertebrates and small mammals.

6.11 Cumulative Impacts

6.11.1 The applicant identified 18 developments within 2km of the Scheme which would potentially give rise to cumulative impacts to IEF. A summary of the relevant ecological survey information and assessments obtained from these developments is provided in Chapter 17, 'Cumulative Impacts'.

6.11.2 Each development will or has been subject to ecological assessment in line with relevant and legal biodiversity framework processes where protected or notable species and habitats have been identified.

6.11.3 Considered of most relevance in terms of cumulative impacts is the proposed residential development at Lea Road, Preston (Northern Parcel and Southern Parcel) which applied for an EIA screening opinion. This proposed housing development borders the Scheme to the immediate north and south. These developments have a combined area of approximately 14.5ha. EIA was not deemed to be required by the planning authority. Without mitigation, the Scheme and these housing projects would contribute to the removal of hedgerows and trees that would further impact the local ecology. However, both the Scheme and these projects are obligated to achieve a 10% biodiversity net gain once planting has established which would compensate for the removal of hedgerows, trees and general loss of habitat. The exception to this would be the loss of habitat for brown hare where the cumulative habitat loss would increase the level of impact and be significant for brown hare at the **Local** level.

6.11.4 A detailed summary of the most relevant developments and the corresponding ecological information submitted to support these development proposals along with the ecological mitigation to be applied for each development is provided in Table 6.11.1.

Table 6.11.1 Review of Applications Potentially Giving Rise to Cumulative Effects

Development	Application Ref.	Summary of Ecological Data and Mitigation
Preston Western Distributor/East West Link Road	LCC/2016/0046 (Approved)	Extensive baseline ecological information submitted along with an ecology chapter of an Environmental Statement (Jacobs, 2017) and a wide range of mitigation, management and monitoring documents were submitted pre and post planning approval. The ecology chapter anticipated that despite the committed mitigation, impacts would remain significant in the year of opening for the following IEFs: • Bartle Wetland BHS (not included within the scope of this Scheme) • Broad-leaved semi-natural woodland • Scattered broad-leaved trees • Veteran trees • Hedgerows • Birds (breeding and wintering) • Barn owl • Bats However, the ecology chapter anticipated that there would be no significant residual effects after 15 years following mitigation and management.
Land at, Lea Road, Preston (Northern Parcel and Southern Parcel)	06/2020/1229 (EIA Screening Opinion only)	The planning application for this development had not been submitted at the time of writing (October 2021). Two preliminary ecological appraisal (PEA) reports were commissioned to inform this development (E3P, 2019a; E3P, 2019b); one to cover land north of the Preston to Blackpool rail line and one to cover the land to the south of the rail line. Good practice mitigation recommendations were provided within the reports and included:

Development	Application Ref.	Summary of Ecological Data and Mitigation
		• Retention of tree lines and hedgerows (habitats of most value). • Planting to comprise native species and species of value to local wildlife. • Avoidance of impacts to protected species including birds, amphibians, bats, badgers, reptiles and hedgehogs. • Recommendations for biodiversity net gain. • Enhancements for birds and bats via planting and installation of boxes. • Recommendations for further surveys for otter, water vole and bats. Further, follow up surveys for otter, water vole and bats found no evidence of each species/species group on either land parcel. Appendices 6.11 and 6.12 provide a summary of these findings.
Land at Bartle, Preston	06/2020/0888 (Approved)	This housing development has a distinct overlap (in terms of area) with the PWD / EWLR development. The ecology chapter of the Environmental Statement (DPP Planning, 2020) predicted that without mitigation, construction and operational impacts would be significant for the following IEFs: • Bartle Wetland BHS • European Designated Sites • Tree and hedgerows • Woodlands • Ponds • Amphibians • Bats • Breeding Birds • Invasive Species • Brown hare • Hedgehog

Development	Application Ref.	Summary of Ecological Data and Mitigation
		However, following mitigation, no significant residual effects on these IEFs were anticipated.
Former Cottam Brickworks - Cottam Avenue, Preston	06/2019/1451 (Full planning permission – approved) 06/2009/0499 (outline application – approved)	A variation of this development was previously subject to an EIA in 2009. The ecology report (ERAP, 2019) confirmed that impacts to Cottam Hall Brickworks BHS were mitigated via an off-site receptor. Other impacts included GCN (translocated to an off-site receptor area) and nesting birds. The vegetation from this site was cleared some years previously.

Designated Sites

6.11.5 This ecology chapter has concluded that adverse effects to statutory and non-statutory designated sites are absent or negligible and so any contribution to a combined effect is considered inconsequential. As such, it is considered that the Scheme could not contribute significantly to any cumulative effects.

Habitats

6.11.6 The developments listed in Table 6.11.1 are largely confined to habitats of limited ecological value including agriculturally improved/semi-improved species poor grassland and/or are within locations bound by existing developments.

6.11.7 Where habitats of ecological value are to be impacted by the aforementioned developments, such impacts have been assessed and mitigation has been applied and no significant residual effects have been predicted (where the development has been subject to an EcIA). With reference to various planning documents, by way of example, such mitigation includes:

- Avoid impacts to notable ecological features including hedgerows and trees where possible;
- Supplementary and compensatory planting relating to native hedgerows and trees;
- Habitat creation (e.g., ponds);
- Native and wildlife friendly planting to be included within the landscape proposals; and,
- Enhancement of retained habitats.

6.11.8 The construction of these developments would result in a further reduction of semi-natural habitat in the local area when combined with the Scheme. Although dominated by habitats of limited ecological value it is acknowledged

that notable habitats including hedgerows and trees within these areas would be impacted. Impacts to hedgerows and trees are the most common significant impact encountered across the five developments. In relation to the Scheme, scattered trees, hedgerows and treelines are the only IEFs (habitats) for which without mitigation, impacts would be significant. Impacts to scattered trees will be significant at Local level and impacts to hedgerows and treelines will be significant at District level.

6.11.9 The cumulative impacts associated with the Scheme and these additional developments would increase impacts on these IEFs. However, the mitigation, compensation and enhancement measures, which are / would be included as part of these developments include an overall net increase of valuable ecological habitats. The assessed impacts for the Scheme would not be significantly worsened by these nearby developments once new planting has had time to establish. Cumulative impacts to scattered trees, hedgerows and treelines would therefore be negligible.

6.11.10 The exception to this is the proposed 'Land at Lea Road', developments as the plans (including committed ecological mitigation) are unknown. However, it is assumed that good practice mitigation measures would be adopted by this development and sensitive landscaping design would be applied (via legal obligations and planning control). Due to the proximity of these proposed developments to the Scheme, impacts from this development are the most likely to contribute to cumulative effects. Following a review of the habitats present within these proposed development areas, cumulative effects are only likely to extend to impacts to habitats already considered significant within this chapter (i.e., scattered trees, hedgerows and treelines) and it is considered unlikely that the cumulative effect would increase the levels of impacts already predicted. In addition, due to the low conservation value of habitats within the Scheme and the lack of a pathway for any significant impacts on other IEFs to occur (e.g. broadleaved woodlands), cumulative impacts to other habitats would be negligible.

Protected and Notable Species

6.11.11 As is summarised in Table 6.11.1, the potential for impacts to protected and notable species have been assessed by each development and mitigation has been applied to avoid, minimise or compensate for significant impacts to the relevant species. This also includes EPS mitigation licences, particularly in respect of GCN on the Cottam Hall development.

6.11.12 In the absence of mitigation, cumulative impacts on certain protected/notable species would be significant (at the Local level or above). However, due to mitigation, compensation and enhancement measures included in the design of these developments for specific species and for wildlife and habitats in general, the assessed impacts for the Scheme would not be worsened by these nearby developments once new planting has had time to establish. Cumulative impacts to protected/notable species would therefore not be significant.

6.11.13 As with habitats mentioned above, the exception to this is the proposed 'Land at Lea Road' development as the plans (including committed ecological mitigation) are unknown. Due to the proximity of this proposed development to the Scheme, cumulative impacts from this development would have the greatest potential impact on protected and notable species. However, provided that good practice mitigation measures are adopted by this development and sensitive landscaping design is applied (via legal obligations and planning control), cumulative impacts are not likely to be significant for most species. The exception to this the impact of habitat loss in respect of brown hare. When considered alone, habitat loss from the Scheme is not considered to be significant due to the relatively small loss of land in consideration of the home range of brown hare, and the availability of suitable habitats in the surrounding area. However, the combined habitat loss from the Land at Lea Road development amounts to approximately 16-18ha. This cumulative habitat loss will increase the level of impact and be significant for brown hare at the Local level.

6.11.14 Brown hare inhabit agricultural and semi-natural habitats only. There is no feasible scope for the mitigation of these habitats within the Scheme (see Section 6.12).

6.12 Residual Impacts

6.12.1 This section details the potential residual impacts that remain after mitigation has been implemented. This is assessed on the basis that the mitigation measures detailed in Section 6.9 are implemented successfully and function as intended.

6.12.2 Table 6.11.1 sets out the significance of the remaining impacts during construction, in the opening year (when construction has been completed, but all mitigation measures not yet mature) and 20 years after opening.

6.12.3 This timeframe takes into account the time it will take for the target condition to be met (20 years for 'good condition') for all habitats to be created within the Scheme. It also allows for the maturation of the habitats to provide intended value for faunal species. These timeframes are set within Biodiversity Metric 3.1 (Panks. *et al.,* 2022).

6.12.4 It is noted the habitats must be secured and maintained for a period of at least 30 years in accordance with the Environment Act 2021 and this will be factored into any management plans produced.

6.12.5 After 20 years, significant residual impacts at a **Local level** are predicted for one important ecological feature only: brown hare.

Table 6.11.1 Ecological Impact Assessment Summary Table

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
Habitats						
Scattered broad-leaved trees	**Local**	**Significant** Loss of 3 mature broadleaved trees.	**Not significant**	• Minimise damage/loss via good practice protection measures during construction. • 0.98ha of native tree planting and a further 0.99ha of ornamental trees.	**Significant**	**Not significant**
Species-rich intact hedge **Species-rich hedge and trees** **Species-poor intact hedgerow** **Species-poor**	**District**	**Significant** Loss of 970m of combined hedgerow network. Loss of approximately 23 mature trees located within hedgerows and treelines.	**Not significant**	• Replacement hedgerow and tree planting (minimum of five woody species) within a combined total of 1370m. • Strengthening of existing hedgerows through adoption of good management practices.	**Significant**	**Not significant**

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
hedgerow and trees						
Species-poor defunct hedgerow						

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
Protected and Notable Species						
Common toads	**District**	**Significant**	**Not Significant**	• Undertaking construction of temporary working area compound (adjacent to P24) outside of the migration period (Feb-Apr). • Undertaking vegetation clearance works outside of hibernation period (Nov to mid-Feb / Mar). • Precautionary working measures to avoid species mortality (e.g. hand searches, toolbox talks, ecological supervision). • Installation of dropped kerbs and offset gully pots where appropriate. • Retention, restoration, and creation of habitats and features (refuge habitats) suitable for common toad.	**Significant**	**Not Significant**

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
Slow worm	**Local**	**Significant**	**Not Significant**	• Undertaking vegetation clearance works outside of hibernation period (Nov to Mar). • Precautionary working measures to avoid species mortality (e.g. hand searches, toolbox talks, ecological supervision). • Retention, restoration, and creation of habitats and features (including species rich grassland and scrub, five hibernacula and additional log piles)	**Significant**	**Not Significant**
Breeding birds	**County**	**Significant**	**Not Significant**	• Habitat retention and planting of hedgerows and trees. • Installation of 12 bird boxes on the edge of the mature woodland to the east of the wildlife enhancement area.	**Significant**	**Not significant**

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
				• Undertaking works outside the breeding season (where practicable). • Sensitive management of hedgerow network (cutting regime, timing etc.).		
Wintering birds	**County**	**Significant**	**Not Significant**	• Habitat retention and planting of hedgerows and trees (including fruit bearing trees). • Provision of 12 bird boxes (for potential winter roosting). Sensitive management of hedgerow network (cutting regime, timing etc.) to provide a greater foraging resource for over-wintering species.	**Significant**	**Not significant**
Bats	**Local to District**	**Significant** (four species)	**Significant** (three species/ genera)	• Protection and retention of hedgerows and trees on the periphery of the construction footprint. • The creation and management of significant	**Significant**	**Not significant**

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
				areas of replacement habitat (i.e., hedgerow and trees) to provide connective links and foraging features. These features are referred to bat 'hop' over-style shrubs and trees in the EMP. • Sensitive management of hedgerow network to provide a greater foraging resource and enhancement of flight lines. • Sensitive lighting design including the avoidance of powerful lighting close to known and potential roosts and, foraging routes. • Limiting works to daylight hours. • Precautionary measures for tree felling work or works adjacent to		

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
				potential roost features in trees. • Precautionary measures for construction works adjacent to Quaker's Bridge.		
Hedgehog	**Local**	**Significant**	**Not significant**	• Retention and creation of foraging habitats (grassland, hedgerows and trees). • Provision of nesting features (log piles and two hedgehog houses). • Avoidance of vegetation clearance in hibernation season (Nov-Mar) • Precautionary working methods during construction.	**Not significant**	**Not significant**
Otter	**District**	**Significant**	**Not significant**	• Restrictions on night working during construction. • Avoidance of light spill onto Lancaster Canal during operation via	**Not significant**	**Not significant**

Ecological Feature	Importance for Biodiversity	Potential Impact (Construction)	Potential Impact (Operation)	Mitigation	Significance of Residual Effect in Year of Opening	Significance of Residual Effect 20 Years After Opening
				sensitive planting and lighting design.		
Brown hare	**Local**	**Significant**	**Significant**	• Precautionary working methods during construction.	**Significant**	**Significant**

6.13 Monitoring and Management

Construction Environmental Management Plan

6.13.1 All environmental protection measures, including those for IEFs would be detailed in a Construction Environmental Management Plan (CEMP). This document will provide effective, site-specific procedures and mitigation measures to monitor and control environmental impacts throughout the construction phase of the project and ensure that construction activities so far as is practical do not adversely impact the environment. The CEMP will cover such aspects as construction traffic, noise and vibration, dust and air pollutants, land contamination, ecology and ground water.

Pre-construction Surveys

6.13.2 It is recognised that there will be a prolonged period between the baseline data collection and the commencement of the works (estimated at three years or over). Additional baseline survey data would therefore be collected in accordance with the construction programme to inform mitigation strategies and precautionary methods of working to be followed during construction as appropriate.

6.13.3 The main consideration during the pre-construction phase is the collection of information relating to bat roosts and potential bat roosts in trees. The appropriate update surveys will need to be undertaken. This will include surveys of trees with bat roost potential which are to be felled or potentially impacted. Surveys within the most recent season are required for an EPS mitigation licence application.

6.13.4 Pre-construction surveys would therefore need to be appropriately planned and undertaken, in advance of construction, and in consideration of seasonal timing constraints of surveys, construction start dates, the time required to obtain a licence from Natural England and timings associated with the implementation of any mitigation that may be required.

Precautionary Working Methods

6.13.5 As a supplement to the CEMP, a PWMS (or similar) will be completed. The PWMS is to detail all mitigation measures to be applied to IEFs during the construction phase. This information is to include: timings of works; details of toolbox talks; guidance on the identification of species; and roles and responsibilities including the tasks to be undertaken by an Ecological Clerk of Works (ECoW). The PWMS is to include good practice working measure for habitats (retained trees and hedgerows) common toads, nesting birds, bats, badger, hedgehogs and brown hare.

Wildlife Box Scheme

6.13.6 A wildlife box Scheme for birds, bats and hedgehogs is to be submitted to provide details of the type of boxes to the used; guidance on the siting and installation of the boxes; and further confirmation of the locations of the boxes within the Scheme. It is envisaged that an ECoW will provide direct guidance to the contractors on site regarding the correct siting of the boxes.

Post-construction Monitoring and Management

6.13.7 A landscape and ecology management plan (LEMP) is to be completed in order to provide a framework for the immediate and long-term establishment, protection, and management of biodiversity within the Scheme. The LEMP is to include such details as habitat establishment, maintenance, and aftercare; remedial measures; a work schedule (including an annual work plan); targets for success; and details of the organisation responsible for implementation and management of the plan.

6.13.8 The LEMP is to provide management and maintenance action for a period of at least 30 years in line with the Environment Act 2021. This time allows for hedgerows and trees to be established.

6.13.9 Post-construction monitoring would be undertaken to assess the success of all key mitigation and compensation measures. Monitoring would be undertaken in respect to all habitat creation measures, including areas of habitat established for multi-species habitat creation in accordance with their prescribed landscape management regimes.

6.13.10 In order to assess the success of mitigation and enhancements the following post construction monitoring would be undertaken:

- Passive monitoring of bat activity (e.g., static detectors to record bat activity levels post-construction);
- Monitoring of wildlife boxes (bats, birds and hedgehogs);
- Use of trail cameras or hedgehog tunnels to monitor hedgehog presence within enhanced habitat areas; and
- Monitoring of the attenuation pond and enhanced seasonally wet pond for the presence of amphibians.
- Monitoring of the confirmed bat roost within Quaker's Bridge.

6.14 Summary

6.14.1 An accurate ecological baseline was undertaken for the Scheme through desk study, field surveys and assessments (habitat and species) undertaken between 2019 and 2021. Table 6.14.1 provides a summary of the ecological features which were considered to be of sufficient value (i.e., **Local level** or above) for inclusion within the EcIA:

Table 6.14.1 Summary of Important Ecological Features included within the EcIA.

Ecological Feature	Site or Feature Name
Designated Sites	Ribble and Alt Estuaries SPA Ribble and Alt Estuaries Ramsar The Ribble Estuary MCZ

Ecological Feature	Site or Feature Name
	Haslam Park LNR Lancaster Canal BHS
Habitats	Broad-leaved semi-natural woodland Broad-leaved plantation woodland Scattered broad-leaved trees Standing water Running water Hedgerows Veteran trees
Species	Common toad Great crested newt Slow worm Breeding birds Wintering birds Barn owl Bats (four species) Hedgehog Brown hare Otter

6.14.2 As discussed in Section 6.7 and Section 6.8, in the absence of specific mitigation/compensation, potential significant impacts are anticipated for:

- Scattered mature broad-leaved trees;
- Hedgerows;
- Common toad;
- Slow worm;
- Breeding birds;
- Wintering birds;

- Bats;
- Hedgehog;
- Brown hare; and
- Otter.

6.14.3 The implementation of mitigation measures would reduce impacts to these valuable ecological features to insignificant levels in the year of opening or before. The exceptions to this are listed below:

- Scattered broad-leaved trees (mature trees);
- Hedgerows;
- Common toad;
- Slow worm;
- Bats
- Hedgehog; and
- Brown hare.

6.14.4 After 20 years it is anticipated that residual impacts to most IEFs detailed above **would not be significant.** The exception to this would be brown hare. Due to the cumulative impacts of habitat loss, such effects on brown hare would remain significant at **Local** level.

6.14.5 In accordance with the LA 108 Biodiversity (Highways England, 2020c), the Scheme would result in **Slight (Adverse)** residual impacts in the opening year due to impacts on the hedgerow network and brown hare. Residual impacts 20 years after opening would be **Slight (Adverse)** for impacts to brown hare and **Minor (Beneficial) Impact on all other IEFs.**

6.14.6 With the creation and management of the post-development habitats as is illustrated within the Environmental Masterplan (Appendix 18), the scheme will

attain a net gain **of 18.35 habitat units (45.63%)** and **29.02 hedgerow units (29.02%).** River metric data will be provided in supplementary information to the application.

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Appendix A: Impact Screening Table

This Appendix outlines the results of the screening process undertaken for the ecological features identified as to be potentially impacted by the proposed Cottam Parkway Railway Scheme.

Important ecological features that have passed through the screening process and are likely to be subject to significant effects are discussed in detail within the impact assessment sections (6.7 to 6.8) of Chapter 6 'Ecology' of the Environmental Statement (ES).

Ecological features which are recognised to be less than Local biodiversity importance or those that are unlikely to be subject to significant effects are not considered further within the ES.

Further details for all Scheme-activity related impacts (i.e., habitat loss, severance/fragmentation, changes to environmental conditions/disturbance and mortality) on important ecological features that have been considered at the construction and operational stages of the Scheme are presented below in Table 1. Where certain Scheme-activity related impacts have been assessed as not significant and have been screened out for further consideration in the impact assessment, a clear rationale is presented within the table.

Impacts have been screened following the *source-pathway-receptor* model. This 'screening out' approach takes account of best practice principles supported by professional Institutes, notably the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018) and the Institute of Environmental Impact Assessment (IEMA).

This approach has screened out impacts that:

- Do not have a sufficient magnitude (size, extent) to result in effects to an important ecological feature via an existing pathway (air, water, ground); and/or,
- Do not have a pathway (air, water, ground) which would result in effects to an important ecological feature (i.e., spatial zone of influence is limited); and/or,
- Do not occur at a sensitive time of year or across a sufficient period of time/duration to result in an effect to an important ecological feature (i.e., temporal zone of influence is limited).

All other likely impacts that have been 'screened in' are taken through the impact assessment and presented in the ES Chapter.

The impact categories have been split between direct and indirect impacts with sub-categories of impact types within these, as follows:

1. Direct impacts:
   - Habitat loss or damage;
   - Severance/fragmentation; and,
   - Species mortality.
2. Indirect impacts:
   - Change to environmental conditions (including hydrological or air quality changes); and,
   - Disturbance (including increase in noise, vibration and general activity in the area).

Those impacts that are **screened out** are indicated by the grey cells. All other impacts are taken through the impact assessment in Chapter 6 'Ecology'.

Table A.1: Screening of Potential Impacts (Construction and Operational Stages) against Important Ecological Features (grey cells = impact is screened out and not taken through the impact assessment)

Ecological Feature	Value	Habitat Loss (Land take)	Severance/ Fragmentation (Construction)	Severance/ Fragmentation (During Operation)	Changes to Environmental Conditions/ Disturbance (Construction)	Changes to Environmental Conditions/ Disturbance (Operation)	Direct Mortality (Construction)	Direct Mortality (During Operation)
Ribble and Alt Estuaries SPA (within 5km)	International	All potential impacts not significant. Wintering and breeding bird surveys undertaken for the Scheme did not record any evidence to suggest that the land within the study area was functionally linked to the SPA. Only teal (an SPA qualifying species) were recorded within the study area in significant numbers (i.e., over a 1% threshold). The teal population was recorded outside of the Scheme boundary and within an area that would be unaffected by any direct or in-direct impacts from the construction and operation of the Scheme (Refer to Appendices 6.7, 6.8 and 6.15 for further details).						
Ribble and Alt Estuaries Ramsar (within 5km)	International	All potential impacts not significant. Wintering and breeding bird surveys undertaken for the Scheme did not record any evidence to suggest that the land within the study area was functionally linked to the Ramsar. Only teal (Ramsar qualifying species) were recorded within the study area in significant numbers (i.e., over a 1% threshold). The teal population was recorded outside of the Scheme boundary and within an area that would be unaffected by any direct or in-direct impacts from the construction and operation of the Scheme (Refer to Appendices 6.7, 6.8 and 6.15 for further details).						
The Ribble Estuary MCZ (within 2km)	National	All potential impacts not significant. There is a remote hydrological connection between the Scheme and the Ribble Estuary MCZ via a minor watercourse which runs north to south through the Scheme footprint. This watercourse runs into Savick Brook 450m south. Savick Brook forms part of the MCZ designation approximately 1.4km south-west of the Scheme. Integral mitigation is to include good practice pollution prevention measures to avoid any potential impacts to this MCZ.						
Haslam Park LNR (within 2km)	District	All potential impacts not significant. There are no pathways for potential impacts.						
Lancaster Canal BHS	County	All potential impacts not significant. The bridge construction over the canal represents a very small percentage of the total length of the BHS (e.g., over 50 miles of the canal are navigable). Integrated construction mitigation and good practice design is to be employed to avoid pollutants entering the watercourse. Whilst there may be temporary impacts (i.e., damage or loss) to the emergent vegetation on the canal margins of the BHS, this is not considered to represent a significant impact. Other interest features including Daubenton's bats and breeding birds are covered separately.						
Broad-leaved semi-natural woodland	District	Not significant. No broad-leaved semi-natural woodland to be lost.	Not significant.	Not significant.	Not significant. Integral mitigation during construction (e.g., tree protection) and operation for all retained trees would avoid potential significant impacts related		Not significant.	Not significant.

Ecological Feature	Value	Habitat Loss (Land take)	Severance/ Fragmentation (Construction)	Severance/ Fragmentation (During Operation)	Changes to Environmental Conditions/ Disturbance (Construction)	Changes to Environmental Conditions/ Disturbance (Operation)	Direct Mortality (Construction)	Direct Mortality (During Operation)
					to changes in environmental conditions/disturbance.			
Broadleaved plantation woodland	Local	Not significant. No broad-leaved plantation woodland to be lost.	Not significant.	Not significant.	Not significant. Integral mitigation during construction (e.g., tree protection) and operation for all retained trees would avoid potential significant impacts related to changes in environmental conditions/disturbance.		Not significant.	Not significant.
Scattered trees (mature)	District	Screened in.	Not significant.	Not significant.	Not significant. Integral mitigation during construction (e.g., tree protection) and operation for all retained trees would avoid potential significant impacts related to changes in environmental conditions/disturbance.		Not significant.	Not significant.
Veteran trees	County	All potential impacts not significant. There are no pathways for potential impacts. The potential veteran oak identified is located approximately 125m west of the Scheme.						
Native species-rich hedgerow	District	Screened in.	Not significant.	Not significant.	Not significant. Integral mitigation during construction (e.g., tree protection) and operation for all retained trees would avoid potential significant impacts related to changes in environmental conditions/disturbance.		Not significant.	Not significant.
Native species-rich hedgerow and trees								
Native species-poor hedgerow								

Ecological Feature	Value	Habitat Loss (Land take)	Severance/ Fragmentation (Construction)	Severance/ Fragmentation (During Operation)	Changes to Environmental Conditions/ Disturbance (Construction)	Changes to Environmental Conditions/ Disturbance (Operation)	Direct Mortality (Construction)	Direct Mortality (During Operation)
Native species-poor hedgerow and trees								
Species-poor defunct hedgerow								
Swamp	District	All potential impacts not significant. There are no pathways for potential impacts to the swamp habitat identified within the study area.						
Standing water	District	All potential impacts not significant. Only one pond is located within the Scheme footprint. This pond only holds water on a very temporary basis (i.e., after prolonged periods of wet weather) and the vegetation within and around the pond is terrestrial and would not be classed as an important ecological feature in isolation. This pond is to be retained. The two ponds containing breeding toad populations are not to be directly impacted during construction or operation. Also refer to screening assessment for common toads. The bridge construction over the Lancaster Canal represents a very small percentage of the total length of the canal (e.g., over 50 miles of the canal are navigable). Integrated construction mitigation and good practice design is to be employed to avoid pollutants entering the watercourse. Whilst there may be temporary impacts (i.e., damage or loss) to the emergent vegetation on the canal margins, this is not considered to represent a significant impact.						
Running water	Local	All potential impacts not significant. Central Watercourse is located with the Scheme footprint. Most of this watercourse is currently culverted under the pasture land which forms the proposed area of the car park. Lady Head Runnel lies to the east of the Scheme and Western Ordinary Watercourse lies adjacent to the western boundary of the Scheme. The watercourses are to be protected from potential impacts via integral mitigation (e.g., good practice pollution prevention measures) and through the culverting design which is proposed for the new Secondary Means of Escape.						
Species								
Common toad	District	Screened in.	Screened in.	Screened in – in combination with mortality.	Not significant. The species is not particularly susceptible to	Not significant. The species is not particularly	Screened in.	Screened in.

Ecological Feature	Value	Habitat Loss (Land take)	Severance/ Fragmentation (Construction)	Severance/ Fragmentation (During Operation)	Changes to Environmental Conditions/ Disturbance (Construction)	Changes to Environmental Conditions/ Disturbance (Operation)	Direct Mortality (Construction)	Direct Mortality (During Operation)
					disturbance – assessment of direct mortality are considered significant.	susceptible to disturbance.		
Slow worm	Local	Screened in.	Screened in.	Not significant. All impacts to slow worm relate to habitat loss and severance / fragmentation during construction.	Screened in.	Not significant. slow worm are semi-fossorial, spending much of their time in the undergrowth and underneath refugia and are therefore not particularly sensitive to potential indirect disturbance related impacts that may result during operation.	Screened in.	Not significant. Slow worm not expected to be at significant risk of mortality during the operation of the Scheme.
Breeding birds	County	Screened in.	Not significant. The habitat types (farmland and hedgerows) most common within the Scheme boundary are well represented within the wider area and the habitat loss would not significantly severe/fragment the breeding bird populations recorded.		Not significant. Construction and operational disturbance is not likely to result in significant changes to population levels. The habitat types (farmland and hedgerows) most common within the Scheme boundary are well represented within the general area and would therefore allow species which suffer disturbance to be displaced to suitable areas in close proximity.		Screened in.	Not significant. The intended traffic levels and speed of the road (30mph) is not expected to result in significant morality impacts.

Ecological Feature	Value	Habitat Loss (Land take)	Severance/ Fragmentation (Construction)	Severance/ Fragmentation (During Operation)	Changes to Environmental Conditions/ Disturbance (Construction)	Changes to Environmental Conditions/ Disturbance (Operation)	Direct Mortality (Construction)	Direct Mortality (During Operation)
Wintering birds	County	Screened in.	Not significant. The habitat types (farmland and hedgerows) most common within the Scheme boundary are well represented within the wider area and the habitat loss would not significantly severe/fragment the wintering bird populations recorded.		Not significant. Construction and operational disturbance is not likely to result in significant changes to population levels. The habitat types (farmland and hedgerows) most common within the Scheme boundary are well represented within the general area and would therefore allow species which suffer disturbance to be displaced to suitable areas in close proximity.		Not significant. Wintering birds would move away from (slow moving) construction plant.	Not significant. The intended traffic levels and speed (30mph) of the road is not expected to result in significant morality impacts.
Barn owl	District	All potential impacts not significant. No roosts/breeding sites would be directly impacted. The nearest roost site (non-breeding) is located approximately 130m north-west of the Scheme. The nearest occupied breeding site is located over 1km north-west of the Scheme. In the absence of mitigation, there is to be a loss of (sub-optimal) foraging habitat of approximately 2.9ha. This loss accounts for a very small proportion of habitat that is available in a barn owls home range which is typically approximately 5000 ha in the winter and a minimum of 350 ha in the summer when there is more food available (Barn Owl Trust, 2012). The linear habitats to be lost are concentrated along Sidgreaves Lane and the existing railway line and within locations not likely to form an important foraging or connective function. Due to the low numbers of barn owl present within the survey area and the lack of optimal foraging habitat present, it is considered that any severance/fragmentation or changes in conditions/disturbance of barn owl would not be significant during the construction or operational phases. The habitats present are common and widespread in the surrounding landscape. No barn owl fatalities are anticipated as a result of construction activities. Construction vehicles are unlikely to be moving at a sufficient speed to collide with barn owl. The intended traffic levels and speed (20 and 30 mph) of the road along with the relatively low levels of activity are highly unlikely to result in morality incidents (i.e., road collisions).						
Common pipistrelle bat	Local	Screened in	Screened in	Screened in	Screened in	Screened in	Screened in	Not significant. The predicted night time traffic levels (11 cars per hour between 7pm and 7am) and vehicle speed of 30mph along with the relatively low levels

Ecological Feature	Value	Habitat Loss (Land take)	Severance/ Fragmentation (Construction)	Severance/ Fragmentation (During Operation)	Changes to Environmental Conditions/ Disturbance (Construction)	Changes to Environmental Conditions/ Disturbance (Operation)	Direct Mortality (Construction)	Direct Mortality (During Operation)
								of activity are unlikely to result morality incidents (i.e., road collisions).
Daubenton's bat	District	Screened in	Screened in	Screened in	Screened in	Screened in	Screened in	Not significant. The predicted night time traffic levels (11 cars per hour between 7pm and 7am) and vehicle speed of 30mph along with the relatively low levels of activity are unlikely to result morality incidents (i.e., road collisions).
Brown long-eared bat	Local	Screened in	Screened in	Screened in	Screened in	Screened in	Screened in	Not significant. The predicted night time traffic levels (11 cars per hour between 7pm and 7am) and vehicle speed of 30mph along with the relatively low levels of activity are unlikely to result morality incidents

Ecological Feature	Value	Habitat Loss (Land take)	Severance/ Fragmentation (Construction)	Severance/ Fragmentation (During Operation)	Changes to Environmental Conditions/ Disturbance (Construction)	Changes to Environmental Conditions/ Disturbance (Operation)	Direct Mortality (Construction)	Direct Mortality (During Operation)
								(i.e., road collisions).
Noctule	Local	Screened in	Screened in	Screened in	Screened in	Screened in	Screened in	Not significant. Noctule bats are unlikely to be at risk of road collisions due to their high flight patterns.
Hedgehog	Local	Screened in	Screened in.	The road construction is to replace vehicle use on Sidgreaves Lane. It is not anticipated that the road would significantly hinder the movement and distribution of hedgehog to an extent in which the road would be avoided and fragment populations. Such road types are less likely to present a barrier to movement as compared to multi-lane roads of greater width and	Whilst hedgehog are likely to be deterred by construction related impacts (noise, light, vibration), such impacts are not considered to be potentially significant and will be transitory only. Research suggests hedgehogs are not significantly affected by disturbance and use of lighting at night-time is unlikely to significant affect this species (The	Potential disturbance factors such as traffic noise and light pollution are not expected to present potential significant impacts to hedgehog as the species is associated with urban environments and if not expected to be significantly affected by any such changes.	Screened in	Not significant. The predicted night time traffic levels are averaged at 11 cars per hour between 7pm and 7am. This level is expected to be very much reduced after public trains are not in operation (e.g., post 11pm-12am until 6am). As hedgehog are largely nocturnal, potential road crossings would therefore occur during the very lowest traffic levels. The vehicles speed is to be set at 30mph. Mortality risks are not

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				greater levels of traffic (with avoidance increasing in proportion to road width (Rondinini and Doncaster, 2002). Potential significant effects are likely to extend to habitat loss and mortality rather than severance / fragmentation during the construction and operation of the Scheme.	Mammal Society, 2012)			considered to be significant.
Brown hare	Local	Screened in (due to cumulative impacts)	Not significant. The two lane road construction is to replace vehicle use on Sidgreaves Lane. It is not anticipated that the road would significantly hinder the movement and distribution of brown hare to an extent in which the road would be avoided and fragment populations. Such road types are less likely to present a barrier to movement as compared to multi-lane roads of greater width and greater levels of traffic. Potentially viable habitats for brown hare to the east of the road are also limited to two large fields		Not significant. Whilst brown hare are likely to be prone to construction related disturbance, such disturbance is not anticipated to significantly impair normal activity patterns.	Not significant. Operational disturbance is not anticipated to significantly impair normal activity patterns.	Screened in	Not significant. The predicted night time traffic levels are averaged at 11 cars per hour between 7pm and 7am. This level is expected to be very much reduced after the public trains are not in operation (e.g., post 11pm-12am until 6am). As

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			located either side of the Lancaster Canal (representing approximately 14ha of pasture land). There are already significant barriers to movement (residential areas and roads) around these parcels of land to the east.					brown hare are largely nocturnal (it is noted that they can move around within the daylight) potential road crossings would therefore occur during the very lowest traffic levels. The vehicles speed is to be set at 30mph. Mortality risks are not considered to be significant.
Otter	District	Not significant. No loss of potential resting sites or suitable habitats.	Screened in	Not significant. The design of the road would not hinder movement of otter along Lancaster Canal.	Screened in	Not significant. Due to the relatively small scale of the access road and expected traffic use of the road, environmental changes from operational activities are unlikely to significantly change from existing conditions. Otters are prevalent in other locations where there are	Not significant. There are no expected terrestrial crossing points within the Scheme.	Not significant. There are no expected terrestrial crossing points within the Scheme.

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						road crossing points over the canal.		