HyNet North West

ENVIRONMENTAL STATEMENT (VOLUME II)

Chapter 9 – Biodiversity (Tracked Change)

HyNet Carbon Dioxide Pipeline DCO

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulations 5(2)(a)

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9. BIODIVERSITY

9.1. INTRODUCTION

9.1.1. This Chapter reports the assessment of the likely significant effects of the Development Consent Order (DCO) Proposed Development on Biodiversity and describes:

- Relevant, legislation, policy and guidance;
- Consultation undertaken;
- Scope of the assessment;
- Assessment methodology;
- Baseline conditions;
- Sensitive receptors;
- Design development and embedded mitigation;
- Assessment of likely impacts and effects;
- Mitigation and enhancement measures;
- Potential design, mitigation, and enhancement measures;
- Residual effects;
- Monitoring; and
- Next steps.

9.1.2. This Chapter (and its associated appendices) is intended to be read as part of the wider Environmental Statement (ES), with particular reference to **Chapter 12 - Landscape and Visual (Volume II), Chapter 18 - Water Resources and Flood Risk (Volume II)**, and **Chapter 19 - Combined and Cumulative Effect (Volume II**). This Chapter should be read in conjunction with the following supporting appendices:

- **Appendix 9.1 - Habitats and Designated Sites Survey Report (Volume III);**
- **Appendix 9.2 - Great Crested Newt Survey Report (Volume III);**
- **Appendix 9.3 - Bat Activity Survey Report (Volume III);**
- **Appendix 9.4 - Bats and Hedgerows Assessment (Volume III);**
- **Appendix 9.5 - Badger Survey Report (Confidential) (Volume III);**
- **Appendix 9.6 - Riparian Mammal Survey Report (Volume III);**
- **Appendix 9.7 - Barn Owl Survey Report (Confidential) (Volume III);**
- **Appendix 9.8 - Bird Survey Report (Volume III);**
- **Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III);**

- **Appendix 9.10 - Aquatic Ecology (Ponds) Survey Report (Volume III);**
- **Appendix 9.11 - Arboricultural Impact Assessment Report** (**Volume III**);
- **Habitats Regulations Assessment (Document reference: D.6.5.6);** and
- **Biodiversity Net Gain Assessment (Document reference: D.6.5.12).**

9.1.3. This Chapter has been prepared by competent experts with relevant and appropriate experience, as outlined in **Appendix 5.1 – Relevant Expertise and Competency (Volume III).**

~~9.1.4. This Chapter (Revision B) replaces and supersedes Revision A [APP-061]. Further surveys, as detailed within **Appendix 9.3 - Bat Activity Survey Report (Revision B) (Volume III), Appendix 9.4 - Bats and Hedgerows Assessment (Revision B) (Volume III)** and **Appendix 9.6 – Riparian Mammals (Revision B) (Volume III)** were completed between July 2022 and September 2022 and as such were not presented within the DCO Proposed Development ES Chapter 9 Biodiversity [APP-061]. This Chapter (Revision B) and associated appendices takes account of the updated survey data.~~

9.2. LEGISLATIVE AND POLICY FRAMEWORK

9.2.1. A summary of the international, national, and local legislation, planning policy and guidance relevant to the Biodiversity assessment for the DCO Proposed Development is set out below.

LEGISLATIVE FRAMEWORK

9.2.2. The following legislation is relevant to the DCO Proposed Development;

The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations) (as amended) (Ref. 9.1)

9.2.3. The Habitats Regulations consolidate the Conservation of Habitats and Species Regulations 2010 with subsequent amendments. The Regulations Transpose Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive), into national law. They also transpose elements of the EU Wild Birds Directive in England and Wales. The Regulations are transposed through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the Conservation (Natural Habitats &c.) Regulations 1994.

9.2.4. All species listed under Annex IV of the Habitats Directive require strict protection and are known as European Protected Species (EPS). Under Regulation 42 of the Habitats Regulations, it is unlawful to: Deliberately kill, capture or disturb; Deliberately take or destroy the eggs of; and Damage or destroy the breeding site/resting place of any species protected under this legislation.

9.2.5. If it is determined that impacts to an EPS are unavoidable then the works may need to be carried out under a site-specific mitigation licence from the relevant statutory body.

9.2.6. Certain EPS are also listed under Annex II of the Habitats Directive and are afforded protection by the establishment of core areas of habitat known as Special Areas of Conservation. This means these species are a relevant consideration in a Habitats Regulations Assessment (HRA) (see **Habitats Regulations Assessment, Document reference: D.6.5.6** for further detail**).**

9.2.7. The Birds Directive seeks to maintain populations of all wild bird species across their natural range (Article 2). All bird species listed under Annex I of the Birds Directive are rare or vulnerable and afforded protection by the classification of Special Protection Areas (SPAs) or Ramsar, these are also designated under all regularly occurring migratory species, with regard to the protection of wetlands of international importance (Article 4). This means these bird species and communities are a relevant consideration in an HRA.

The Wildlife and Countryside Act 1981 (as amended) (WCA) (Ref. 9.2)

9.2.8. Protected birds, animals and plants are listed under Schedules 1, 5, 8 and 9 respectively of the Wildlife and Countryside Act 1981 (WCA).

9.2.9. Birds listed under Schedule 1 of the WCA are afforded additional protection with regard to intentional or reckless disturbance whilst nest-building, or at a nest containing eggs or young, or disturb the dependent young of such a bird.

9.2.10. Species listed in Schedule 5 can either be fully protected or be partially protected under Section 9, which makes it unlawful to intentionally: kill, injure or take; possess or control (live or dead animal, part or derivative); damage or destruct any structure used for shelter or protection; disturb them in a place of shelter or protection; obstruct access to place of shelter or protection; sell, offer for sale, possess or transport for the purpose of sale (live or dead animal, part or derivative); and advertise for buying or selling.

9.2.11. The Act makes it an offence (subject to exceptions) to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8.

9.2.12. Invasive species listed under Schedule 9 are prohibited from release into the wild and the Act prohibits planting or “causing to grow” in the wild of any plant species listed in Schedule 9. It should be noted that certain bird species listed on Schedule 1 of the WCA are also listed on Schedule 9 to prevent release of non-native and captive individuals, this includes barn owl, red kite, goshawk and corncrake.

9.2.13. Under the WCA, all birds, their nests and eggs (with exception of species listed under Schedule 2) are protected by the WCA.

Environment Act Wales (2016) (Ref. 9.3)

9.2.14. The Environment (Wales) Act 2016 puts in place the legislation needed to plan and manage Wales' natural resources in a more proactive, sustainable and cohesive way. Section 7 replaces the duty in Section 42 of the Natural Environment and Rural Communities 2006 and it places a duty on the Welsh Ministers to publish, review and revise lists of living organisms and types of habitats which they consider are of key significance to sustain and improve biodiversity in Wales. The species and habitat lists are identical to those in Section 42.

Countryside Rights of Way Act 2000 (Ref. 9.4)

9.2.15. The Countryside and Rights of Way (CRoW) Act has amended the WCA in England and Wales strengthening the protection afforded to Sites of Special Scientific Interest (SSSI) and the legal protection for threatened species. It adds the word 'reckless' to the wording of the offences listed under Section 9(4) of the WCA. This alteration makes it an offence to recklessly commit an offence, where previously an offence had to be intentional to result in a breach of legislation.

The Natural Environment and Rural Communities (NERC) Act 2006 (Ref. 9.5)

9.2.16. Species and Habitats of Principal Importance are listed under Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC). Section 41 lists species that are of principal importance for the conservation of biodiversity in England and should be used to guide decision-makers such as local and regional authorities when implementing their duty to have regard for the conservation of biodiversity in the exercise of their normal functions, as required under Section 40 of the NERC Act 2006.

The Protection of Badgers Act 1992 (Ref. 9.6)

9.2.17. It is an offence to wilfully take, kill, injure, possess or ill-treat a badger. Under the Protection of Badgers Act 1992 their setts are protected against intentional or reckless interference. Sett interference includes damaging or destroying a sett, obstructing access to any part of the sett, or disturbance of a badger whilst it is occupying a sett. The Act defines a badger sett as 'any structure or place, which displays signs indicating the current use by a badger' and statutory bodies takes this definition to include seasonally used setts that are not occupied but that show sign of recent use by badgers.

The Hedgerows Regulations 1997 (Ref. 9.7)

9.2.18. Under The Hedgerows Regulations it is an offence to remove a hedgerow (as defined within the Regulations) without obtaining local planning authority (LPA) permission. Should the hedgerow be deemed unimportant according to the

criteria within the Regulations, the LPA is obliged to allow removal; however, if the hedgerow qualifies as 'Important' under the Regulations the LPA must decide whether the reasons for removal justify the loss of an 'Important Hedgerow', with a presumption for retention.

The Wild Mammals (Protection) Act 1996 (Ref. 9.8)

9.2.19. An Act providing protection for wild mammals against certain acts of deliberate harm. "Wild mammal" means any mammal which is not a "protected animal" within the meaning of the Animal Welfare Act 2006 (Schedule 3, Section 13 of the 2006 Act). The following offences are specified in relation to any wild mammal: to mutilate, kick, beat, nail or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate. The offences require proof of intent to inflict unnecessary suffering.

Salmon and Freshwater Fisheries Act 1975 (Ref. 9.9)

9.2.20. This Act covers regulation of fisheries in England and Wales and includes legislation that covers the introduction of polluting effluents, the obstruction of fish passage (screens, dams, weirs, culverts etc) illegal means of fishing, permitted times of legal fishing and fishing licencing (which covers electric fishing).

9.2.21. Under this act any person who causes or knowingly permits to flow, or puts or knowingly permits to be put, into any waters containing fish or into any tributaries of waters containing fish, any liquid or solid matter to such an extent as to cause the waters to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish, shall be guilty of an offence.

9.2.22. The act also requires that fish passes are installed on new and rebuilt barriers that affect waters frequented by salmon or migratory trout. In the future, it is likely that fish passage facilities will need to be designed to accommodate all fish species and life stages, with nature-like bypass channels being the most appropriate solution currently available.

The Eels (England and Wales) Regulations 2009 (Ref. 9.10)

9.2.23. The Eels (England and Wales) Regulations 2009 implement Council Regulation (EC) No 1100/2007 of the Council of the European Union, which required Member States to establish measures for the recovery of the stock of European eel. The regulations apply to England and Wales.

9.2.24. They give powers to the regulators (the Environment Agency and Natural Resources Wales) to implement recovery measures in all freshwater and estuarine waters in England and Wales. The aim of the regulations is to achieve 40 per cent escapement of adult eels relative to escapement levels under pristine conditions. The measures, as set out in the legislation, by which this is

to be achieved are to reduce fishing pressures, improve access and habitat quality and reduce the impact of impingement and entrainment.

9.2.25. Under the Regulations, the regulators can serve notice to companies detailing their legal obligation to screen intakes and outfalls for eel and/or to remove or modify obstructions to eel migration. However, it is possible for companies to be granted with exemptions if the costs of works greatly exceeds the benefits. In such a situation it is likely the regulator will seek a package of more cost-effective, “alternative measures”.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (2000/60/EC) (Ref. 9.11)

9.2.26. These regulations revoke and replace the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (SI 2003 No. 3242). They continue to transpose for England and Wales Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the Water Framework Directive).

9.2.27. They also transpose aspects of Directive 2006/118/EEC on the protection of groundwater against pollution and deterioration (the Groundwater Directive) and of Directive 2008/105/EC on environmental quality standards in the field of water policy (the Environmental Quality Standards Directive). The Regulations impose duties on the Secretary of State, Welsh Ministers, the Environment Agency (EA) and Natural Resources Wales (NRW) to carry out certain functions so as to ensure compliance with the EU directives, in particular when deciding whether to grant, vary or revoke certain permits and licences which affect water quality.

9.2.28. The purpose of the Water Framework Directive (WFD) is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater and for all waterbodies (unless artificial or heavily modified) to achieve “good” ecological status.

9.2.29. Ecological Status is expressed in terms of five classes (high, good, moderate, poor or bad). These classes are established on the basis of specific criteria and boundaries defined against biological, physico-chemical and hydromorphological elements. Biological assessment uses numeric measures of communities of plants and animals (for example, fish and rooted plants). Physico-chemical assessment looks at elements such as temperature and the level of nutrients, which support the biology. Hydromorphological quality looks at water flow, sediment composition and movement, continuity (in rivers) and the structure of physical habitat.

9.2.30. The overall Ecological Status of a water body is determined by whichever of these assessments is the poorer. For example, a water body might pass ‘Good

Status' for chemical and physico-chemical assessments but be classed as 'Moderate Status' for the biological assessment. In this case it would be classed overall as 'Moderate Ecological Status'. To achieve the overall aim of good surface water status, the Directive requires that surface waters be of at least Good Ecological Status and Good Chemical Status. To achieve High Status, the Directive requires that the hydromorphological Quality Elements are also in place.

9.2.31. When considering the effect of a development or activity on a waterbody it is a regulatory requirement under the WFD to assess if it will cause or contribute to a deterioration in status or jeopardise the waterbody achieving good status in the future.

9.2.32. Where a scheme is considered to cause deterioration, or where it may contribute to the failure of the water body to meet Good Ecological Status or Good Ecological Potential, then an Article 4.7 assessment would be required which makes provision for deterioration of status provided that certain stringent conditions are met.

Environment Act 2021 (Ref. 9.12)

9.2.33. The Environment Act 2021 has two main functions:

- To give a legal framework for environmental governance in the UK.
- To bring in measures for improvement of the environment in relation to waste, resource efficiency, air quality, water, nature and biodiversity, and conservation.

9.2.34. The vast majority of this Act does not make any immediate changes for organisations other than regulators. Changes to duties for businesses and other organisations are expected in subsequent legislation made under this Act.

9.2.35. Biodiversity Net Gain (BNG) will be a statutory requirement for most planning applications, as per the new Environment Act (previously Environment Bill), which achieved Royal Assent through Parliament on 9 November 2021. Whilst there is currently a transition period before mandatory requirements come into force (expected to be winter 2023), it will require development to deliver a 10% net gain in biodiversity units (area habitat, hedge and river units where applicable), as determined through the use of a biodiversity metric.

9.2.36. The government intends that the BNG requirement should apply across all terrestrial infrastructure projects, or terrestrial components of projects, accepted for examination by the Planning Inspectorate through the NSIP regime by November 2025 (subject to the provisions of the applicable National Policy Statements or biodiversity gain statement). Projects accepted for examination before the specified commencement date would not be required to deliver mandatory biodiversity net gain.

POLICY

National

9.2.37. The Planning Policy Wales (PPW) (2021) (**Ref. 9.13**), states *"planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity".*

9.2.38. The National Planning Policy Framework (NPPF) (2021) (**Ref. 9.14**) states that at an overview level the "*planning system should contribute to and enhance the national and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*".

9.2.39. The Department for Business, Energy, and Industrial Strategy (BEIS) published a number of National Policy Statements (NPS) in relation to energy infrastructure and are considered relevant in assessing the DCO Proposed Development.

- Overarching NPS for Energy (EN-1) (**Ref. 9.15**)
- NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (**Ref. 9.16**)

9.2.40. It should be noted that the NPS underwent review and consultation in 2021, feedback analysis is still underway, with EN-1 and EN-4 amendments currently under draft. However, the contents of a draft NPS released in 2021 have also been considered during the preparation of this Chapter.

9.2.41. The Office of the Deputy Prime Minister (ODPM) Biodiversity and Geological Conservation Government Circular 06/2005 (**Ref. 9.17**) has been superseded by the National Planning Policy Framework (**Ref. 9.14**); however, key principles and policies are still relevant in assessing the DCO Proposed Development. These include promoting opportunities for the incorporation of beneficial biodiversity features within the design of the development, ensuring biodiversity and geological conservation interests are conserved and enhanced and ensuring appropriate mitigation measures are put in place where necessary.

Local

9.2.42. The DCO Proposed Development includes infrastructure located within the administrative boundaries of Flintshire County Council (FCC) and Cheshire West and Chester Council (CWCC). Therefore, the following local planning policies are of relevance in assessing the DCO Proposed Development:

- Cheshire West and Chester Local Plan 2015 – 2030 (**Ref. 9.18**); ENV4 Biodiversity and geodiversity;
- Flintshire County Council Biodiversity Plan 'Supporting Nature in Flintshire 2020-2023' (**Ref. 9.19**).

9.2.43. ~~It~~ It should be noted that the FCC Local Development Plan 2015-2030 was adopted on 24 January 2023. The following current draft policies of relevance in assessing the DCO Proposed Development include: ~~should be noted that the FCC Local development plan 2015-2030 is currently undergoing consultation (**Ref. 9.20**), with the Deposit Local Development Plan (2019) at Examination Stage. The following current draft policies of relevance in assessing the DCO Proposed Development include:~~

- STR13: Natural and Built Environment, Green Networks and Infrastructure;
- EN6: Sites of Biodiversity and Geodiversity Importance;
- EN7: Development Affecting Trees, Woodlands and Hedgerows
- EN11: Green Wedges

~~STR13: Natural and Built Environment, Green Networks and Infrastructure;~~

~~EN6: Sites of Biodiversity Importance;~~

~~EN7: Development Affecting Trees, Woodlands and Hedgerows~~

~~EN11: Green Barriers~~

GUIDANCE

9.2.44. Baseline data collection, mitigation, and enhancement options have been collated in line with relevant current good practice guidelines, with specific reference to those within the Chartered Institute of Ecology and Environmental Management (CIEEM) good practice guidance list (**Ref. 9.21**). Surveys have been completed in line with CIEEM guidance alongside each receptor's individual best practice guidelines (detailed in Table 9.3~~**Table 9.3**~~). The impact assessment and methodology follow CIEEM's Ecological Impact Assessment (EcIA) guidelines (**Ref. 9.22**). Where deviations from best practice, or where no best practice guidelines are available, approaches to survey effort have been detailed and justified within survey methods and/or limitations within this Chapter and its supporting technical appendices.

9.2.45. As encouraged through the NPPF and PPW, a **Biodiversity Net Gain (BNG) Assessment** (**Document reference: D.6.5.12**) based on Defra BNG Metric 3.0 (**Ref. 9.23**[1]), has been used to inform and quantify the change in biodiversity value of land within the Newbuild Infrastructure Boundary before and after the

[1] Metric 3.1 was used for assessment of river units owing to errors within the Metric 3.0.

construction of the DCO Proposed Development (see **Section 9.5** for further details).

9.3. SCOPING OPINION AND CONSULTATION

RESPONSE TO THE SCOPING OPINION

9.3.1. An **EIA Scoping Opinion** (**Appendix 1.2, Volume III**) was received by the Applicant from the Planning Inspectorate (The Inspectorate) on 14 July 2021, including formal responses from Statutory Consultees. A full list of the responses from The Inspectorate and how these requirements have been addressed by the Applicant are set out in **Appendix 1.3 –Scoping Opinion Responses (Volume III)**.

CONSULTATION UNDERTAKEN TO DATE

9.3.2. Table 9.1~~**Table 9.1**~~ provides a summary of the consultation undertaken to inform the Biodiversity assessment to date.

Table 9.1 - Summary of Consultation Undertaken

Body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Natural Resources Wales (NRW) and Natural England (NE)	03 February 2021, Teleconference	Proposed survey approaches and methodologies for surveying aquatic and terrestrial receptors (for example, fish, birds, bats, etc.) was presented for discussion and/or comment. Subsequent meetings were tabled to specifically discuss survey approaches for great crested newt (GCN) *Triturus cristatus* and bats, primarily the assessment of bat commuting/foraging routes associated with hedgerows. Additionally, separate meetings were agreed to discuss BNG and Habitats Regulations Assessment (HRA) considerations.
NRW and NE	23 February 2021, Teleconference	A meeting was held to discuss detailed survey approach and methodology for GCN and bats, in response to the meeting held on 03 February 2021. Topics discussed related to Habitat Suitability Index (HSI) scoring, survey extents, survey techniques (for example, use of eDNA) and the use of the rapid risk assessment tool. Utilisation of District Level Licensing (DLL) for GCN was tabled for use in England, along with potential mitigation options for GCN in areas where DLL is not possible. A draft novel survey approach and methodology for assessing bat use of hedgerows was presented following a request for consideration of assessment during the prior meeting. The novel approach comprising: a literature review of existing information regarding bat activity and hedgerow use; proposed methods for assessment and categorisation of hedgerows following field surveys, and subsequent methods and extent of further survey to determine bat activity and use - was discussed and provided to each organisation for comment following the meeting with a request for feedback.
NRW and NE	26 May 2021, Teleconference	A meeting was held to discuss the novel survey approach and methodology for bats and hedgerows, in response to the meeting on 23 February 2021. Potential mitigation options were discussed including use of artificial hedgerows; sensitive timings for works; trenchless installation techniques for critical hedgerows; planting of standard shrubs alongside whips to provide more instant hedgerow structure and providing additional roosting opportunities. Further details on the static detector sampling strategy were presented and discussed. The use of aerial tree climbing inspections as an alternative supplementary approach to dusk emergence/dawn re- entry surveys for trees was tabled and agreed with both stakeholders.
NRW and NE	18 June 2021, Teleconference	The amended survey methodology and approach for assessing bat use of hedgerows, was tabled and discussed. NRW agreed to provide examples and NRW guidance in relation to presenting an assessment of conservation status. It was acknowledged that if an impact is not significant within EIA it does not mean it is not a significant impact to the maintenance of favourable conservation status and that the two are separate assessments.
Flintshire County Council (FCC) and Chester and Cheshire West Council (CWCC)	22 July 2021, Teleconference	Approach to baseline surveys was presented along with current working assumptions of construction. A description of the proposed scope of ecological surveys was provided, with the arboricultural scope and assessment then discussed, including targeted walkover survey for trees, use of LiDAR data and classification of trees. BNG was discussed in relation to the DCO Proposed Development, with consultees advised of separate assessments for England and Wales. It was tabled that BM3.0 will be used to complete the assessment.

Body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
		Early mitigation considerations were presented and acknowledgement of the need to complete a HRA provided. DLL, including pre-application discussions with NE, was raised with CWCC who recommended that any DLL discussions should include CWCC as the implementing body.
NRW, NE and FCC	19 November 2021, Teleconference	The meeting sought to discuss and seek opinion on the approach to survey and assessment of aquatic receptors associated with the River Dee. Two potential options were presented; 'Do Nothing Approach', using desk-study information alone, and a 'Survey Approach' utilising appropriate surveys and methods. Potential mitigation measures were also tabled. A number of concerns were raised by NRW and FCC including: the presence of otter *Lutra lutra* along the River Dee; timing of drilling in regard to fish movement; appropriate licences for survey work such as sediment grabs; potential maintenance requirements; impacts associated with blowouts/frac outs from trenchless installation techniques; and decommissioning. Following the meeting, NRW provided their written opinion, recommending the 'Survey Approach' be taken forward.
NE and CWCC	26 January 2022, Teleconference	GCN survey approach was presented, including proposed survey plans, previous 2021 survey results and next steps. This also included discussion of DLL risk zones with the proposed Newbuild Infrastructure Boundary discussed given its location through one red risk zone. Compensation and DLL was further discussed, including NE remarking that larger scheme licencing is normally based on Newbuild Infrastructure Boundary to ensure some flexibility and advising of the need for a resubmission screening application.
Chester Zoo	8 February 2022, Teleconference	Discussion with Chester Zoo Ecologist and Regional Field Programme Manager, where the approach to surveys and assessment within Chester Zoo's land ownership within the Newbuild Infrastructure Boundary were presented. A summary of ecological features within the survey areas was shared by Chester Zoo. In relation to GCN, Chester Zoo agreed that survey data for ponds accrued within the appropriate timeframe would be shared with the Applicant for all Chester Zoo land within the Newbuild Infrastructure Boundary.
NRW and NE	24 February 2022, Teleconference	Survey results to date were outlined with a description provided of further surveys requiring completion in 2022. Reduced survey effort within the red risk zone associated within the Mollington/Chester Zoo location was presented given the agreement from Chester Zoo to provide their survey results and data for this area to remove unnecessary trapping of newts. Further topics discussed and presented included: avoidance measures, to outright remove or reduce potential impacts of the DCO Proposed Development; mitigation principles, to illustrate how the DCO Proposed Development will mitigate for impacts where these can't be avoided, citing industry best practice and standard environmental legislation; construction methods: including trenchless installation techniques, implementation of demarcated root protection zones, provision of Ecological Clerk of Works (ECoW), and sensitively timed/seasonally constrained working periods.
NRW	06 April 2022 Email correspondence	Email correspondence to ensure specific concerns for key aquatic receptors and potential Invasive Non-Native Species (INNS) for watercourse crossings were addressed and agreed such that suitable avoidance and mitigation methods can be implemented to reduce risk of harm to a reasonable and acceptable level. A spreadsheet detailing watercourse crossings and the proposed crossing design/type were provided. NRW response provided key aquatic receptors for each watercourse crossing and the potential for INNS at specific watercourses crossings.

Body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
Environment Agency (EA)	08 April 2022 Email correspondence	Email correspondence to ensure specific concerns for key aquatic receptors and potential INNS for watercourse crossings were addressed and agreed such that suitable avoidance and mitigation methods can be implemented to reduce risk of harm to a reasonable and acceptable level. A spreadsheet detailing watercourse crossings and the proposed crossing design/type were provided. EA provided written comment outlining concerns for open trench crossings at specific watercourses citing potential adverse impacts to water vole and barriers to fish migration. Additionally, EA outlined the requirement for fish rescues during de-watering at open trench crossings and the need for 2 mm screens on intakes during over-pumping/de-watering.
NRW and NE	07 July 2022, Teleconference	An update on the DCO Proposed Development was provided, detailing the refinement and reduction of the Newbuild Infrastructure Boundary due to influences from pipeline design and mitigation workshops. On-going issues regarding land access were discussed, with the implementation of a precautionary approach to assessment for certain receptors explained. It was explained that surveys will continue post DCO Application for select receptors (primarily bats and hedgerows and bat dusk and dawn surveys) and that the results of these will be submitted as Supplementary Information. It was iterated that results of surveys post DCO Application are unlikely to alter the impact significance and/or mitigation proposals beyond those included at DCO Application. General commitments and mitigation measures were detailed for the DCO Proposed Development and those relevant for each receptor and the use of a project wide European Protected Species Licence as required. A short discussion was held regarding BNG and potential for cross-border mitigation schemes. NE and NRW would require further details on any proposals for cross-border mitigation. An update on ecology surveys and receptor specific mitigation approaches was provided, including survey results from bats, GCN, riparian mammals, barn owl and badger.
FCC & CWCC	14 July 2022, Teleconference	An update on the DCO Proposed Development was provided, detailing the refinement and reduction of the Newbuild Infrastructure Boundary due to influences from pipeline design and mitigation workshops. On-going issues regarding land access were discussed, with the implementation of a precautionary approach to assessment for certain receptors explained. It was explained that surveys will continue post DCO Application for select receptors (primarily bats and hedgerows and bat dusk and dawn surveys) and that the results of these will be submitted as Supplementary Information. It was iterated that results of surveys post DCO Application are unlikely to alter the impact significance and/or mitigation proposals beyond those included at DCO Application. General commitments and mitigation measures were detailed for the DCO Proposed Development and those relevant for each receptor and the use of a project wide European Protected Species Licence as required. A short discussed was held regarding BNG and potential for cross-border mitigation schemes. FCC highlighted that such plans must be well balanced, and CWCC noted that local policy plans must be considered in cross border mitigation. An update on ecology surveys and receptor specific mitigation approaches was provided, including survey results from bats, GCN, riparian mammals, barn owl and badger.
FCC & CWCC	21 July 2022, Teleconference	A meeting was held to discuss the BNG approach and methodology for the DCO Proposed Development. This included details on survey approach, and sources of habitat data, irreplaceable habitats, river condition assessment, the post development assessment and offsetting. A summary of the current BNG results were provided and that the DCO Proposed Development will seek to offset loss of priority habitats on land within the same local authority boundary that the priority habitat was lost from, but may not be possible in some cases, and early engagement with landowners is commencing regarding land requirements for mitigation.
NRW & NE	26 July 2022	A meeting was held to discuss the BNG approach and methodology for the DCO Proposed Development. This included details on survey approach, sources of habitat data, irreplaceable habitats, river condition assessment and post development

Body / organisation	Meeting dates and other forms of consultation	Summary of outcome of discussions
	Teleconference	assessment and offsetting. A summary of the current BNG results was provided. It was noted that the DCO Proposed Development will seek to offset loss of priority habitat on land within the same local authority boundary it was lost from, where possible, with this approach agreed with NE and NRW.
NRW & NE	17 November 2022 Teleconference	An update on the DCO Proposed Development was provided. This included an update on the surveys to be undertaken post submission, updates on project design amendments, mitigation requirements and likely future survey requirements.
FCC & CWCC	08 December 2022 Teleconference	An update on the DCO Proposed Development was provided. This included an update on the surveys to be undertaken post submission, updates on project design amendments, mitigation requirements and likely future survey requirements.

9.4. SCOPE OF THE ASSESSMENT

9.4.1. The scope of this assessment has been established through an ongoing scoping process. Further information can be found in **Chapter 5 - EIA Methodology (Volume II)** of this ES.

9.4.2. This section provides an update to the scope of the assessment and re-iterates the evidence base for scoping out elements following further iterative assessment.

ELEMENTS SCOPED OUT OF THE ASSESSMENT

9.4.3. The elements shown in Table 9.2~~Table 9.2~~ are not considered to give rise to likely significant effects as a result of the DCO Proposed Development and have therefore not been considered within this assessment.

Table 9.2 Elements Scoped Out of the Assessment

Element Scoped Out	Justification
Ecological impacts arising from the existing Flint Connection to PoA Terminal Pipeline (excluding Block Valve Stations and their tie-ins)	No physical works consented within this DCO Application. Therefore, no impacts relevant to Biodiversity for Construction, Operation or Decommissioning Stages are anticipated.
Non-Habitats of Principal Importance (HPI) or Biodiversity Action Plan (BAP) Habitats	The majority of habitat types within the Newbuild Infrastructure Boundary comprise non HPI / BAP habitats including arable farmland, neutral semi-improved grassland, poor-semi-improved grassland and improved grassland. Given the short term, temporary and localised nature of constructing the Newbuild Carbon Dioxide Pipeline, and the location of permanent features such as Above Ground Installations (AGIs) and Block Valve Stations (BVSs) on habitats of low ecological value, it is considered unlikely to significantly impact non-HPI / BAP habitats across the Newbuild Infrastructure Boundary. Mitigation measures detailed within this ES (and included within **the Register of Environmental**

Element Scoped Out	Justification
	Actions and Commitments (REAC) (Document reference: D.6.5.1) and in the **Outline Construction Environmental Management Plan (OCEMP), Document reference: D.6.5.4**) will ensure the implementation of Precautionary Working Methods and the supervision of an Ecological Clerk of Works present during construction works, and that habitats are reinstated post construction where possible. Therefore, no construction, operational or decommissioning impacts are anticipated.
Reptiles	Habitats exist within the Newbuild Infrastructure which have the potential to support reptile species. Therefore, potential exists for direct physical impacts (e.g., mortality or loss of hibernacula, basking and foraging resource) on reptiles as well as indirect impacts (e.g., disturbance, increased pollution, noise and vibration) affecting their habitats. However, given the short term, localised and temporary nature of constructing the Newbuild Carbon Dioxide Pipeline, and the location of permanent features such as AGIs and BVSs on habitats of low ecological value, it is considered unlikely to significantly impact reptile populations across the Newbuild Infrastructure Boundary. Mitigation measures detailed within this ES (and included within the **REAC (Document reference: D.6.5.1)** and in the **OCEMP** (**Document reference: D.6.5.4**) will ensure the protection of reptiles, through the implementation of Precautionary Working Methods and the supervision of an Ecological Clerk of Works present during construction works. Therefore, no construction, operational or decommissioning impacts are anticipated.
Other Mammals (including brown hare *Lepus europaeus* and	Habitats exist within the Newbuild Infrastructure which have the potential to support other mammal species, such as brown hare and hedgehog. Therefore, potential exists for direct physical impacts (e.g. injury,

Element Scoped Out	Justification
hedgehog *Erinaceus europaeus*)]	mortality) on other mammals as well as indirect impacts (e.g. disturbance, increased pollution, noise and vibration) affecting their habitats. However, given the short term, localised and temporary nature of constructing the Newbuild Carbon Dioxide Pipeline, and the location of permanent features such as AGIs and BVSs on habitats of low ecological value, it is considered unlikely to significantly impact such populations across the Newbuild Infrastructure Boundary. Mitigation measures included within this ES will ensure the protection of other mammal species, including brown hare and hedgehog during construction. Therefore, no construction, operational or decommissioning impacts are anticipated.
Invasive Non-Native Species (INNS)	INNS species are present across the Newbuild Infrastructure Boundary and there is potential for accidental spread and / or propagation of INNS within terrestrial and aquatic habitats. Mitigation measures included within this ES will ensure that INNS are dealt with appropriately and will include the preparation of a Biosecurity Method Statement at the Detailed Design stage as set out within **the REAC (Document reference: D.6.5.1).** Therefore, no construction, operational or decommissioning impacts are anticipated.

ELEMENTS SCOPED INTO THE ASSESSMENT

Construction Stage

9.4.4. In the absence of embedded and secondary mitigation, the below ecological features are considered to have likely significant effects during construction and have been scoped into the impact assessment.

- Statutory and Non-Statutory Designated Sites;

- Habitats of Conservation Importance (e.g., Priority Habitats[2]);
- Watercourses and Waterbodies;
- GCN;
- Bats;
- Badger *Meles meles;*
- Barn Owl *Tyto alba;*
- Riparian Mammals (Otter *Lutra lutra* and Water vole *Arvicola amphibius*);
- Wintering Birds;
- Breeding Birds;
- Aquatic Habitats – Watercourses;
- Aquatic Habitats – Ponds;
- Fish;
- Aquatic Macroinvertebrates;
- Macrophytes.

Operational Stage

9.4.5. In the absence of embedded and secondary mitigation, the below ecological features are considered to have likely significant effects during the Operational stage and have been scoped into the impact assessment:

- Bats;
- Breeding Birds;
- Barn owl;
- Aquatic Habitats and Species.

Decommissioning Stage

9.4.6. In the absence of embedded and secondary mitigation, the below ecological features are considered to have likely significant effects during the decommissioning stage and have been scoped into the impact assessment.

- GCN;
- Bats;
- Breeding Birds;
- Barn owl;
- Aquatic Habitats and Species.

[2] Priority Habitats are defined as habitats which are listed under Section 41 of the NERC Act 2006 (**Ref. 9.5**) (England) and under Section 7 of the Environment Act (Wales) 2016 (**Ref. 9.3**).

9.5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

STUDY AREA

9.5.1. The Study Areas used to inform the EIA have been developed on the basis of the likely Zones of Influence (ZoI) of the DCO Proposed Development, during construction, operation and decommissioning and its potential to result in significant impacts/effects on relevant ecological features. Study Areas of varying extent have therefore been applied in response to perceived potential impacts/effects or else to ensure that an individual receptor is fully surveyed/assessed in line with relevant best practice guidelines and methods. The Study Area for each receptor is detailed within Table 9.3~~**Table 9.3**~~.

9.5.2. The specific trenchless installation technique at each location is subject to ongoing refinement and will, in some cases, be dependent on a variety of factors including: ground conditions at the time of construction; the type of feature to be crossed; the length of crossing, etc. As such, the ZoI at such locations has been taken into account, with the reasonable worst-case scenario defining the ZoI and Survey Area.

9.5.3. Where Wales and England are referenced within this report these refer to the Welsh and English sections of the DCO Proposed Development respectively.

METHOD OF BASELINE DATA COLLATION

9.5.4. The biodiversity baseline has been determined through a combination of desk study and field surveys, as summarised below. The extent of individual receptor Study Areas applied during the baseline data gathering exercise are also identified. The application of Study Areas of varying extent, in response to individual receptors, was discussed and agreed with NE, NRW and other relevant stakeholders.

Desk Study

9.5.5. A desk study was undertaken to identify nature conservation designations and protected and notable habitats and species potentially relevant to the DCO Proposed Development, in line with CIEEM Preliminary Ecological Appraisal guidelines (**Ref. 9.24**). The desk study included a review of publicly available resources and databases, such as the Multi Agency Geographic Information for the Countryside (MAGIC) website (**Ref. 9.61)** and the following third-party data sources:

- Cofnod
- rECOrd
- Cheshire Wildlife Trust
- British Trust for Ornithology (BTO)
- Environment Agency (EA) Ecology and Fish Data Explorer (**Ref. 9.32)**

- Natural Resource Wales (NRW) (**Ref. 9.63)** and NBN Atlas Wales (**Ref. 9.64)**.

9.5.6. The following search distances and parameters were applied:

- Up to 10 km from the Newbuild Infrastructure Boundary for statutory designated sites of international importance[3], and those listed within the National Site Network (extended to 30 km for Special Areas of Conservation (SAC) designated for bat species);
- Statutory designated sites of national importance within 2 km of the Newbuild Infrastructure Boundary[4];
- Statutory designated sites of international or national importance hydrologically linked to watercourses located within the Newbuild Infrastructure Boundary;
- Priority habitats and woodland listed on the Ancient Woodland Inventory (AWI) within 1 km of the Newbuild Infrastructure Boundary;
- Records of historic protected species licences within 2km of the Newbuild Infrastructure Boundary;
- Records of protected and/or notable species within 2 km of the Newbuild Infrastructure Boundary;
- Records of bat species within 5 km of the Newbuild Infrastructure Boundary;
- Records of fish, aquatic macroinvertebrate, and macrophyte species within 10km of the Newbuild Infrastructure Boundary; and
- Locations of non-statutory designated sites[5] within 1km of the Newbuild Infrastructure Boundary.

Site Visit and Surveys

9.5.7. Field surveys scoped into the assessment, as highlighted within the **EIA Scoping Report** (**Appendix 1.1, Volume III**), are detailed in Table 9.3~~Table 9.3~~. Field surveys commenced in 2020, continuing through 2021 and 2022. A selection of surveys, primarily in relation to bats and riparian mammals has taken place following the completion of the version of this ES submitted with the DCO Application, between July 2022 and September 2022. The results of these surveys are presented within this Chapter and within updated associated appendices (**Appendix 9.3 - Bat Activity Survey Report (Volume III), Appendix 9.4 - Bats and Hedgerows (Volume III) and Appendix 9.6 –**

[3] Special Areas of Conservation (SAC), candidate SAC (cSAC), Special Protection Areas (SPA), potential SPA (pSPA) and Ramsar Sites.
[4] Site of Special Scientific Interest (SSSI), Local Nature Reserve (LNR), National Nature Reserve (NNR)
[5] Local Wildlife Sites (LWS) (England) and Wildlife Sites (WS) (Wales)

Riparian Mammals (Volume III). The survey data collected is sufficient to inform a robust reasonable worst-case assessment, as provided in this Chapter and its supporting appendices.

9.5.8. Baseline conditions were established through a range of preliminary surveys including Phase 1 habitat surveys, Preliminary Bat Roost Assessment (PBRA) of trees, buildings, and structures; Habitat Suitability Index (HSI) assessments of waterbodies for great crested newt; hedgerow assessment surveys and aquatic habitat surveys.

9.5.9. Preliminary surveys, whilst influencing the Preliminary Design in their own right, additionally helped to define a suite of detailed/targeted survey requirements for a range of protected and/or notable species and habitat assessments.

9.5.10. As part of initial consultation with NE and NRW regarding assessment and survey approach, it was raised that given the cumulative extent of hedgerow severance associated with construction of the DCO Proposed Development, impacts in relation to bats (temporary loss of commuting and foraging habitat) should be considered. Subsequently, the Applicant has devised a novel methodology, given the absence of a standardised approach, with which to inform the EIA. The novel methodology has also been subject to iterations of review and comment with relevant stakeholders (comprising NE, NRW, FCC and CWCC), as highlighted within Table 9.1~~Table 9.1~~**.**

9.5.11. Table 9.3~~Table 9.3~~ details the scope of surveys completed to support the preparation of the ES for the DCO Proposed Development, alongside Survey Areas applied to each individual receptor. References to best practice methods or guidelines are also provided, where applicable.

9.5.12. Survey Areas cited provide the broadest extent of survey effort applied. Where deviations from best practice methods/guidelines have occurred, full justification has been provided within this ES and its supporting appendices (see **Appendices 9-1 – 9-10, Volume III**).

Table 9.3 Receptor, Survey Area and Reference to Best Practice Guidelines

Receptor	Survey Area	Current Good Practice Guideline Reference	Relevant Appendix
Habitats	Entire Newbuild Infrastructure Boundary	Phase 1 Habitat Survey: Joint Nature Conservation Committee (JNCC) (2010) (**Ref. 9.25)**.	**Appendix 9.1 - Habitat and Designated Sites Survey Report (Volume III)**
	Targeted locations within the Newbuild Infrastructure Boundary	National Vegetation Classification (**Ref. 9.26)**.	**Appendix 9.1 - Habitat and Designated Sites Survey Report (Volume III)**
	Entire Newbuild Infrastructure Boundary	Watercourses (**Ref. 9.27**) Ponds (**Ref. 9.28**)	**Appendix 9.9 - Aquatic Ecology – (Watercourses) Survey Report (Volume III)** **Appendix 9.10 - Aquatic Ecology (Ponds) Survey Report (Volume III)**
Great Crested Newt	Entire Newbuild Infrastructure Boundary +250 m buffer	Habitat Suitability Index Assessment**:** (**Ref. 9.29**), (**Ref. 9.30**). Environmental DNA (eDNA) surveys**:** (**Ref. 9.31**). Presence / Absence Surveys**:** (**Ref. 9.32**) and (**Ref. 9.33**).	**Appendix 9.2 - Great Crested Newt Survey Report (Volume III)**
Bat	Entire Newbuild Infrastructure Boundary	(**Ref. 9.34**).	**Appendix 9.3 - Bat Activity Survey Report (Volume III)** **Appendix 9.4 - Bats and Hedgerows (Volume III)**
Badger	Entire Newbuild Infrastructure Boundary	(**Ref. 9.35**). (**Ref. 9.36**). (**Ref. 9.37**).	**Appendix 9.5 - Badger Survey Report (Confidential) (Volume III)**
Otter	Entire Newbuild Infrastructure Boundary +150 m[6]	(**Ref. 9.38**).	**Appendix 9.6 - Riparian Mammal Survey Report (Volume III)**
Water Vole	Entire Newbuild Infrastructure Boundary +150 m[5]	(**Ref. 9.39**).	
Barn Owl	Newbuild Infrastructure Boundary	(**Ref. 9.40**).	**Appendix 9.7 - Barn Owl Survey Report (Confidential) (Volume III)**
Birds – breeding and wintering	No defined corridor – targeted transects only	Wintering Bird Surveys**:** (**Ref. 9.41**), (**Ref. 9.42**). Breeding Bird Surveys**:** (**Ref. 9.43**). Farmland Birds Surveys**:** (**Ref. 9.43**). Wetland and Intertidal Birds Surveys: (**Ref. 9.43**).	**Appendix 9.8 - Bird Survey Report (Volume III)**
Fish	Entire Newbuild Infrastructure Boundary	(**Ref. 9.44**). (**Ref. 9.45**). (**Ref. 9.46**).	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III)**

[6] Upstream and downstream of proposed watercourse crossing points or beyond the Newbuild Infrastructure Boundary

Receptor	Survey Area	Current Good Practice Guideline Reference	Relevant Appendix
Aquatic macroinvertebrates	Entire Newbuild Infrastructure Boundary	(**Ref. 9.47**). (**Ref. 9.48**).	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III)**
Macrophytes	Entire Newbuild Infrastructure Boundary	(**Ref. 9.49**).	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III)**
Ponds (Predicative Systems for Multimetrics (PSYM) surveys)	Entire Newbuild Infrastructure Boundary	(**Ref. 9.28**)	**Appendix 9.10 - Aquatic Ecology (Ponds) Survey Report (Volume III)**

IMPACT ASSESSMENT METHODOLOGY

9.5.13. This assessment has been undertaken in accordance with the CIEEM 'Guidance for Ecological Impact Assessment in the UK and Ireland' (2019) (**Ref. 9.22**) (herein referred to as the 'CIEEM Guidelines'). The CIEEM Guidelines represent the current best practice for assessing impacts to ecological receptors as a result of development projects.

9.5.14. Through application of the impact assessment methodology, as per CIEEM Guidelines, this Chapter ensures that assessment of protected sites, habitats and species as per the requirements of NPS EN-1 (**Ref. 9.15**), are fully realised.

Nature Conservation Evaluation

9.5.15. To characterise the impacts and effects of the DCO Proposed Development on ecological receptors, the nature conservation importance of each ecosystem, habitat and species is assigned a level of importance for nature conservation based on criteria detailed within the CIEEM Guidelines, as detailed in Table 9.4~~**Table 9.4**~~.

9.5.16. The rarity, ability to resist or recover from environmental change, uniqueness of an ecological receptor, function/role within an ecosystem, and level of legal protection or designation afforded to a given ecological receptor are all factors considered in determining its importance. Consideration has also been given to the importance of a species or habitat and its conservation status at a geographic level, taking population size, life cycle, rarity and/or distribution into consideration, particularly where distribution is changing as a result of global trends and climate change.

9.5.17. In addition, the importance of an ecological receptor takes into account any statutory or non-statutory designations, the intrinsic importance of the ecological receptor and whether it supports legally protected or notable species.

9.5.18. The assessment was informed by an evaluation of the DCO Proposed Development for foraging, commuting and roosting bats, as detailed within **Ref. 9.50,** which provides guidance on the evaluation of the bat fauna in terms of a geographical context. This method uses numerical criteria (dependant on the species of bat recorded, number of bats recorded, number of nearby roosts and habitat characteristics) to arrive at an appropriate valuation. This guidance method has been used along with professional judgement and current conservation status information on each species.

Table 9.4 Importance Criteria

Importance	Criteria
International	Ecosystems and Habitats - Ecosystems or habitats essential for the maintenance of: • Internationally designated areas or undesignated areas that meet the criteria for designation; and/or • Viable populations of species of international conservation concern. Species: • Species whose presence contributes to the maintenance of qualifying habitats, communities and assemblages that occur within internationally designated sites or within undesignated areas that meet the criteria for such designation. • Resident, or regularly occurring, populations of species that may be considered at an International level, where: – The loss of the population would adversely affect the conservation status or distribution of the species at this geographical 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.
UK or National	Ecosystems and Habitats - Ecosystems or habitats essential for the maintenance of: • Qualifying communities and assemblages that occur within nationally designated sites or within undesignated areas that meet the criteria for such designation; and/or • Viable populations of species of national conservation concern. • Areas of Ancient Woodland • Habitats listed for their principal importance for biodiversity (Section 41 of the NERC Act (**Ref. 9.5)** and Section 7 of the Environment (Wales) Act (**Ref. 9.3)**. Species: • Species whose presence contributes to: – The maintenance of qualifying habitats, communities and assemblages that occur within nationally designated sites or within undesignated areas that meet the criteria for such designation; or – The maintenance and restoration of biodiversity and ecosystems at a national level, as defined in the Natural Environment and Rural Communities (NERC) Act 2006 Section 41 and the Environment (Wales) Act 2016 Section 7 requirements. • Resident, or regularly occurring, populations of species that may be considered at an International (as detailed above), National or UK level including those receiving legal protection (listed within Schedules 1, 5 and 8 of the WCA) or listed for their principal importance for biodiversity or conservation status, where: – The loss of the population would adversely affect the conservation status or distribution of the species at this geographical 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.
Regional	Ecosystems and Habitats - Ecosystems or habitats essential for the maintenance of: • Populations of species of conservation concern within the region. Species: • Species whose presence contributes to the maintenance and restoration of biodiversity and ecosystems within the region; and/or

Importance	Criteria
	• Resident, or regularly occurring, populations of species that may be considered at an International, UK or National level (as detailed above), where: – The loss of the population would adversely affect the conservation status or distribution of the species at this geographical 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.
County	Ecosystems and Habitats - Ecosystems or habitats essential for the maintenance of: • Populations of species of conservation concern within the authority area. Species: • Species whose presence contributes to the maintenance and restoration of biodiversity and ecosystems within a relevant area such as Cheshire or Flintshire; and/or • Resident, or regularly occurring, populations of species that may be considered at an International, UK or National level (as detailed above), where: – The loss of the population would adversely affect the conservation status or distribution of the species at this geographical 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.
Local	Ecosystems and Habitats - Ecosystems or habitats essential for the maintenance of: • Populations of species of conservation concern within the local area (for example a Local Nature Reserve). Species: • Species whose presence contributes to the maintenance and restoration of biodiversity and ecosystems at a local level; and/or • Resident, or regularly occurring, populations of species that may be considered at an International, UK or National level (as detailed above), where: – The loss of the population would adversely affect the conservation status or distribution of the species at this geographical 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.
Less than Local	Ecosystems or habitats that do not meet the above criteria, i.e., supporting at least populations of species of conservation concern within the local area.

Characterising Potential Impacts

9.5.19. CIEEM (**Ref. 9.22**) notes that impacts that are likely to be relevant in an assessment are those that are predicted to lead to significant effects, either adverse or beneficial, on important ecological receptors. Significant effects are those that undermine or enhance the conservation status[7] of important ecological receptors.

9.5.20. Knowledge and understanding of baseline conditions, construction methods (including site preparation) and operational activities associated with the DCO Proposed Development, in tandem with ecologist professional judgement, knowledge and experience of similar large-scale infrastructure schemes, has been used to identify the potential impacts of the DCO Proposed Development on ecological receptors.

9.5.21. Habitats and species considered to have a nature conservation status of Less than Local are not considered important ecological receptors[8] in the context of this assessment. Any impact on such a receptor as a result of the DCO Proposed Development is considered unlikely to have a significant effect on the conservation status of such habitat or species at a local, national, regional, or international scale. Therefore, features assessed to be of Less than Local nature conservation importance have been scoped out of the EIA.

9.5.22. In line with CIEEM Guidelines (**Ref. 9.22**), the following parameters have been considered in assessing effects on ecological structure and function:

- **Impact:** The physical change in the environment that may lead to an effect upon an ecological feature.
- **Effect:** The consequence of an impact upon an ecological feature.
- **Probability:** What the probability of the impact is of occurring – Certain, Probable, Unlikely.
- **Positive or negative:** Whether the impact will have a positive (beneficial) or negative (adverse) change on the quality of the ecological feature.
- **Magnitude:** The 'size' or 'amount' of an effect determined on a quantitative basis e.g., total or partial.
- **Extent/Complexity:** The geographical area over which the effect occurs, whether Direct, Indirect or Cumulative.

[7] Conservation status for habitats is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure or function as we as the long-term distribution and abundance of its population within a given geographical area. Conservation status for species is determined by the sum of influences acting on the species concerned that may affect the long-term distribution or abundance of its population within a geographical area.
[8] An ecological receptor is considered important based on multiple factors including, but not limited to, rarity, diversity, naturalness, context in the wider landscape, size and distribution as set out in CIEEM Guidelines (**Ref. 9.22**).

- **Duration:** The period over which the effect is expected to last prior to recovery or replacement of the resource or feature, for example, short-term (up to 1 year), medium term (between 1 and 10 years) or long-term (greater than 10 years).
- **Reversibility:** Whether recovery from the effect is possible or not, e.g. irreversible (permanent) effects or reversible (temporary) effects.
- Timing and frequency.

SIGNIFICANCE CRITERIA

9.5.23. The CIEEM Guidelines (**Ref. 9.22**) define a significant effect in the context of an ecological impact assessment as "*an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general*". Significant effects, as defined by the CIEEM guidelines, are determined by assessing any deviation in baseline conditions of a feature of ecological importance that may occur as a result of individual or cumulative impacts during the Construction, Operational or Decommissioning Stages of a development.

9.5.24. When determining the level of significance of an ecological effect, Table 9.5~~Table 9.5~~ has been used as a guide in tandem with professional judgement and will apply to a determination of significance for both beneficial and adverse effects. These effects are expressed in terms of geographical scale, however, the geographical scale at which an effect is significant can vary from the geographical importance of the ecological feature being assessed. For example, an effect on an ecological receptor of county level importance could be considered Major if a particularly high proportion of the county resource were to be affected.

Table 9.5 Significance Categories of Effects on Ecological Receptors

Typical Descriptors of Effect (Nature Conservation)	Significance Category
An impact on one or more receptor(s) of International, National or Regional importance	Major
An impact on one or more receptor(s) of importance County importance.	Moderate
An impact on one or more receptor(s) of Local importance	Minor
No significant impacts on key nature conservation receptors or impacts to receptors of Less than Local importance	Negligible

BIODIVERSITY NET GAIN CALCULATIONS

9.5.25. In light of the recent developments provided for by the Environment Act 2021 (**Ref. 9.12**) and the Government's recent consultation on its implementation, a **Biodiversity Net Gain (BNG) Assessment** (**Document reference: D.6.5.12**) has been carried out for the DCO Proposed Development to quantify biodiversity losses and gains. The assessment has been completed in accordance with relevant best practice guidance detailed in CIEEM, IEMA and CIRIA's BNG: Good Practice Principles for Development (**Ref. 9.51**) and utilised Natural England's Biodiversity Metric 3.0 (BM3.0) (**Ref. 9.23**). Condition assessment data was collected throughout habitat surveys across the Newbuild Infrastructure Boundary to inform habitat calculations for the BNG assessment.

9.5.26. Whilst it is recognised that policy in Wales does not require the use of a metric, BM3.0 has been applied given its ability to provide quantifiable detail of changes in biodiversity. This can additionally evidence quantifiable benefits for biodiversity in line with the Environment Wales Act (**Ref. 9.3**) which requires all public authorities to "*maintain and enhance biodiversity*". The BNG assessment has been undertaken separately for both the England and Wales sections of the DCO Proposed Development.

ASSUMPTIONS AND LIMITATIONS

9.5.27. Broad assumptions and limitations are provided below. Receptor specific assumptions and limitations are provided within Appendices (**Appendices 9-1 – 9-11, Volume III)**, as required.

9.5.28. No residential properties are required to be lost or otherwise directly interfered with to the facilitate construction of the DCO Proposed Development. However, where residential and non-residential properties have been considered to be at risk of indirect effects, taking into consideration existing disturbance levels, due to their proximity to the DCO Proposed Development, these have been assessed for their potential to support protected and/or notable species.

9.5.29. All efforts have been made to complete field surveys across the entirety of the Newbuild Infrastructure Boundary including the use of appropriate land access powers (S172 powers). However, areas of land were unable to be accessed for completion of field surveys despite land access powers having been exercised; due to physical inaccessibility (e.g. physical barriers) of land through continued refusal of access by landowners as well as concerns for surveyor health and safety (**Figure 9.1.3** within **Appendix 9.1 - Habitats and Designated Sites Survey Report, Volume III)**. As such it has been necessary to apply a precautionary approach to assessment and mitigation in the absence of field survey data (in line with CIEEM guidance (**Ref. 9.22**)). Where a precautionary approach has been applied this has been identified within this ES and its supporting appendices. In such cases, the employment of a reasonable worst-

case scenario (for example, assumed presence) has been applied and is considered sufficient to inform this impact assessment.

9.5.30. The exact route of the DCO Proposed Development within the Newbuild Infrastructure Boundary (and specifically within the Permanent Acquisition of Subsurface Area) will be determined at Detailed Design, with an indicative Newbuild Carbon Dioxide Pipeline route shown in **Figure 3.2 - DCO Proposed Development (Volume IV)**. For the purposes of this impact assessment, a reasonable worst-case scenario has been assumed to inform this impact assessment and the mitigation requirements.

9.5.31. As a result of the COVID-19 pandemic, restrictions on survey method have been imposed to safeguard surveyor and public health. Specifically, no internal bat roost assessments of buildings have been undertaken. Where required, buildings have been subjected to detailed external inspection only to identify features with potential to support roosting bats. Where necessary, appropriate further survey effort has been applied (i.e. dusk emergence and dawn re-entry surveys). This has also involved the use of infrared cameras to supplement physical surveyor presence. An absence of internal building assessments is not considered to have negatively impacted the categorisation of building suitability to support roosting bats nor this impact assessment or mitigation prescriptions.

9.5.32. The DCO Proposed Development will proceed under a District Level Licence[9] (DLL) for GCN in England. Discussions regarding applying a DLL to the DCO Proposed Development have taken place with NE (Table 9.1~~Table 9.1~~) with agreement that a DLL approach can be utilised. One Red Risk Zone[10] (**Ref. 9.52**) is present within the Newbuild Infrastructure Boundary, which has been excluded from the DLL application (red risk zones are omitted on the basis they contain key populations of GCN at the regional, national, or international scale). Consequently, presence / likely absence surveys have been completed on waterbodies within the red risk zone or else substituted by recent field survey data provided by Chester Zoo, to inform this ES and mitigation requirements.

9.5.33. Waterbodies separated from the DCO Proposed Development by significant barriers that would prevent GCN dispersal (for example, major roads and rivers) have not been subject to survey or assessment on the basis that the DCO Proposed Development will not result in direct or indirect impacts to populations

[9] District Level Licencing (DLL) is a type of mitigation licence for GCN which is available in selected areas within England. DLL differs from a traditional mitigation licence, which applies at a project level, providing a strategic landscape scale mitigation option**,** without the requirement for prior survey. Where granted, DLL allows development to proceed without the need for project level mitigation/compensation of habitats (specific to GCN only). A financial contribution is made to NE to secure off-site habitat compensation for GCN which is dealt with at a county scale by NE selected third parties and removes applicant requirements to provide on-site mitigation/compensation.

[10] District Level Licencing is categorised into three different zones, Red, Amber and Green to correspond to the likelihood of GCN presence. Red is the highest risk zone where populations here are considered too important to affect and are excluded from any DLL application. Data is available at https://naturalengland-defra.opendata.arcgis.com/datasets/gcn-risk-zones-cheshire/explore

as a consequence of barrier presence. Such waterbodies have not been considered within this impact assessment.

9.5.34. In relation to barn owl *Tyto alba* in Table 9.3~~Table 9.3~~, initial scoping surveys were completed using previous iterations of the Newbuild Infrastructure Boundary, e.g., as presented within the **Preliminary Environmental Information Report** (**Document reference: D.0.9.2),** which covered a larger survey area. Refinement of the Newbuild Infrastructure Boundary as presented within this ES has meant that features previously identified with suitability to support barn owl are presented outside the Newbuild Infrastructure Boundary. However, given potential disturbance within Protection Zone Distances (**Ref. 9.40**), features located outside the Newbuild Infrastructure Boundary have been scoped into the assessment.

9.5.35. Taking into consideration the known species and roost types identified across the DCO Proposed Development, inferences can be made on the likelihood of a similar mix of species and roost types likely found within the 31 trees and 5 buildings assessed precautionarily to contain a roost. These would primarily comprise day roosts of common species such as common pipistrelle and soprano pipistrelle, with the potential occurrence of a single maternity roost of a common species. Consideration is given to the likelihood of an Annex II species significant roost within structures; however, no building was identified with potential roosting features suitable for Annex II species such as lesser horseshoe bats.

9.6. BASELINE CONDITIONS

9.6.1. A summary of key desk study and field survey results to date per receptor are detailed in Table 9.6~~Table 9.6~~ and Table 9.7~~Table 9.7~~.

EXISTING BASELINE

Designated Sites

9.6.2. The desk study identified nine Internationally designated sites recorded within 10 km of the Newbuild Infrastructure Boundary, comprising five SACs, two SPAs with associated Ramsar designations and two Ramsar sites.

9.6.3. Twelve nationally designated sites were identified within 2 km of the Newbuild Infrastructure Boundary, comprising eleven SSSIs and one LNR.

9.6.4. Thirty-eight non-statutory designated sites were identified within 1km of the Newbuild Infrastructure Boundary, comprising twenty-three LWSs and fifteen WSs.

9.6.5. These sites are described in Table 9.6~~Table 9.6~~ and shown in **Figure 9.1.1** and **9.1.2** within **Appendix 9.1 – Habitats and Designated Sites Survey Report (Volume III).**

Table 9.6 Summary of Statutory and Non-Statutory Designated Sites

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
European/Internationally Designated Sites			
River Dee and Bala Lake SAC	1,309	0 m – crossed by the Newbuild Infrastructure Boundary	The SAC is designated for its presence of sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, Atlantic salmon *Salmo salar* and plant species such as floating water-plantain *Luronium natans*.
Deeside and Buckley Newt Sites SAC	208	0 m north – shares a boundary with the Newbuild Infrastructure Boundary	This site in north-east Flintshire is designated for the largest populations of great crested newt in Great Britain. The site also includes European bullhead *Cottus gobio*, and old sessile oak *Quercus petraea* woods with holly *Ilex sp*. and hard fern species *Blechnum sp*.
Halkyn Mountain (Mynydd Helygain) SAC	611	248 m north	Halkyn Mountain includes an extensive Calaminarian grassland of *Violetalia calaminariae*. There is a large population of great crested newt, which breed in the abandoned quarry workings and across the site. Other Annex I qualifying habitats include European dry heaths, semi-natural dry grasslands and scrubland facies on calcareous substrates, and *Molinion caeruleae* meadows are also present on the calcareous, peaty or clayey-silt-laden soils.
The Mersey Estuary SPA & Ramsar	5,024	1 km north	The sites importance is noted regarding feeding and roosting sites for waterfowl. Golden plover *Pluvialis apricaria* are an Annex I qualifying species found at the site. The site is regularly used by over 20,000 waterbirds in any season.
Dee Estuary / Aber Dyfrdwy SAC	15,806	1.02 km north	This large site comprises an estuary, saltmarshes, mudflats and sandflats. The SAC is designated for its presence of mudflats and sandflats which during low tide are not covered by seawater. The SAC also mentions the importance of annuals, including *Salicornia sp.*, which colonize the mud and sands within the site area. Atlantic salt meadows *Glauco-Puccinellietalia maritimae* form the most extensive type of saltmarsh in the Dee, helping displace vast amounts of *Spartina anglica*, a non-native common cordgrass. The SAC also supports Annex II species including river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus* and petalwort *Petalophyllum ralfsii*.
The Dee Estuary SPA & Ramsar	14,292	1.02 km north	The Dee Estuary is a large, sheltered estuary which is internationally important due to the number of waterfowl and waders it supports. Qualifying interests include a breeding colony of natterjack toad Bufo calamita and over 20,000 individual waterbirds each year such as redshank Tringa totanus and black-tailed godwit Limosa limosa.
Alyn Valley Woods SAC	167	5.9 km southwest	Characterised by three of the habitat types that are listed in Annex I of the SAC Directive: Tilio-Acerion forests of slopes, screes and ravines; alluvial forests of alder *Alnus glutinosa* and ash *Fraxinus excelsior*; and areas of semi natural dry grassland and scrubland facies on a calcareous substrate.
Midland Meres & Mosses Phase 1 Ramsar	511	8.67 km east	A series of 16 sites made up of nutrient-rich open water bodies with fringing habitats of reed swamp, fen, carr and damp pasture and peatlands.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Midland Meres & Mosses Phase 2 Ramsar	1,594	8.9 km east	A series of 18 sites made up of nutrient-rich open water bodies with fringing habitats of reed swamp, fen, carr and damp pasture and peatlands.
Nationally Designated Sites			
Afon Dyfrdwy (Wales) / River Dee (England) SSSI	1,490	0 m – crossed by the Newbuild Infrastructure Boundary	Afon Dyfrdwy (River Dee) is of special interest for its fluvial geomorphology and range of river habitat types, as well as saltmarsh transition habitats. It is also of special interest for populations of floating water plantain *Luronium natans*, slender hare's-ear *Bupleurum tenuissimum*, sea barley *Hordeum marinum*, hard-grass *Parapholis strigosa*, otter, salmon, European bullhead, brook lamprey, river lamprey *Lampetra fluviatilis*, sea lamprey, club-tailed dragonfly *Gomphus vulgatissimus* and other aquatic invertebrates. The River Dee is of special interest for Atlantic salmon for which it is one of the Environment Agency's index rivers. The Mynach, Meloch and Ceiriog tributaries are the most important salmon spawning tributaries in the Dee catchment and are included within the Afon Dyfrdwy SSSI. The lower reaches of the River Dee support Britain's only known population of the stonefly *Isogenus nubecula*, which is classified as vulnerable in the Red Data Book. Furthermore, the nationally scarce weevil *Baris lepidii* has been recorded along the lower Dee and has not been recorded on any other Welsh river.
Connah's Quay Ponds and Woodland SSSI	94	0 m north – shares a boundary with the Newbuild Infrastructure Boundary	Part of 'The Deeside and Buckley Newts Site SAC'. This site includes Broadoak Wood, Wepre Country Park, Gathering Grounds Wood and Llwyni Pond Local Nature Reserve. The site is of special interest for its population of great crested newt' its assemblage of widespread amphibian species, and for its semi-natural broadleaved woodland.
Halkyn Common and Holywell Grasslands/Comin Helygain a Glaswell Tiroedd Treffynnon SSSI	699.3	248 m northeast	Halkyn Common and Holywell Grasslands is of special interest for the mineralisation associated with the Carboniferous Limestone and cherts which is found in spoil tips and in situ exposures; open vegetation on soils rich in heavy metals; calcareous grassland; dry heath; fen meadow; base-rich flush; and populations of spring sandwort *Minuartia verna* and stemless thistle *Cirsium acaule*. An assemblage of widespread amphibian species including great crested newt are also present.
Buckley Claypits and Commons SSSI	100	540 m south	This site forms part of the Deeside and Buckley Newt Sites SAC and is notable due to its presence of great crested newt. Breeding reed bunting *Emberiza schoeniclus* and water vole are also present.
Flint Mountain (Mynydd Y Fflint) SSSI	26	500 m northwest	The site is of special interest for its stands of unimproved neutral grassland and semi-natural broadleaved woodland, which occur in association with scrub, fen-meadow and swamp vegetation. Notable species include pale flax *Linum bienne*, restharrow *Ononis repens*, figwort *Scrophularia nodosa* and hemp agrimony *Eupatorium cannabinum*.
Maes Y Grug SSSI	18	870 m south	The site is of special interest for its population of great crested newt and forms part of the Deeside and Buckley Newts Site SAC. Habitats comprise a mosaic of grassland, scrub and woodland habitats surrounding waterbodies that have been managed or allowed to develop naturally.
Mersey Estuary SSSI	6,715	1.1 km north	The Mersey Estuary is an internationally important site for wildfowl and consists of large areas of intertidal sand and mudflats. The site also includes an area of reclaimed marshland, saltmarshes, brackish marshes and boulder clay cliffs with freshwater seepages. Notable species include curlew *Numenius arquata* and golden plover.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Dee Estuary SSSI	13,680	1.02 km north	The Dee Estuary is a large, sheltered estuary which is internationally important due to the number of waterfowl and waders it supports. Habitats include intertidal mud and sandflats, rocky sandstone cliffs of Hilbre Island and Middle Eye with species including sandhill rustic moth *Luperina nickerlii gueneei*, a Red Data Book species. River lamprey, sea lamprey and European smelt Osmerus eperlanus are also of note.
Parc Linden SSSI	10.2	1.2 km southeast	Parc Linden is an area of enclosed pasture located close to the village of Lixwm on a shallow glacial drift over carboniferous limestone. The site supports unimproved calcareous grassland, acid grassland, limestone pavement, bracken *Pteridium aquilinum* and scrub. Parc Linden is of special interest for its unimproved calcareous grassland which is the best-known example of its type in Clwyd (Flintshire). A small partially wooded limestone pavement occurs in the northern part of the site.
Gathering Grounds Woods & Llwyni Pond Local Nature Reserve LNR	3	1.2 km north	This site is within the Connah's Quay Ponds and Woodland SSSI and The Deeside and Buckley Newts Site SAC. The site is notable due to the presence of great crested newt. Other species include, badger, field vole *Microtus agrestis*, blue tit *Cyanistes caeruleus*, chaffinch *Fringilla coelebs*, tawny owl *Strix aluco*, redwing *Turdus iliacus* and dunnock *Prunella modularis*.
Coed Trefraith SSSI	11	1.4 km southwest	Designated for its botanical interest. One of the best examples in Clwyd (Flintshire) of a woodland type found mainly in Wales and south-west England but also in the Midlands and north-east England. In north Wales the majority of the examples are in Clwyd at low altitudes, the remainder being in West Gwynedd.
Parc Bodlondeb and Gwenallt-Parc SSSI	17.5	2.0 km south	Parc Bodlondeb and Gwenallt-Parc is an area of enclosed pasture located close to the village of Lixwm, on a shallow glacial drift over Carboniferous Limestone. The site supports a mosaic of unimproved calcareous, acid and neutral grasslands together with limestone heath and stands of bracken, scrub and broadleaved woodland. It is of special interest for its unimproved calcareous grassland, limestone heath and species-rich acid grassland. All these types have highly localised national distributions. Additional interest is provided by the neutral grassland, scrub and woodland communities.
Non-Statutory Designated Sites			
England			
Frodsham Helsby and Ince Marshes LWS	1,150	0 m – within the Newbuild Infrastructure Boundary	An extensive area of coastal floodplain, used for agricultural purposes. The wider landscape includes Ince Banks and the Mersey Estuary SPA and Ramsar to the north. The site provides a mosaic of habitats including grassland, a complex ditch system, semi-natural plantation woodland, scrub, tall ruderal vegetation, hedgerows, reed beds and an area of developing saltmarsh. It is of county, national and international ornithological importance for breeding, wintering and passage species. It is also of botanical interest at county and national levels, with yellow-vetch *Vicia lutea*, a nationally scarce species, recorded. There is a good-sized water vole population within the ditch system.
Saughall Bank LWS	3.80	0 m– within the Newbuild	Species-rich grassland on the south-west facing old bank of the River Dee over 2km from the river, containing plants rare in Cheshire including restharrow, agrimony *Agrimonia sp.*, and dyer's greenweed *Genista tinctoria*.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
		Infrastructure Boundary	
Shropshire Union Canal (Main Line) LWS	14.12	0 m– within the Newbuild Infrastructure Boundary	A 1.9km length of the Shropshire Union Canal main line, south-east of Huxley between Williamson's Bridge and Bate's Mill Bridge, including the canal, towpath and boundary hedgerows. Bird species recorded include yellowhammer *Emberiza citrinella*, chaffinch, house martin *Delichon urbicum* and great spotted woodpecker *Dendrocopos major*.
Gowy Meadows and Ditches LWS	193	0 m– within the Newbuild Infrastructure Boundary	A large group of fields with an interconnecting ditch system which is part of the eastern floodplain of the River Gowy. Some areas of good semi-improved, neutral and marshy grassland. Native black poplar *Populus nigra* is present and the ditches in particular are of high conservation value, supporting rare/scarce flora and a water vole population. The site is of significant ornithological interest, supporting a number of red and amber list species and breeding snipe *Gallinago gallinago*.
Wood West of Crabwell Manor LWS	0.94	0 m– within the Newbuild Infrastructure Boundary	A narrow strip of broadleaved woodland along a stream. The canopy consists of ash, pedunculate oak, sycamore *Acer pseudoplatanus* and beech *Fagus sylvatica*, with an understory of hawthorn *Crataegus monogyna*, hazel, field-rose *Rosa arvensis* and wild cherry *Prunus avium*. Common ground flora species are present, such as bramble *Rubus fruticosus*, common nettle *Urtica dioica* and wood avens *Geum urbanum*.
Collinge Wood & Meadow LWS	4.67	5 m south	Two adjoining areas of woodland and a wet meadow with reed bed, adjacent to the Shropshire Union Canal. Silver birch *Betula pendula* is abundant in the woodland, with pedunculate oak and sycamore. Wetland species in the meadow include gipsywort *Lycopus europaeus*, common marsh bedstraw *Galium palustre*, wild angelica *Angelica sylvestris* and yellow iris *Iris pseudacorus*.
Chester Zoo (Butterhill – Millenium Cycle Route) LWS	0.89	14 m west	A section of the Millenium Cycle Way between Butter Hill and Chester Zoo, comprising of a surfaced track/cycle route with a steep hedge bank in the northern section and deep ditches along the southern section. Common tree and shrub species line the track, including sessile and pedunculate oak, ash *Fraxinus excelsior*, hawthorn *Crataegus monogyna* and hazel *Corylus avellana*. In the ditches hard shield fern *Polystichum aculeatum* and greater burdock *Arctium lappa* are present, which are locally scare species, along with ground flora such as yellow iris, brooklime *Veronica beccabunga*, duckweed *Lemna minor* and red campion *Silene dioica*.
Shropshire Union Canal (Little Stanley to Waverton) LWS	4.6	15 m south	A long section of canal passing through Chester and ending near Ellesmere Port. The section between bridges 138 and 141 is of greatest botanical interest, with hedgerows, extensive marginal-emergent vegetation, aquatic vegetation and other wetland flora species.
Lea by Backford Railway Cutting LWS	3.20	34 m north	A narrow strip of regenerating mixed woodland, scrub and neutral grassland north-east of Mollington. Contains notable species for Cheshire, including agrimony, yellow wort *Blackstonia perfoliata* and common spotted orchid *Dactylorhiza fuchsii*.
Viaduct Wood LWS	2.34	40 m south	A narrow section of woodland on the slopes of a brook, adjacent to the Chester to Liverpool Railway line. Canopy and shrub layer consists of common woodland species such as beech, hazel, field rose Rosa arvensis and bramble. Ground flora includes wood anemone *Anemone nemorosa*, bluebell *Hyacinthoides non-scripta*, and common dog violet *Viola riviniana*.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Wervin Meadows LWS	35.83	57 m north	Predominantly a grazed floodplain adjacent to the River Gowy, consisting of a mosaic of grassland, wetland and tall ruderal vegetation with numerous ditches. The grassland provides important habitat for ground nesting birds, in particular lapwing *Vanellus vanellus*. The ditches and wet areas are botanically rich. The site supports brown hare.
Chester Zoo Ponds LWS	0.35	108 m south from closest pond	A cluster of seven ponds within permanent pasture, grazed by cattle. Important in the wider region due to supporting aquatic invertebrates and rare plants, including 24 wetland indicator species and regionally rare species.
Canal Wood LWS	3.6	270 m south	The site lies several metres below the Shropshire Union Canal and comprises of woodland, wet grassland, swamp and drainage ditches. The canopy and shrub layer consist of common woodland species such as sycamore, oak, hawthorn and elder *Sambucus nigra*. Wood melick *Melica uniflora*, an Ancient Woodland indicator species in Cheshire, is present in the ground flora. The grassland is of varying quality and is more diverse to the south.
Station Road Railway Site LWS	0.5	270 m north	An area of open mosaic habitat at a disused former railway site. Reptiles are present in the vicinity.
Backford Brook Fields LWS	8.15	283 m north	A section of Backford Brook Valley. Species within the grassland include cat's-ear *Hypochaeris radicata*, selfheal *Prunella vulgaris*, yarrow *Achillea millefolium* and pignut *Conopodium majus*. There is a large mature black poplar along the brook's banks. There is a pond within the site, with common bird's-foot-trefoil *Lotus corniculatus* nearby.
Picton Green Lane LWS	0.92	290 m southeast	An area of damp neutral unimproved grassland and adjacent green lane, with a gully leading to a spring and associated wet flush. Scattered trees present include crack *Salix fragilis* and goat *Salix caprea* willow, ash and crab apple *Malus sylvestris*. In the flush species include marsh marigold *Caltha palustris* and black knapweed *Centaurea nigra*, and in the grassland ragged-robin *Lychnis flos-cuculi*, glaucous sedge *Carex flacca* and meadowsweet *Filipendula ulmaria* are present.
The Greenway Millenium Cycle Route LWS	11.4	350 m southeast	A section of the Millenium Cycle Way between Blacon and Newton which was a former railway line. The site consists of a surfaced track / cycle route with amenity grassland and planted trees. Grassland flora of note include tor-grass *Brachypodium pinnatum* and thrift *Armeria maritima*, which are locally rare and scarce species, respectively.
Blacon Escarpment Wood LWS	11.2	520 m southeast	An area of broadleaved woodland along the old sea cliffs of the Dee Estuary. The woodland canopy includes ash, sycamore and pedunculate oak, with understory of hawthorn and hazel.
Hoblane Ponds LWS	0.30	670 m east	A series of small ponds north of Cottage Farm, west of Dunham on the Hill. Notable species within the ponds include water forget-me-not *Myosotis scorpioides*, tubular water dropwort *Oenanthe fistulosa L.*, greater spearwort *Ranunculus lingua*, yellow iris and marsh figwort *Scrophularia auriculata*.
Bridge Trafford North LWS	13.3	750 m east	The site consists of planted woodland, ponds, grassland and tall ruderal vegetation, as well as scrub and a small area of swamp. The site is adjacent to the River Gowy. The woodland has abundant ash and field maple *Acer campestre*, with spindle *Euonymus europaeus* (a locally scarce species). Bulrush *Typha latifolia* is present in the wetland area, and the grassland supports flora such as ribwort plantain *Plantago lanceolata*, red clover *Trifolium pratense* and black medick *Medicago lupulina*. Bird species present include Bullfinch *Pyrrhula pyrrhula*.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Old river Dee Escarpment LWS	16.28	770 m northwest	A mosaic of habitats including broadleaved semi-natural woodland, broadleaved plantation, scrub, semi-improved neutral grassland, running water and an area of marsh. A strip of woodland in the south-east has some Ancient Woodland indicator species such as wood melick, wood sedge *Carex sylvatica*, soft shield fern *Polystichum setiferum*, sanicle *Sanicula europaea*, bluebell, wood millet *Milium effusum* and common dog violet.
Field North of Hadrian Drive LWS	4.20	800 m southeast	A shallow valley with a stream, consisting of several fields, hedgerows and a pond. Grassland quality varies but the presence of thrift, a locally scarce species, is notable.
Knolls Bridge Fields	11.31	890 m south	Site includes restorable grassland, fens, swamps, bogs and reedbeds, wildlife corridors and is accessible natural greenspace.
Wales			
Leadbrook Wood WS	35.1	0 m – within the Newbuild Infrastructure Boundary	Semi-natural broad-leaved woodland occupying the dingles in which the Lead Brook and its tributaries flow. In several areas drainage is impeded. The woodland canopy is mainly dominated by ash and sycamore with some oak alder, beech, common lime *Tilia x europaea* and silver birch. The shrub layer has abundant holly, hazel and wych elm *Ulmus glabra*. Near Ty'n-y-coed there is semi-improved and species-rich marshy grassland, with oval sedge *Carex leporina*, ragged-robin and common spotted orchid.
Brook Park Farm Wood WS	6.7	0 m – within the Newbuild Infrastructure Boundary	Semi-natural broadleaved woodland and mixed broadleaved and coniferous plantation along a stream valley. The mixed woodland includes sycamore, larch *Larix decidua* and Corsican pine *Pinus nigra* with a shrub layer of wych elm, elder, blackthorn *Prunus spinosa* and hazel. The herb layer has bluebell, wood avens, great wood-rush *Luzula sylvatica* and common centaury *Centaurium erythraea*. Ash and sycamore dominate the broadleaved canopy with some oak, holly and wild cherry.
Coed y Cra WS	44.9	0 m – within the Newbuild Infrastructure Boundary	Large woodland along the Nant y Fflint and its tributaries, comprising semi-natural broadleaved woodland, mixed and conifer plantation. Part of the wood at the north-west end is wet and the canopy is dominated by ash and alder and some goat willow. Here the ground flora is rich with marsh marigold, yellow flag, meadowsweet and horsetails. The majority of the wood is mixed woodland with conifers, sycamore, oak, silver birch, sweet chestnut *Castanea sativa*, wild cherry, hornbeam *Carpinus betulus*, beech and poplar *Populus sp*. The understorey is generally sparse with hazel, holly, hawthorn and elder with patches of laurel *Laurus sp*. and rhododendron *Rhododendron ponticum*. In part of Coed y Felin there is an open wet grassland with common spotted orchid, meadowsweet, marsh valerian *Valeriana dioica*, bugle *Ajuga reptans* and horsetail.
New Inn Brook Wood WS	4.8	Shares a boundary with the Newbuild Infrastructure Boundary	Semi-natural broadleaved woodland in the steep side valley of the New Inn Brook. Parts of the woodland are wet. The woodland canopy is dominated by ash and sycamore with occasional poplar and alder. There is a small patch of larch. The shrub layer has abundant hazel and elder with some hawthorn and holly. The rich herb layer has frequent male fern *Dryopteris filix-mas*, wood avens, yellow archangel *Lamium galeobdolon*, tufted hair-grass *Dechampsia cespitosa*, ramsons *Allium ursinum*, bryophytes and ivy *Hedera helix* with occasional hart's-tongue fern *Asplenium scolopendruim*, dog's mercury *Mercurialis perennis*, bluebell and wood anemone.
Aston Wetland WS	4.0	9 m north	Level triangular site of willow *Salix sp*. scrub with marshy grassland mosaic with patches of tall herb fen and birch trees along the railway. The area of scattered grey willow *Salix cinerea* and downy birch *Betula pubescens* is species-rich with common spotted orchid, black knapweed, ragged-robin, greater bird's-foot trefoil *Lotus penduculatus*, carnation sedge *Carex panicea*, fleabane

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
			Pulicaria dysenterica and marsh pennywort *Hydrocotyle vulgaris*. The patches of tall herb are dominated by great willow herb *Epilobium hirsutum*, giant horsetail *Equisetum telmateia* and hemp agrimony. Two sides of the site are bounded by a steep embankment with hawthorn, elder, nettle, bramble, rosebay willowherb *Chamerion angustifolium* and cleavers *Galium aparine*.
Warred Wood WS	14.2	41 m south	Site comprises broadleaved semi-natural woodland, coniferous plantation and mixed plantation woodland.
Cobbler's and Stoneybeach Woods	12.5	141 m south	An elongated narrow stand of semi-natural broad-leaved woodland in the steep-sided valleys of Alltami Brook and two of its tributaries. Oak, ash and sycamore are the dominant canopy trees with some birch and willow. In the shrub layer there are dense patches of holly with elder, hazel, elm and sycamore saplings. Broad buckler fern *Dryopteris dilatata*, opposite-leaved golden saxifrage *Chrysosplenium oppositifolium*, bramble, yellow archangel, wood avens and bryophytes are abundant in the species-rich herb layer.
Sea View Wetland WS	2.3	190 m northwest	Wetland habitat with stands of common reed *Phragmites australis* and bare ground where floating sweet-grass *Glyceria fluitans* and toad rush *Juncus bufonius* have colonised. Marshy grassland habitat is present with frequent glaucous and hairy sedge *Carex hirta*, sweet vernal grass *Anthoxanthum odoratum* and common spotted orchid.
Coed Cae-Crwn	18.0	360 m east	Broad-leaved woodland, conifer plantation and mixed plantation with a marshy grassland. Coed Cae-crwn has a canopy of mainly beech and sycamore with locally frequent sweet chestnut and an area of coniferous plantation. The shrub layer is sparse comprising mainly elder and the ground layer is dominated by bramble with frequent broad buckler fern, bracken, wood sorrel *Oxalis acetosella*, rosebay willowherb and raspberry *Rubus idaeus*. Coed Bryn-eithin is on a gentle north facing slope with some wet areas. This mixed woodland has a canopy of mainly larch, fir and sycamore with some ash, alder and oak. The shrub layer is elder with some holly. The herb layer comprises frequent bluebell, bracken, soft grass, bramble, wood sorrel and dog's mercury. Along the northern edge of Coed Bryn-eithin is a marshy grassland dominated by soft rush *Juncus effusus* with marsh bedstraw, ragged-robin, compact rush *Juncus conglomeratus*, greater bird's-foot trefoil and cuckooflower *Cardamine pratensis*.
Llwyn-onn	1.0	460 m west	A complex site consisting of woodland, neutral grassland, scrub and marsh on the slopes of a stream valley. The grassland is semi-improved and has abundant sweet vernal grass, crested dog's-tail and red fescue. Herbs present include field wood-rush, bulbous buttercup *Ranunculus bulbosus* and bird's-foot trefoil. Dense scrub with some woodland plants borders the grassland. The marsh is situated at the bottom of the valley and is botanically very rich. Sweet-grass, fool's water-cress *Helosciadium nodiflorum*, Yorkshire fog *Holcus lanatus*, marsh horsetail *Equisetum palustre* and meadowsweet are common here with common fleabane, bog stitchwort *Stellaria alsine* and water mint *Mentha aquatica* occurring. These marshy species continue into the wet woodland. This habitat is dominated by alder with some willow in the understorey. Other species found in the wet woodland include valerian *Valeriana sp.* and remote sedge *Carex remota*. On the slopes the woodland is dry and bluebell, wood anemone, pignut and yellow archangel are found.
Coed Ffrith	8.2	535 m north	Elongated, semi-natural broad-leaved woodland on the slopes of a stream valley. The woodland canopy is dominated by sycamore with some oak and ash occurring. Wych elm and holly are frequent in the shrub layer with hawthorn abundant in the areas influenced by grazing. The field layer has also been affected by grazing but still retains its diversity. Ramsons, bluebell and lesser celandine *Ficaria verna* are copious within this layer. Woodruff *Galium odoratum*, moschatel *Adoxa moschatellina*, tufted hair-grass and pignut can also be found on the site.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Pentre Moch Pond	2.6	645 m north	Small swamp and pond. The swamp is dominated by greater reedmace *Typha latifolia* and tufted sedge *Carex lenticularis*. The hedges around the swamp are formed by hawthorn, blackthorn, elder, willow and sessile oak. Nearby is a small pond surrounded by oak trees with a woodland flora.
Soughton Hall & Gorse Wood Ponds	72.9	680 m west	Over mature common lime, oak, sweet chestnut, ash, sycamore and horse chestnut *Aesculus hippocastanum*, with occasional dead fallen and hollow trees. Includes two small ponds on the edge of woodland. The ponds are of importance to amphibians, especially great crested newts. The site includes a fringe of woodland and grassland habitat as foraging area.
Cornist Wood WS	4.1	720 m east	Broadleaved and mixed woodland in a steep sided stream valley with a pond. The northern part of woodland is predominately beech with some oak and larch, whereas the southern part of the wood is dominated by sycamore with some ash. The shrub layer is mainly elder, holly and hazel with some field maple and wild cherry. The ground flora is predominantly ivy, bramble, dog's mercury, wood melick, nettle and ferns. The wood has been severed by a trackway.
Engineer Park	1.0	855 m west	Part of old River Dee wildlife site. Semi-improved neutral grassland with scrub, with saltmarsh grading into intertidal mud.

~~Site name~~	~~Approximate Size (ha)~~	~~Distance from Newbuild Infrastructure Boundary~~	~~Reason For Designation~~
~~European/Internationally Designated Sites~~			
~~River Dee and Bala Lake SAC~~	~~1,309~~	~~0 m – crossed by the Newbuild Infrastructure Boundary~~	~~The SAC is designated for its presence of sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri,* Atlantic salmon *Salmo salar* and plant species such as floating water-plantain *Luronium natans.*~~
~~Deeside and Buckley Newt Sites SAC~~	~~208~~	~~0 m north – shares a boundary with the Newbuild Infrastructure Boundary~~	~~This site in north-east Flintshire is designated for the largest populations of great crested newt in Great Britain. The site also includes European bullhead *Cottus gobio,* and old sessile oak *Quercus petraea* woods with holly *Ilex sp.* and hard fern species *Blechnum sp.*~~
~~Halkyn Mountain (Mynydd Helygain) SAC~~	~~611~~	~~400 m north~~	~~Halkyn Mountain includes an extensive Calaminarian grassland of *Violetalia calaminariae.* There is a large population of great crested newt, which breed in the abandoned quarry workings and across the site. Other Annex I qualifying habitats include European dry heaths, semi-natural dry grasslands and scrubland facies on calcareous substrates, and *Molinion caeruleae* meadows are also present on the calcareous, peaty or clayey-silt-laden soils.~~
~~The Mersey Estuary SPA & Ramsar~~	~~5024~~	~~1 km north~~	~~The sites importance is noted regarding feeding and roosting sites for waterfowl. Golden plover *Pluvialis apricaria* are an Annex I qualifying species found at the site. The site is regularly used by over 20,000 waterbirds in any season.~~

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Dee Estuary / Aber Dyfrdwy SAC	15,806	1.2 km north	This large site comprises an estuary, saltmarshes, mudflats and sandflats. The SAC is designated for its presence of mudflats and sandflats which during low tide are not covered by seawater. The SAC also mentions the importance of annuals, including *Salicornia* sp., which colonize the mud and sands within the site area. Atlantic salt meadows *Glauco-Puccinellietalia maritimae* form the most extensive type of saltmarsh in the Dee, helping displace vast amounts of *Spartina anglica*, a non-native common cordgrass.
The Dee Estuary SPA & Ramsar	14,292	1.2 km north	The Dee Estuary is a large, sheltered estuary which is internationally important due to the number of waterfowl and waders it supports. Qualifying interests include a breeding colony of natterjack toad *Bufo calamita* and over 20,000 individual waterbirds each year such as redshank *Tringa totanus* and black-tailed godwit *Limosa limosa*.
Alyn Valley Woods SAC	167	6.8 km southwest	Characterised by three of the habitat types that are listed in Annex I of the SAC Directive: Tilio-Acerion forests of slopes, screes and ravines; alluvial forests of alder *Alnus glutinosa* and ash *Fraxinus excelsior*; and areas of semi natural dry grassland and scrubland facies on a calcareous substrate.
Midland Meres & Mosses Phase 1 Ramsar	511	8.7 km east	A series of 16 sites made up of nutrient-rich open water bodies with fringing habitats of reed swamp, fen, carr and damp pasture and peatlands.
Midland Meres & Mosses Phase 2 Ramsar	1594	9.7 km east	A series of 18 sites made up of nutrient-rich open water bodies with fringing habitats of reed swamp, fen, carr and damp pasture and peatlands.
Nationally Designated Sites			
Afon Dyfrdwy (Wales) / River Dee (England) SSSI	1,490	0 m – crossed by the Newbuild Infrastructure Boundary	Afon Dyfrdwy (River Dee) is of special interest for its fluvial geomorphology and range of river habitat types, as well as saltmarsh transition habitats. It is also of special interest for populations of floating water plantain *Luronium natans*, slender hare's-ear *Bupleurum tenuissimum*, sea barley *Hordeum marinum*, hard-grass *Parapholis strigosa*, otter, salmon, European bullhead, brook lamprey, river lamprey *Lampetra fluviatilis*, sea lamprey, club-tailed dragonfly *Gomphus vulgatissimus* and other aquatic invertebrates. The River Dee is of special interest for Atlantic salmon for which it is one of the Environment Agency's index rivers. The Mynach, Meloch and Ceiriog tributaries are the most important salmon spawning tributaries in the Dee catchment and are included within the Afon Dyfrdwy SSSI. The lower reaches of the River Dee support Britain's only known population of the stonefly *Isogenus nubecula*, which is classified as vulnerable in the Red Data Book. Furthermore, the nationally scarce weevil *Baris lepidii* has been recorded along the lower Dee and has not been recorded on any other Welsh river.
Connah's Quay Ponds and Woodland SSSI	94	0 m north – shares a boundary with the Newbuild Infrastructure Boundary	Part of 'The Deeside and Buckley Newts Site SAC'. This site includes Broadoak Wood, Wepre Country Park, Gathering Grounds Wood and Llwyni Pond Local Nature Reserve. The site is of special interest for its population of great crested newt' its assemblage of widespread amphibian species, and for its semi-natural broadleaved woodland.
Halkyn Common and Holywell Grasslands/Comin	699.3	327 m northeast	Halkyn Common and Holywell Grasslands is of special interest for the mineralisation associated with the Carboniferous Limestone and cherts which is found in spoil tips and in situ exposures; open vegetation on soils rich in heavy metals; calcareous grassland;

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Helygain a Glaswell Tiroedd Treffynnon SSSI			dry heath; fen meadow; base-rich flush; and populations of spring sandwort *Minuartia verna* and stemless thistle *Cirsium acaule*. An assemblage of widespread amphibian species including great crested newt are also present.
Buckley Claypits and Commons SSSI	100	540 m south	This site forms part of the Deeside and Buckley Newt Sites SAC and is notable due to its presence of great crested newt. Breeding reed bunting *Emberiza schoeniclus* and water vole are also present.
Flint Mountain (Mynydd Y Fflint) SSSI	26	550 m northwest	The site is of special interest for its stands of unimproved neutral grassland and semi-natural broadleaved woodland, which occur in association with scrub, fen meadow and swamp vegetation. Notable species include pale flax *Linum bienne*, restharrow *Ononis repens*, figwort *Scrophularia nodosa* and hemp agrimony *Eupatorium cannabinum*.
Maes Y Grug SSSI	18	977 m south	The site is of special interest for its population of great crested newt and forms part of the Deeside and Buckley Newts Site SAC. Habitats comprise a mosaic of grassland, scrub and woodland habitats surrounding waterbodies that have been managed or allowed to develop naturally.
Mersey Estuary SSSI	6715	1.1 km north	The Mersey Estuary is an internationally important site for wildfowl and consists of large areas of intertidal sand and mudflats. The site also includes an area of reclaimed marshland, saltmarshes, brackish marshes and boulder clay cliffs with freshwater seepages. Notable species include curlew *Numenius arquata* and golden plover.
Dee Estuary SSSI	13,680	1.2 km north	The Dee Estuary is a large, sheltered estuary which is internationally important due to the number of waterfowl and waders it supports. Habitats include intertidal mud and sandflats, rocky sandstone cliffs of Hilbre Island and Middle Eye with species including sandhill rustic moth *Luperina nickerlii gueneei*, a Red Data Book species.
Parc Linden SSSI	10.2	1.2 km southeast	Parc Linden is an area of enclosed pasture located close to the village of Lixwm on a shallow glacial drift over carboniferous limestone. The site supports unimproved calcareous grassland, acid grassland, limestone pavement, bracken *Pteridium aquilinum* and scrub. Parc Linden is of special interest for its unimproved calcareous grassland which is the best-known example of its type in Clwyd (Flintshire). A small partially wooded limestone pavement occurs in the northern part of the site.
Gathering Grounds Woods & Llwyni Pond Local Nature Reserve LNR	3	1.4 km north	This site is within the Connah's Quay Ponds and Woodland SSSI and The Deeside and Buckley Newts Site SAC. The site is notable due to the presence of great crested newt. Other species include, badger, field vole *Microtus agrestis*, blue tit *Cyanistes caeruleus*, chaffinch *Fringilla coelebs*, tawny owl *Strix aluco*, redwing *Turdus iliacus and* dunnock *Prunella modularis*.
Coed Trefraith SSSI	11	1.4 km southwest	Designated for its botanical interest. One of the best examples in Clwyd (Flintshire) of a woodland type found mainly in Wales and south-west England but also in the Midlands and north-east England. In north Wales the majority of the examples are in Clwyd at low altitudes, the remainder being in West Gwynedd.
Parc Bodlondeb and Gwenallt-Parc SSSI	17.5	2.0 km south	Parc Bodlondeb and Gwenallt-Parc is an area of enclosed pasture located close to the village of Lixwm, on a shallow glacial drift over Carboniferous Limestone. The site supports a mosaic of unimproved calcareous, acid and neutral grasslands together with limestone heath and stands of bracken, scrub and broadleaved woodland. It is of special interest for its unimproved calcareous grassland, limestone heath and species-rich acid grassland. All these types have highly localised national distributions. Additional interest is provided by the neutral grassland, scrub and woodland communities.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Non-Statutory Designated Sites			
England			
Frodsham Helsby and Ince Marshes LWS	1150	0 m – within the Newbuild Infrastructure Boundary	An extensive area of coastal floodplain, used for agricultural purposes. The wider landscape includes Ince Banks and the Mersey Estuary SPA and Ramsar to the north. The site provides a mosaic of habitats including grassland, a complex ditch system, semi-natural plantation woodland, scrub, tall ruderal vegetation, hedgerows, reed beds and an area of developing saltmarsh. It is of county, national and international ornithological importance for breeding, wintering and passage species. It is also of botanical interest at county and national levels, with yellow-vetch *Vicia lutea,* a nationally scarce species, recorded. There is a good-sized water vole population within the ditch system.
Saughall Bank LWS	3.80	0 m– within the Newbuild Infrastructure Boundary	Species-rich grassland on the south-west facing old bank of the River Dee over 2km from the river, containing plants rare in Cheshire including restharrow, agrimony *Agrimonia sp.*, and dyer's greenweed *Genista tinctoria*.
Shropshire Union Canal (Main Line) LWS	14.12	0 m– within the Newbuild Infrastructure Boundary	A 1.9km length of the Shropshire Union Canal main line, south-east of Huxley between Williamson's Bridge and Bate's Mill Bridge, including the canal, towpath and boundary hedgerows. Bird species recorded include yellowhammer *Emberiza citrinella*, chaffinch, house martin *Delichon urbicum* and great spotted woodpecker *Dendrocopos major*.
Gowy Meadows and Ditches LWS	193	0 m– within the Newbuild Infrastructure Boundary	A large group of fields with an interconnecting ditch system which is part of the eastern floodplain of the River Gowy. Some areas of good semi-improved, neutral and marshy grassland. Native black poplar *Populus nigra* is present and the ditches in particular are of high conservation value, supporting rare/scarce flora and a water vole population. The site is of significant ornithological interest, supporting a number of red and amber list species and breeding snipe *Gallinago gallinago*.
Wood West of Crabwell Manor LWS	0.94	0 m– within the Newbuild Infrastructure Boundary	A narrow strip of broadleaved woodland along a stream. The canopy consists of ash, pedunculate oak, sycamore *Acer pseudoplatanus* and beech *Fagus sylvatica*, with an understory of hawthorn *Crataegus monogyna*, hazel, field-rose *Rosa arvensis* and wild cherry *Prunus avium*. Common ground flora species are present, such as bramble R*ubus fruticosus*, common nettle *Urtica dioica* and wood avens *Geum urbanum*.
Collinge Wood & Meadow LWS	4.67	5 m south	Two adjoining areas of woodland and a wet meadow with reed bed, adjacent to the Shropshire Union Canal. Silver birch *Betula pendula* is abundant in the woodland, with pedunculate oak and sycamore. Wetland species in the meadow include gipsywort *Lycopus europaeus*, common marsh bedstraw *Galium palustre*, wild angelica *Angelica sylvestris* and yellow iris *Iris pseudacorus*.
Chester Zoo (Butterhill – Millenium Cycle Route) LWS	0.89	17 m west	A section of the Millenium Cycle Way between Butter Hill and Chester Zoo, comprising of a surfaced track/cycle route with a steep hedge bank in the northern section and deep ditches along the southern section. Common tree and shrub species line the track, including sessile and pedunculate oak, ash Fraxinus excelsior, hawthorn *Crataegus monogyna* and hazel *Corylus avellana*. In the ditches hard shield fern *Polystichum aculeatum* and greater burdock *Arctium lappa* are present, which are locally scare species, along with ground flora such as yellow iris, brooklime *Veronica beccabunga*, duckweed *Lemna minor* and red campion *Silene dioica*.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Shropshire Union Canal (Little Stanley to Waverton) LWS	4.6	21 m south	A long section of canal passing through Chester and ending near Ellesmere Port. The section between bridges 138 and 141 is of greatest botanical interest, with hedgerows, extensive marginal-emergent vegetation, aquatic vegetation and other wetland flora species.
Lea by Backford Railway Cutting LWS	3.20	50 m north	A narrow strip of regenerating mixed woodland, scrub and neutral grassland north-east of Mollington. Contains notable species for Cheshire, including agrimony, yellow wort *Blackstonia perfoliata* and common spotted orchid *Dactylorhiza fuchsii.*
Viaduct Wood LWS	2.34	55 m south	A narrow section of woodland on the slopes of a brook, adjacent to the Chester to Liverpool Railway line. Canopy and shrub layer consists of common woodland species such as beech, hazel, field rose *Rosa arvensis* and bramble. Ground flora includes wood anemone *Anemone nemorosa*, bluebell *Hyacinthoides non-scripta*, and common dog violet *Viola riviniana*.
Wervin Meadows LWS	35.83	57 m north	Predominantly a grazed floodplain adjacent to the River Gowy, consisting of a mosaic of grassland, wetland and tall ruderal vegetation with numerous ditches. The grassland provides important habitat for ground nesting birds, in particular lapwing *Vanellus vanellus*. The ditches and wet areas are botanically rich. The site supports brown hare.
Chester Zoo Ponds LWS	0.35	108 m south from closest pond	A cluster of seven ponds within permanent pasture, grazed by cattle. Important in the wider region due to supporting aquatic invertebrates and rare plants, including 24 wetland indicator species and regionally rare species.
Backford Brook Fields LWS	8.15	295 m north	A section of Backford Brook Valley. Species within the grassland include cat's-ear *Hypochaeris radicata*, selfheal *Prunella vulgaris*, yarrow *Achillea millefolium* and pignut *Conopodium majus*. There is a large mature black poplar along the brook's banks. There is a pond within the site, with common bird's-foot-trefoil *Lotus corniculatus* nearby.
Picton Green Lane LWS	0.92	300 m southeast	An area of damp neutral unimproved grassland and adjacent green lane, with a gully leading to a spring and associated wet flush. Scattered trees present include crack *Salix fragilis* and goat *Salix caprea* willow, ash and crab apple *Malus sylvestris*. In the flush species include marsh marigold *Caltha palustris* and black knapweed *Centaurea nigra*, and in the grassland ragged-robin *Lychnis flos-cuculi*, glaucous sedge *Carex flacca* and meadowsweet *Filipendula ulmaria* are present.
Canal Wood LWS	3.6	304 m south	The site lies several metres below the Shropshire Union Canal and comprises of woodland, wet grassland, swamp and drainage ditches. The canopy and shrub layer consist of common woodland species such as sycamore, oak, hawthorn and elder *Sambucus nigra*. Wood melick *Melica uniflora*, an ancient woodland indicator species in Cheshire, is present in the ground flora. The grassland is of varying quality and is more diverse to the south.
The Greenway Millenium Cycle Route LWS	11.4	376 m southeast	A section of the Millenium Cycle Way between Blacon and Newton which was a former railway line. The site consists of a surfaced track/cycle route with amenity grassland and planted trees. Grassland flora of note include tor-grass *Brachypodium pinnatum* and thrift *Armeria maritima*, which are locally rare and scarce species, respectively.
Blacon Escarpment Wood LWS	11.2	630 m southeast	An area of broadleaved woodland along the old sea cliffs of the Dee Estuary. The woodland canopy includes ash, sycamore and pedunculate oak, with understory of hawthorn and hazel.
Hoblane Ponds LWS	0.30	694 m east	A series of small ponds north of Cottage Farm, west of Dunham on the Hill. Notable species within the ponds include water forget-me-not *Myosotis scorpioides*, tubular water dropwort *Oenanthe fistulosa L.*, greater spearwort *Ranunculus lingua*, yellow iris and marsh figwort *Scrophularia auriculata*.

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
Station Road Railway Site LWS	0.5	713 m north	An area of open mosaic habitat at a disused former railway site. Reptiles are present in the vicinity.
Old river Dee Escarpment LWS	16.28	766 m northwest	A mosaic of habitats including broadleaved semi-natural woodland, broadleaved plantation, scrub, semi-improved neutral grassland, running water and an area of marsh. A strip of woodland in the south-east has some Ancient Woodland indicator species such as wood melick, wood sedge *Carex sylvatica*, soft shield fern *Polystichum setiferum*, sanicle *Sanicula europaea*, bluebell, wood millet *Milium effusum* and common dog violet.
Bridge Trafford North LWS	13.3	740 m east	The site consists of planted woodland, ponds, grassland and tall ruderal vegetation, as well as scrub and a small area of swamp. The site is adjacent to the River Gowy. The woodland has abundant ash and field maple *Acer campestre*, with spindle *Euonymus europaeus* (a locally scarce species). Bulrush *Typha latifolia is* present in the wetland area, and the grassland supports flora such as ribwort plantain *Plantago lanceolata*, red clover *Trifolium pratense* and black medick *Medicago lupulina*. Bird species present include Bullfinch *Pyrrhula pyrrhula*.
Field North of Hadrian Drive LWS	4.20	829 m southeast	A shallow valley with a stream, consisting of several fields, hedgerows and a pond. Grassland quality varies but the presence of thrift, a locally scarce species, is notable.
Knolls Bridge Fields	11.31	893 m south	Site includes restorable grassland, fens, swamps, bogs and reedbeds, wildlife corridors and is accessible natural greenspace.
Wales			
Leadbrook Wood WS	35.1	0 m – within the Newbuild Infrastructure Boundary	Semi-natural broad-leaved woodland occupying the dingles in which the Lead Brook and its tributaries flow. In several areas drainage is impeded. The woodland canopy is mainly dominated by ash and sycamore with some oak alder, beech, common lime *Tilia x europaea* and silver birch. The shrub layer has abundant holly, hazel and wych elm *Ulmus glabra*. Near Ty'n-y-coed there is semi-improved and species-rich marshy grassland, with oval sedge *Carex leporina*, ragged-robin and common spotted orchid.
Brook Park Farm Wood WS	6.7	0 m – within the Newbuild Infrastructure Boundary	Semi-natural broadleaved woodland and mixed broadleaved and coniferous plantation along a stream valley. The mixed woodland includes sycamore, larch *Larix decidua* and Corsican pine *Pinus nigra* with a shrub layer of wych elm, elder, blackthorn *Prunus spinosa* and hazel. The herb layer has bluebell, wood avens, great wood-rush *Luzula sylvatica* and common centaury *Centaurium erythraea*. Ash and sycamore dominate the broadleaved canopy with some oak, holly and wild cherry.
Coed y Cra WS	44.9	0 m – within the Newbuild Infrastructure Boundary	Large woodland along the Nant y Fflint and its tributaries, comprising semi-natural broadleaved woodland, mixed and conifer plantation. Part of the wood at the north-west end is wet and the canopy is dominated by ash and alder and some goat willow. Here the ground flora is rich with marsh marigold, yellow flag, meadowsweet and horsetails. The majority of the wood is mixed woodland with conifers, sycamore, oak, silver birch, sweet chestnut *Castanea sativa*, wild cherry, hornbeam *Carpinus betulus*, beech and poplar *Populus* sp. The understorey is generally sparse with hazel, holly, hawthorn and elder with patches of laurel *Laurus* sp. and rhododendron *Rhododendron ponticum*. In part of Coed y Felin there is an open wet grassland with common spotted orchid, meadowsweet, marsh valerian *Valeriana dioica*, bugle *Ajuga reptans* and horsetail.
New Inn Brook Wood WS	4.8	16 m west	Semi-natural broadleaved woodland in the steep side valley of the New Inn Brook. Parts of the woodland are wet. The woodland canopy is dominated by ash and sycamore with occasional poplar and alder. There is a small patch of larch. The shrub layer has

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
			abundant hazel and elder with some hawthorn and holly. The rich herb layer has frequent male fern *Dryopteris filix-mas*, wood avens, yellow archangel *Lamium galeobdolon*, tufted hair-grass *Dechampsia cespitosa*, ramsons *Allium ursinum,* bryophytes and ivy *Hedera helix* with occasional hart's-tongue fern *Asplenium scolopendruim*, dog's mercury *Mercurialis perennis*, bluebell and wood anemone.
Warred Wood WS	14.2	41 m south	Site comprises broadleaved semi-natural woodland, coniferous plantation and mixed plantation woodland.
Aston Wetland WS	4.0	94 m north	Level triangular site of willow *Salix* sp. scrub with marshy grassland mosaic with patches of tall herb fen and birch trees along the railway. The area of scattered grey willow *Salix cinerea* and downy birch *Betula pubescens* is species-rich with common spotted orchid, black knapweed, ragged-robin, greater bird's-foot trefoil *Lotus penduculatus*, carnation sedge *Carex panicea*, fleabane *Pulicaria dysenterica* and marsh pennywort *Hydrocotyle vulgaris*. The patches of tall herb are dominated by great willow herb *Epilobium hirsutum*, giant horsetail *Equisetum telmateia* and hemp agrimony. Two sides of the site are bounded by a steep embankment with hawthorn, elder, nettle, bramble, rosebay willowherb *Chamerion angustifolium* and cleavers *Galium aparine*.
Cobbler's and Stoneybeach Woods	12.5	141 m south	An elongated narrow stand of semi-natural broad-leaved woodland in the steep-sided valleys of Alltami Brook and two of its tributaries. Oak, ash and sycamore are the dominant canopy trees with some birch and willow. In the shrub layer there are dense patches of holly with elder, hazel, elm and sycamore saplings. Broad buckler fern *Dryopteris dilatata*, opposite-leaved golden saxifrage *Chrysosplenium oppositifolium,* bramble, yellow archangel, wood avens and bryophytes are abundant in the species-rich herb layer.
Sea View Wetland WS	2.3	270 m northwest	Wetland habitat with stands of common reed *Phragmites australis* and bare ground where floating sweet-grass *Glyceria fluitans* and toad rush *Juncus bufonius* have colonised. Marshy grassland habitat is present with frequent glaucous and hairy sedge *Carex hirta*, sweet vernal grass *Anthoxanthum odoratum* and common spotted orchid.
Llwyn-onn	1.0	482 m west	A complex site consisting of woodland, neutral grassland, scrub and marsh on the slopes of a stream valley. The grassland is semi-improved and has abundant sweet vernal grass, crested dog's-tail and red fescue. Herbs present include field wood-rush, bulbous buttercup *Ranunculus bulbosus* and bird's-foot trefoil. Dense scrub with some woodland plants borders the grassland. The marsh is situated at the bottom of the valley and is botanically very rich. Sweet-grass, fool's water-cress *Helosciadium nodiflorum*, Yorkshire fog *Holcus lanatus*, marsh horsetail *Equisetum palustre* and meadowsweet are common here with common fleabane, bog stitchwort *Stellaria alsine* and water mint *Mentha aquatica* occurring. These marshy species continue into the wet woodland. This habitat is dominated by alder with some willow in the understorey. Other species found in the wet woodland include valerian *Valeriana sp.* and remote sedge *Carex remota*. On the slopes the woodland is dry and bluebell, wood anemone, pignut and yellow archangel are found.
Coed Ffrith	8.2	508 m north	Elongated, semi-natural broad-leaved woodland on the slopes of a stream valley. The woodland canopy is dominated by sycamore with some oak and ash occurring. Wych elm and holly are frequent in the shrub layer with hawthorn abundant in the areas influenced by grazing. The field layer has also been affected by grazing but still retains its diversity. Ramsons, bluebell and lesser celandine *Ficaria verna* are copious within this layer. Woodruff *Galium odoratum*, moschatel *Adoxa moschatellina*, tufted hair-grass and pignut can also be found on the site.
Coed Cae-Crwn	18.0	553 m east	Broad-leaved woodland, conifer plantation and mixed plantation with a marshy grassland. Coed Cae-crwn has a canopy of mainly beech and sycamore with locally frequent sweet chestnut and an area of coniferous plantation. The shrub layer is sparse

Site name	Approximate Size (ha)	Distance from Newbuild Infrastructure Boundary	Reason For Designation
			comprising mainly elder and the ground layer is dominated by bramble with frequent broad buckler fern, bracken, wood sorrel *Oxalis acetosella*, rosebay willowherb and raspberry *Rubus idaeus*. Coed Bryn-eithin is on a gentle north facing slope with some wet areas. This mixed woodland has a canopy of mainly larch, fir and sycamore with some ash, alder and oak. The shrub layer is elder with some holly. The herb layer comprises frequent bluebell, bracken, soft grass, bramble, wood sorrel and dog's mercury. Along the northern edge of Coed Bryn-eithin is a marshy grassland dominated by soft rush *Juncus effusus* with marsh bedstraw, ragged-robin, compact rush Juncus conglomeratus, greater bird's-foot trefoil and cuckooflower *Cardamine pratensis*.
Pentre Moch Pond	2.6	766 m north	Small swamp and pond. The swamp is dominated by greater reedmace *Typha latifolia* and tufted sedge *Carex lenticularis*. The hedges around the swamp are formed by hawthorn, blackthorn, elder, willow and sessile oak. Nearby is a small pond surrounded by oak trees with a woodland flora.
Engineer Park	1.0	855 m west	Part of old River Dee wildlife site. Semi-improved neutral grassland with scrub, with saltmarsh grading into intertidal mud.
Soughton Hall & Gorse Wood Ponds	72.9	889 m west	Over mature common lime, oak, sweet chestnut, ash, sycamore and horse chestnut *Aesculus hippocastanum*, with occasional dead fallen and hollow trees. Includes two small ponds on the edge of woodland. The ponds are of importance to amphibians, especially great crested newts. The site includes a fringe of woodland and grassland habitat as foraging area.
Cornist Wood WS	4.1	920 m east	Broadleaved and mixed woodland in a steep sided stream valley with a pond. The northern part of woodland is predominately beech with some oak and larch, whereas the southern part of the wood is dominated by sycamore with some ash. The shrub layer is mainly elder, holly and hazel with some field maple and wild cherry. The ground flora is predominantly ivy, bramble, dog's mercury, wood melick, nettle and ferns. The wood has been severed by a trackway.

Habitats

9.6.6. An extended Phase 1 habitat survey of all land within the Newbuild Infrastructure Boundary was undertaken where access allowed; full methodology and results are presented within **Appendix 9.1 - Habitats and Designated Sites Survey Report (Volume III)**. The extended Phase 1 habitat survey provided baseline information on the types and distribution of habitats present within the Newbuild Infrastructure Boundary. Habitat types were determined according to standard definitions, using the Joint Nature Conservation Committee (JNCC) Phase 1 habitat codes (**Ref. 9.25**) and their suitability to support protected and notable species was assessed.

9.6.7. Habitats of Principal Importance (HPI) or those listed within any Biodiversity Action Plan (BAP) for relevant local authorities, were identified during the desk study. Field surveys utilised JNCC Phase 1 habitat codes that do not necessarily align with HPI categories. This is the case for two HPI/BAP habitats which have only been identified in certain Sections of the Newbuild Infrastructure Boundary (as defined within **Chapter 3 – Description of the DCO Proposed Development, Volume II);** Ancient Woodland (Section 5 only) and Coastal and Floodplain Grazing Marsh (Section 1 and 2 only).

9.6.8. Deeside and Buckley Newt Sites SAC abuts the Newbuild Infrastructure Boundary. Annex I habitat (comprising deciduous woodland) was present as a qualifying feature of the SAC and is also identified as Ancient Woodland (**Figure 9.1.1** within **Appendix 9.1 - Habitats and Designated Sites, Volume III)**. Deciduous woodland (HPI) that is connected and functionally linked to the Annex I SAC woodland is present within the Newbuild Infrastructure Boundary. Therefore, for the purposes of this assessment, deciduous woodland located along Alltami Brook is considered as Annex I habitat within this impact assessment and is assessed under HPI and Ancient Woodland habitat.

9.6.9. All habitats recorded within the Newbuild Infrastructure Boundary are listed in Table 9.7~~**Table 9.7**~~ below and displayed on **Figure 9.1.3** within **Appendix 9.1 - Habitats and Designated Sites Survey Report (Volume III)** along with their Importance (HPI or BAP) and overall area coverage within the Newbuild Infrastructure Boundary.

9.6.10. Excluding linear features such as hedgerows, non HPI/BAP habitats form the majority of habitat types within the Newbuild Infrastructure Boundary, which is dominated by an agricultural landscape comprising arable farmland (34.14%), improved grassland (38.76%), poor semi-improved grassland (9.07%) and neutral semi-improved grassland (3.49%).

9.6.11. Habitats such as amenity grassland, fence and hardstanding, buildings, bare ground, introduced shrub and other habitat are considered to be habitats of less than local conservation importance. These habitats are not HPI nor do they

form part of any local biodiversity lists (e.g., BAP). They provide limited suitability to support or sustain protected and / or notable species.

9.6.12. Four HPIs, as identified through the provision of the NERC Act (Section 41) (Ref. 9.5), were identified as part of the DCO Proposed Development. Pockets of woodland are present across the landscape, invariably in small aggregations. Ancient Woodland and woodland considered to be Annex I habitat is located within the Newbuild Infrastructure Boundary in discrete locations (Alltami Brook, and Northop Hall). Marshy grassland was located within the Newbuild Infrastructure Boundary, and although not a HPI or BAP habitat, forms part of the coastal and floodplain grazing marsh HPI associated with the Gowy Meadows and Ditches LWS.

Table 9.7 Habitats within the Newbuild Infrastructure Boundary and their Importance

Habitat	HPI / BAP	Area (Ha) or Length (km)	Approximate Area (% of overall Newbuild Infrastructure Boundary)
Broad-leaved semi-natural woodland	✓	3.60ha	0.79
Broad-leaved plantation woodland		3.27ha	0.72
Mixed semi-natural woodland		7.35ha	1.61
Mixed plantation woodland		0.37ha	0.08
Scattered broadleaved and coniferous trees		0.54ha	0.12
Standing water (for example, ponds) and canals	✓	1.18ha	0.26
Running water (for example, ditches, rivers, and streams)	✓	2.19ha	0.48
Ephemeral short perennial		0.01ha	0.00
Arable		155.93ha	34.14

Habitat	HPI / BAP	Area (Ha) or Length (km)	Approximate Area (% of overall Newbuild Infrastructure Boundary)
Poor semi-improved grassland		41.46ha	9.08
Improved grassland		177.04ha	38.76
Neutral unimproved grassland		0.84ha	0.18
Neutral semi-improved grassland		15.93ha	3.49
Marshy grassland		7.89ha	1.73
Dense/continuous scrub		5.16ha	1.13
Scattered scrub		1.90ha	0.42
Continuous bracken		0.002ha	0.00
Tall ruderal		1.94ha	0.42
Introduced shrub		0.007ha	0.00
Amenity grassland		1.89ha	0.41
Buildings		1.49ha	0.33
Bare ground		2.71ha	0.59
Other habitat		2.42ha	0.53
Hardstanding		21.67ha	4.74
Scattered scrub		0.25km	-
Line of trees – broadleaved		3.2km	-
Line of trees – coniferous		0.30km	-
Line of trees – mixed		0.03km	-
Running water (for example, ditches, rivers, and streams)	✓	6.34km	-

Habitat	HPI / BAP	Area (Ha) or Length (km)	Approximate Area (% of overall Newbuild Infrastructure Boundary)
Intact hedge species rich	✓	3.68km	-
Intact hedge species poor	✓	17.4km	-
Defunct hedge species rich	✓	0.54km	-
Defunct hedge species poor	✓	4.57km	-
Hedge with trees species rich	✓	3.03km	-
Hedge with trees species poor	✓	7.57km	-
Fence		8.86km	-
Dry ditch		3.53km	-
Earth bank		0.17km	

~~Habitat~~	~~HPI / BAP~~	~~Area (Hectares) or Length (km)~~	~~Approximate Area (% of overall Newbuild Infrastructure Boundary) or Length (km)~~
~~Broad-leaved semi-natural woodland~~	~~✓~~	~~3.28~~	~~0.72~~

Habitat	HPI / BAP	Area (Hectares) or Length (km)	Approximate Area (% of overall Newbuild Infrastructure Boundary) or Length (km)
Broad-leaved plantation woodland		3.45	0.76
Coniferous plantation woodland		0.01	0.00
Mixed semi-natural woodland		8.08	1.77
Mixed plantation woodland.		0.35	0.08
Scattered broadleaved and coniferous trees		0.55	0.12
Standing water (for example, ponds) and canals	✓	1.20	0.26
Running water (for example, ditches, rivers, and streams)	✓	2.22	0.49
Ephemeral short perennial		0.06	0.01
Arable		178.44	39.19
Poor semi-improved grassland		40.95	8.99
Improved grassland		149.58	32.85
Neutral unimproved grassland		0.82	0.18
Neutral semi-improved grassland		15.75	3.46
Marshy grassland		7.96	1.75
Dense/continuous scrub		5.12	1.12
Scattered scrub		1.92	0.42

Habitat	HPI / BAP	Area (Hectares) or Length (km)	Approximate Area (% of overall Newbuild Infrastructure Boundary) or Length (km)
Bracken		0.00	0.00
Tall ruderal		1.92	0.42
Introduced shrub		0.00	0.00
Amenity grassland		6.08	1.33
Buildings		1.69	0.37
Bare ground		2.77	0.61
Other habitat		2.31	0.51
Hardstanding		20.85	4.58
Intact hedge species rich	✓	3.53	-
Intact hedge species poor	✓	18.22	-
Defunct hedge species rich	✓	0.57	-
Defunct hedge species poor	✓	5.22	-
Hedge with trees species rich	✓	3.38	-
Hedge with trees species poor	✓	7.74	-
Fence		8.89	-
Dry ditch		3.55	-

9.6.13. A National Vegetation Classification (NVC) survey (detailed within **Appendix 9.1 - Habitats and Designated Sites Survey Report, Volume III**) was undertaken between April and July 2022. Surveys of areas identified with potential high floristic diversity or those designated as statutory or non-statutory designated sites (as identified during the desk study (detailed within **Section 9.5**) were subject to survey and included:

- Frodsham and Ince Marches LWS
  - The northern most extent of the Frodsham and Ince Marshes LWS, (at the location of the Ince AGI) was dominated by perennial rye-grass, accompanied by constant meadow foxtail and creeping bent. Forbs were scarce within the sward but included creeping thistle *Cirsium arvense*, meadow buttercup *Ranunculus acris*, dandelion, common mouse-ear *Cerastium fontanum* and white clover. MATCH analysis gave the highest similarity co-efficient (55.2%) for MG7d *Lolium perenne-Alopecurus pratensis* grassland. This sub-community is characteristic of moist, fertile soils which are subject to occasional flooding but within areas with less frequent inundation than would occur within the MG7c *Alopecurus pratensis-Festuca pratensis* grassland sub-community. The southern extent of the Frodsham and Ince Marshes LWS comprised MG9 *Holcus lanatus-Deschampsia cespitosa* grassland. It seems more likely that the species-poor grassland has developed from an MG7 *Lolium perenne* ley but is now showing successional changes towards a wetter grassland community thus has been assigned as MG9 *Holcus lanatus-Deschampsia cespitosa* grassland.
- Gowy Meadows and Ditches LWS
  - This area comprised grassland and a network of ditches to the west of the River Gowy, with a strip of dry neutral grassland immediately to the south of the M56 and stands of plantation woodland further south. The land was crossed by a series of drainage ditches with marshy grassland to the south and a mosaic of swamp communities and marshy grassland within the central area. The flat grassland west of the River Gowy which comprised most of the survey area at this location gave the greatest similarity co-efficient with the MG13 *Agrostis stolonifera-Alopecurus geniculatus* grassland community. This community is characterised by the constant presence of marsh foxtail and creeping bent, sometimes accompanied by soft rush and other grasses typical of moist ground, including tufted hair-grass and floating sweet-grass. It is distributed throughout lowland Britain, where periodic inundation by fresh water occurs. S28 *Phalaris arundinacea* tall-herb fen community, S5 *Glyceria maxima* swamp, MG9 *Holcus lanatus - Deschampsia cespitosa* grassland and MG10a *Holcus lanatus-Juncus effusus* rush pasture are also present within the Gowy Meadows and Ditches LWS.

- Wood West of Crabwell Manor LWS
  - The canopy was dominated by sycamore *Acer pseudoplatanus*, with hazel *Corylus avellana* and hawthorn *Crataegus monogyna* being the most frequent understorey species. The understorey and ground flora, however, seemed to have a close affinity to W8 *Fraxinus excelsior-Acer campestre -Mercurialis perennis* woodland, the type of ash woodland which is typical of lowland south and central Britain. Although ash was rare in the canopy it was frequent as seedings on the woodland floor, showing that it does have the potential to spread within the canopy, given the right conditions and management.
- Saughall Bank LWS
  - Land within Saughall Bank LWS consisted of a wet ditch with a strip of neutral grassland along its northern bank and a narrow stand of dense scrub to the north of the grassland. The wet ditch was steep sided and fenced on both sides with barbed wire. *Meadowsweet Filipendula ulmaria* was frequent along the banks with lesser amounts of broad-leaved dock *Rumex obtusifolius,* lesser celandine *Ficaria verna*, cow parsley *Anthriscus sylvestris*, cleavers and great willowherb *Epilobium hirsutum*. Emergent vegetation consisted of small patches of bulrush *Typha latifolia* growing within the channel. The dense scrub to the north of the grassland was dominated by hawthorn, with occasional blackthorn *Prunus spinosa* and elder *Sambucus nigra,* with a very dense layer of *bramble Rubus fruticosus agg*. below.
- Land owned by Chester Zoo
  - Three grassland fields located adjacent to the eastern bank of the Shropshire Union Canal LWS. The fields consisted of similar grassland habitats with the most frequent grasses comprising creeping bent *Agrostis stolonifera*, perennial rye-grass, meadow foxtail, Yorkshire-fog *Holcus lanatus* and red fescue *Festuca rubra,* with occasional tufted hair-grass *Deschampsia cespitosa.* Tussocks of tall fescue *Schedonorus arundinaceus* were also present but restricted to the most northerly field. Forbs were scarce throughout but included meadow buttercup *Ranunculus acris*, creeping buttercup, cuckooflower *Cardamine pratensis*, common sorrell *Rumex acetosa* and dandelion. Overall, the most suitable community for the grassland as a whole is MG7d *Lolium perenne-Alopecurus pratensis* grassland, with both species prominent across the three fields.
- Ancient Woodland at Little Lead Brook
  - This small stand of woodland, along Little Lead Brook, has an area of Ancient Woodland to the south. Although the Ancient Woodland is outside of the Newbuild Infrastructure Boundary, it is directly connected

and functionally linked to the Ancient Woodland, thus is considered as Ancient Woodland in this assessment. The canopy of the main section of this woodland was dominated by alder *Alnus glutinosa,* with an understorey comprising mostly hawthorn and grey willow *Salix cinerea.* The southern section consisted of a single line of large mature trees including ash *Fraxinus excelsior* and pedunculate oak *Quercus robur*.

- Woodland at Church Lane / A494
  - This woodland is located immediately north of the A494 near Ewloe, off Church Lane. The canopy was dense at the eastern end of the woodland but became more gappy at the western end, eventually leading onto open grassland and scattered scrub, grazed by horses. The eastern edge of the woodland forms the western boundary of residential gardens and contained a high proportion of non-native tree and shrub species including *Cupressus* x *leylandii* and spotted laurel *Aucuba japonica*. The western edge canopy was dominated by sycamore *Acer pseudoplatanus,* with an understorey dominated by hawthorn. The ground layer mostly comprised common nettle and was generally species poor. Due to the modified ground flora and the dominance of sycamore within the canopy, there is no suitable NVC community description for this vegetation.

9.6.14. A number of ancient / veteran trees were identified within the Newbuild Infrastructure Boundary and are presented within **Appendix 9.11 - Arboricultural Impact Assessment Report (Volume III)**.

9.6.15. Overall, non-HPI habitats are considered to be of Less than Local level of conservation importance given their widespread and common occurrence across the wider landscape. Woodland, including HPI woodland, and Ancient Woodland are considered to be of National level of conservation importance given their fragmented and sporadic presence across the wider landscape. Ancient woodland is of national level importance given its scarcity across the UK. Hedgerows, as HPI, are considered to be of County level of conservation importance owing to the extent of hedgerows across the agricultural dominated wider landscape. Other HPI habitats, including Coastal and Floodplain Grazing Marsh are considered to be of Local level importance on the basis on their occurrence across the wider landscape.

Aquatic Habitats

9.6.16. The desk study considered all watercourses within the Newbuild Infrastructure Boundary. Seventy watercourses within the Newbuild Infrastructure Boundary were identified comprising 18 Main Rivers, 1 canal, and 51 Ordinary Watercourses as detailed in **Chapter 18 - Water Resources and Flood Risk (Volume II**), and included the River Dee, River Gowy, Stanney Mill Brook, and the Shropshire Union Canal.

9.6.17. Aquatic habitat walkover assessments were completed from April 2021 to December 2022 (detailed within **Appendix 9.9 – Aquatic Ecology (Watercourses) Survey Report, (Volume III) (Revision B).** These assessments form the preliminary phase of the aquatic ecology surveys and were used to characterise watercourses and identify further survey requirements. A total of 70 initial aquatic habitat walkover assessments have been completed of watercourses across the Newbuild Infrastructure Boundary~~Aquatic habitat walkover assessments were completed from March 2021 to June 2022 (detailed within **Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report, Volume III**). These assessments form the preliminary phase of the aquatic ecology surveys and were used to characterise watercourses and identify further survey requirements. A total of 70 initial aquatic habitat walkover assessments have been completed of watercourses across the Newbuild Infrastructure Boundary~~.

9.6.18. The majority of watercourses surveyed were typically realigned and over-deepened minor watercourses characterised by grazing/arable land-use drainage, small channel dimensions, extensive shading and/or in-channel vegetative growth with limited hydrogeomorphic activity (low energy systems). Habitat diversity was poor, and most watercourses were typically homogenous with uniform bed and bank profiles dominated by glide/slack flow and fine sediment, no or few channel features (such as pools, riffles and bars) and no or few marginal features (such as exposed/submerged tree roots and undercut banks).

9.6.19. Moderate habitat diversity was however observed in both Finchetts Gutter Tributary and Backford Brook where riparian vegetation with exposed/submerged tree roots and log jams provided increased habitat diversity. Alltami Brook and Wepre Brook both also displayed increased habitat diversity driven by dynamic flows, varying substrate and woody debris.

9.6.20. Although relatively homogenous in nature, the submerged and emergent macrophyte community recorded at the River Gowy provides some habitat diversity and cover for aquatic species.

9.6.21. River Dee habitat surveys showed that the number of habitats present both inter-tidally and sub-tidally was extremely limited with the area being characterised by a thin strip of truncated and eroding saltmarsh, which gave way to predominantly sandy inter-tidal sediments classified as oligochaetes in variable salinity littoral mobile sand (LS.LSa.MoSa.OlVS), a species-poor habitat type. Some rocks were within this habitat type, but these were bare. The inter-tidal sediments had a very low diversity and also a low density of individuals and as such probably do not provide very good habitat for wading birds. Only one habitat type (infralittoral mobile sand in variable salinity) was observed in sub-tidal areas. As expected, this also had a very low diversity and

low macrofaunal abundances which is a reflection of both the low mean salinity experienced by the benthic macrofauna and the speed of the current. A very narrow band of saltmarsh occurred at the top of the river banks over the majority of the survey area. Since it was constrained by steep banks and sometimes rip rap, the saltmarsh didn't show typical zonation and transitioned into terrestrial habitat very quickly. All the marsh was classified as SM28 (*Elymus repens* saltmarsh community)

9.6.22. Although the majority of watercourses were typically modified and of poor habitat diversity, many contained habitat essential for species of conservation concern, specifically diadromous fish, and their passage between marine and freshwater environments, but also aquatic macroinvertebrates. Watercourses, and their tributaries, where species of conservation concern are known to occur or where such species were recorded during survey are subsequently of greater conservation importance than those watercourses where no species of conservation concern were recorded. Apart from those watercourses listed below, considered to have a UK or National level of conservation importance as species of conservation concern are known to occur, watercourses of poor habitat diversity are considered to have a Local level of conservation importance for the purposes of this impact assessment.

- Thornton Main Drain
- Gowy Tributary 2
- Sealand Main Drain
- Mancot Brook
- Wepre Brook
- River Gowy
- Shropshire Union Canal
- River Dee
- Mancot Brook Tributary
- Wepre Brook Tributary 1
- Gale Brook
- Wervin Hall Ditch
- Hawarden Brook
- Oakfield Ditch 1
- Northop Brook
- Elton Brook Tributary 1
- Wervin Hall Ditch Tributary
- Railway Ditch 1
- Chester Road Drain Tributary 1
- Northop Brook Tributary 1;
- Thornton Uplands
- Collinge Wood Brook
- Railway Ditch 2
- Willow Park Brook
- Northop Brook Tributary 2
- Halls Green Lane Brook
- Rake Lane Brook
- Broughton Brook
- Aston Hall Brook Tributary
- Little Lead Brook
- Stanney Main Drain
- Seahill Drain
- Chester Road Drain North
- New Inn Brook

- Stanney Mill Brook
- Seahill Tributary 2
- Chester Road Brook Tributary 2
- Alltami Brook

9.6.23. No species of conservation concern are known to occur, or were recorded, on either Finchetts Gutter Tributary or Backford Brook. However, as moderate habitat diversity was recorded at these watercourses, they are considered to have a County level of conservation importance for the purposes of this impact assessment.

9.6.24. Pond PSYM surveys were conducted on seven ponds (detailed within **Appendix 9.10 Aquatic Ecology (Ponds) Survey Report, Volume III**). Pond diversity was generally poor; small rural waterbodies characterised by livestock poaching, poor water quality and low macrophyte diversity. PSYM quality categories ranged from very poor to moderate as overall diversity was poor. One or more uncommon macrophyte species were recorded on five ponds. As such ponds are considered to have a Less than local level of conservation importance for the purposes of this impact assessment.

Species

9.6.25. The desk study and extended Phase 1 habitat surveys identified habitats suitable for the following species or species groups:

- Great crested newt;
- Bats;
- Badger;
- Barn owl;
- Breeding birds;
- Wintering birds;
- Reptiles;
- Water vole;
- Otter;
- Fish;
- Aquatic macroinvertebrates; and
- Macrophytes.

9.6.26. Species-specific surveys were completed to obtain baseline information to determine the presence, or otherwise, of protected and notable species within the Newbuild Infrastructure Boundary. Full methodologies and results of each receptor surveyed are detailed within **Appendices 9.1** to **9.10 (Volume III)** and have been summarised in Table 9.8~~**Table 9.8**~~ below. Bats (Roosting and

Foraging and Commuting) and Riparian Mammals surveys undertaken between July 2022 and September 2022 have been included within **Table 9.8.**

9.6.27. Invasive Non-Native Species were recorded incidentally throughout the suite of surveys undertaken within the Newbuild Infrastructure Boundary. Full details of INNS are provided within the **Habitats and Designated Sites Survey Report** (**Appendix 9.1, Volume III**) and the **Aquatic** (**Ponds and Watercourses) Survey Reports** (**Appendix 9.9** and **9.10, Volume III**, respectively).

9.6.28. Targeted surveys for other species not listed above were not undertaken for this assessment but were recorded where incidentally observed during other surveys. Given the broadly short term, temporary and localised nature of the DCO Proposed Development and acknowledging the distribution and abundance of suitable habitat within the surrounding landscape, general mitigation measures to safeguard wildlife, provided within **Section 9.8** and **9.10**, are considered sufficient to safeguard other species.

Table 9.8 Summary of Species Survey Results

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
Great crested newt	**Desk Study** The desk study identified 174 records of GCN in England, and 810 in Wales during the last 10 years. The closest record was located 84 m southeast of the Newbuild Infrastructure Boundary. A total of 220 waterbodies were identified within 250 m of the Newbuild Infrastructure Boundary. These were identified from aerial imagery, OS Mapping and during Phase 1 Habitat Surveys. An additional two waterbodies were identified outside the Survey Area and scoped into the assessment. **Field Survey** Habitat Suitability Index (HSI) assessments have been carried out on 147 of waterbodies and ranged from Poor to Excellent. eDNA surveys were completed on 11 waterbodies in 2021 with two returning as positive for the presence of GCN. Presence / likely absence surveys of 56 waterbodies were completed. Sixteen waterbodies were subject to a population size class assessment. Fourteen waterbodies were found to have a small population of GCN (of which 5 are within England and 9 in Wales), and two waterbodies (both in Wales) contained a medium GCN population. In total, GCN presence has been confirmed within 17 waterbodies: 6 waterbodies in England and 11 waterbodies in Wales. Where ponds were not able to be surveyed for a minimum of 4 visits, due to access restrictions, in Wales or in the England Red Risk Zone, the likely presence of GCN was assessed using a precautionary approach. Eleven waterbodies were precautionarily assessed as having GCN presence. This was applicable to 5 waterbodies in England and 6 in Wales.	GCN are afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). GCN are also afforded additional consideration under the NERC Act (**Ref. 9.5**) GCN presence was recorded within 11 ponds in Wales and 6 ponds within the red risk zone in England. A further 11 waterbodies were precautionarily assessed as having GCN presence (5 waterbodies in England and 6 in Wales). Given the proximity of Chester Zoo Ponds LWS and the Deeside and Buckley Newt SAC to the Newbuild Infrastructure Boundary the potential for GCN to use habitats within the Newbuild Infrastructure Boundary as functionally linked habitat has been considered. The valuation has taken into account the presence of international designated sites, the presence of suitable habitat within the Newbuild Infrastructure boundary and within the wider landscape and the consideration of GCN movement through the landscape.	National	**Appendix 9.2 - Great Crested Newt Survey Report (Volume III) (Revision B)**
Bats – Roosting	**Desk Study** The desk study returned 192 records of bats in England, of which eight records pertained to confirmed bat roosts during the last 10 years, the closest being 590 m southeast of the Newbuild Infrastructure Boundary and pertained to a soprano pipistrelle *Pipistrellus pygmaeus* roost, however, the roost type is unknown. In Wales, 163 records were returned, of which 18 records pertained to confirmed bat roosts during the last 10 years, the	All bat species in the UK are principally afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). Certain bat species are also afforded additional consideration under the NERC Act (**Ref. 9.5**).	Common pipistrelle – Local Soprano pipistrelle – Local Noctule – Local Brown long-eared bat – Local	**Appendix 9.3 – Bat Activity Survey Report (Volume III) (Revision C)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	closest roost record was 80 m east of the Newbuild Infrastructure Boundary and pertained to a day roost of two common pipistrelles a single soprano pipistrelle and a single lesser horseshoe bat *Rhinolophus hipposideros*. **Field Survey** Preliminary Bat Roost Assessment (PBRA) surveys identified trees and structures with suitability to support roosting bats by virtue of the features present within the Newbuild Infrastructure Boundary. Those identified with potential to support roosting bats were subject to further assessment through either aerial tree climb inspections, dusk emergence and/or dawn re-entry surveys, or a combination of the two methods, appropriate to the level of potential determined during the PBRA survey. A total of 90 structures were identified within the Newbuild Infrastructure Boundary, of which 79 recorded as Negligible, 6 with Low suitability, four with Moderate suitability and one with high suitability. Additionally, a total of 427 trees were identified within the Newbuild Infrastructure Boundary, of which 202 were of Low suitability, 192 of Moderate suitability and 33 of high suitability. Of those, 86 trees were subjected to aerial tree climb inspection surveys, with updated suitability as follows: - 234 trees with Low suitability; - 140 trees with Moderate suitability; - 31 trees with High suitability Twenty confirmed roosts have been recorded to date through further surveys, comprising: - B97 (single common pipistrelle Pipistrellus pipistrellus day roost) - B113 (single common pipistrelle day roost). - B133 (Four common pipistrelles and three soprano pipistrelles day roost) - Seventeen tree roosts comprising; o T1 (single common pipistrelle potential day roost); o T49 (single soprano pipistrelle day roost); o T70 (single soprano pipistrelle day roost);	As per the Bat Conservation Trust (BCT) Species Factsheet (**Ref. 9.53**), common pipistrelle are Britain's commonest bat species, being widely distributed across the UK. The population of common pipistrelle are considered to have increased from baseline levels in 1999 (**Ref. 9.54**) across the UK. Wray et al (**Ref. 9.50**) classify common pipistrelle as common in both England and Wales with roosts attributed a local valuation. Soprano pipistrelle are widely distributed across the UK and alongside the common pipistrelle are considered one of Britain's commonest species, with the population stable within the UK (**Ref. 9.55**). Wray et al (**Ref. 9.50**) classify soprano pipistrelle as common in both England and Wales with roosts attributed a local valuation. Noctule are considered relatively common and widespread across England and Wales (**Ref. 9.56**) with the population considered to be stable with the UK (**Ref. 9.54**). Wray et al (Ref. 9.50) classify noctule as rarer in England and rarest in Wales with roosts attributed a regional valuation. Brown long-eared bat are considered common and widespread across England and Wales (**Ref. 9.57**) with the population considered to be stable within England and to have increased in Wales (**Ref. 9.54**). Wray et al (**Ref. 9.50**) classify brown long-eared bat as common	Myotis species. - Local	

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	○ T111 (single common pipistrelle and single Myotis sp. day roost); ○ T159 (single soprano pipistrelle day roost); ○ T190 (single common pipistrelle day roost); ○ T200 (single soprano pipistrelle day roost); ○ T220 (single common pipistrelle day roost); ○ T234 (single soprano pipistrelle day roost); ○ T238 (two soprano pipistrelle's day roost); ○ T283 (single common pipistrelle day roost); ○ T321 (noctule Nyctulus noctula maternity roost). ○ T325 (potential brown long-eared Plecotus auritus bat day roost along the tree line associated with T325, T326 and T327); ○ T326 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327); ○ T327 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327); ○ T365 (single common pipistrelle day roost); ○ T371 (single common pipistrelle day roost); Where structures and trees were not subjected to a full suite of dusk emergence and dawn re-entry surveys, due to access restrictions, the likely presence of a bat roost was assumed using a precautionary approach. Five structures and 35 trees were precautionarily assessed as a bat roost, comprising; - B79, B80, B125, B126, and B127; and - T4, T11, T13, T16, T17, T18, T25, T26, T27, T28, T34, T36, T37, T165, T230, T265, T349, T376, T377, T419, T422 – T431, T435, T491, T495, T496 and T499. Taking into consideration the known species and roost types identified across the DCO Proposed Development, inferences can be made on the likelihood of a similar mix of species and roost types likely found within the 35 trees and 5 buildings assessed precautionarily to contain a roost. These would primarily comprise day roosts of common species such as common pipistrelle and soprano pipistrelle, with the potential occurrence of a single maternity roost of a common species. Consideration is given to the likelihood of an Annex II species	in England and rarer in Wales with roosts attributed valuations of local and regional, respectively. *Myotis species* (Daubenton's bat *Myotis daubentonii,* Brandt's bat *Myotis brandtii*, whiskered bat *Myotis mystacinus*, Natterer's bat *Myotis nattereri*) are widespread across England and Wales with populations considered to be stable across both England and Wales for Daubenton's bat, whiskered bat and Brandt's bat. The Natterer's bat population is considered to have increased in both England and Wales since 1999 (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify *Myotis* species as rarer in England and Wales and a value of County is attributed to Myotis species roosts in England and Wales. However, given the landscape contains a myriad of suitable potential roosting locations, in the form of trees and buildings across the landscape, suitable roosting provision is available. On this basis, a valuation of Local is attributed to *Myotis sp*. A number of bat roosts have been identified within the Newbuild Infrastructure Boundary, primarily associated with roosts comprising small numbers of common bat species, but also including the presence of a noctule maternity roost. Roosts of common species (pipistrelle species and brown long-eared bat) are of a Local value, and maternity roosts of noctule species are categorised as		

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	significant roost within structures; however, no building was identified with potential roosting features suitable for Annex II species such as lesser horseshoe bats.	Regional value according to Wray *et al* (**Ref. 9.50**). The extent of features identified with suitability to support roosting bats across the Newbuild Infrastructure Boundary has also been taken into account as part of each species valuation. Given the common and widespread occurrence of noctule within the Newbuild Infrastructure Boundary it is considered appropriate to attribute noctule a value of Local. As the wider landscape contains habitats of similar type and quality, it is anticipated that an extensive range of features suitable to support roosting bats is present within the wider landscape beyond the Newbuild Infrastructure Boundary. Similarly, whilst brown long-eared bats are attributed Regional value within Wray, given the abundance of potential roost opportunities within the wider landscape a value of Local is considered proportionate.		
Bats – Foraging and Commuting	As part of the novel methodology (**paragraph 9.5.10**) to assess impacts to hedgerows and movement of bats, hedgerows were initially assessed and categorised as either 'Poor', 'Good' or 'Excellent'. Eighty-two 'Poor', 250 'Good' and 23 'Excellent' hedgerows were initially recorded. Hedgerows were subsequently individually assessed and, where appropriate, grouped in advance of static detector monitoring and/or activity survey assessment in the form of crossing point surveys, utilising a variation on the Defra landscape scale survey method ('Modified Defra Local Scale surveys') (**Ref. 9.58**)). Static bat detectors were located on 'Good' and 'Excellent' hedgerows to collect recordings of bat echolocation calls and help identify bat activity levels along each hedgerow. Both commuting and foraging activity has been recorded for the following species: serotine *Eptesicus serotinus*; common pipistrelle; soprano	All bat species in the UK are principally afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). Certain bat species are also afforded additional consideration under the NERC Act (**Ref. 9.5**). As per the Bat Conservation Trust (BCT) Species Factsheet (**Ref. 9.53**), common pipistrelle are Britain's commonest bat species, being widely distributed across the UK. The population of common pipistrelle are considered to have increased from baseline levels in	Common pipistrelle – Local Soprano pipistrelle – Local Brown long-eared bat – Local Myotis species - Local Lesser horseshoe bat - Local	**Appendix 9.3 – Bat Activity Survey Report (Volume III) (Revision C)** **Appendix 9.4 – Bat & Hedgerow Assessment (Volume III) (Revision C)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	pipistrelle; Nathusius' pipistrelle *Pipistrellus nathusii*; noctule; Leisler's bat *Nyctalus leisleri*; Myotis sp.; brown long-eared bat; and lesser horseshoe bat. All statics with Annex II species lesser horseshoe bat activity levels were subject to interval analysis. Once assessed, activity levels at a total of 27 hedgerows/hedgerow groups were within the upper bounds of the data during the static detector monitoring. These hedgerows remained at, or were upgraded to, Excellent categorisation. The data from the remaining static bat detectors was compared against parameters to determine whether the initial hedgerow category should be upgraded or downgraded. These parameters were based on the presence and numbers of Annex II species, presence and numbers of 'sensitive' species (*Myotis sp*. and brown long-eared bat), and total numbers of bats recorded at each hedgerow. The parameters are defined in detail within **Appendix 9.4**. As a result, the final numbers in each category are as follows: 102 Poor hedgerows, 144 Good hedgerows and 45 Excellent hedgerows. High flying, aerial hawking species and/or those that prefer more open habitats, such as noctule, Leisler's bat, serotine and Nathusius' pipistrelle, were considered within species groups given the regularity at which they will cross open habitats (i.e., they are less reliant on linear features) and the small numbers (an average of less than one pass per night across all seasons) recorded during the static monitoring assessment. These groups were *Nyctalus sp* (noctule, Leisler's bat, and unidentified *Nyctalus sp.*); NSL (serotine and unidentified NSL (noctule, Leisler's bat, or serotine)), and *Pipistrellus sp* (Nathusius' pipistrelle and unidentified *Pipistrellus sp.*). Following the static monitoring assessment, hedgerows with a final category of 'Excellent' were subject to activity survey assessments, in the form of Modified Defra Local Scale surveys. Surveys have been completed on 32 of the 45 'Excellent' hedgerows, 10 of which met the existing Defra thresholds (10 or more commuting bat passes of a single species or genus; or one commuting bat pass for Annex II species). A precautionary approach has been taken in determining hedgerows which are Important Foraging and Commuting Routes (Important FCRs) (Important FCRs are classified as those with bat activity levels considered key for the conservation of the species recorded and that are retained as, or categorisation increased to, 'Excellent' as detailed within **Bat and Hedgerows**	1999 (**Ref. 9.54**) across the UK. Wray et al (**Ref. 9.50**) classify common pipistrelle as common. In the context of commuting routes, common pipistrelle in England and Wales are attributed a valuation of Local. Soprano pipistrelle are widely distributed across the UK and alongside the common pipistrelle are considered one of Britain's commonest species, with the population stable within the UK (**Ref. 9.54**). Wray et al (**Ref. 9.50**) classify soprano pipistrelle as common. In the context of commuting routes, soprano pipistrelle in England and Wales are attributed a valuation of Local. Brown long-eared bat are considered common and widespread across England and Wales (**Ref. 9.57**) with the population considered to be stable within England and to have increased in Wales (**Ref. 9.54**). Wray et al (**Ref. 9.50**) classify brown long-eared bat as common in England and rarer in Wales. In the context of commuting routes, brown long-eared bats are valued as Local and County, respectively. Myotis species (Daubenton's bat *Myotis daubentonii*, Brandt's bat *Myotis brandtii*, whiskered bat *Myotis mystacinus*, Natterer's bat *Myotis nattereri*) are widespread across England and Wales with populations considered to be stable across both England and Wales for Daubenton's bat, whiskered bat and Brandt's bat.		

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	Assessment, Appendix 9.4; **Volume III**) for bat foraging and commuting. As such, the 10 hedgerows which have met the existing Defra thresholds, plus the remaining 13 Excellent hedgerows which were unable to be surveyed are currently precautionarily assessed Important FCRs.	The Natterer's bat population is considered to have increased in both England and Wales since 1999 (**Ref. 9.54**). Wray et al (**Ref. 9.50**) classify *Myotis* species as rarer in England and Wales. In the context of commuting routes, a value of County is attributed to *Myotis* species in England and Wales. Lesser horseshoe bats are considered rare in the British Isles (**Ref. 9.59**), however, the populations in both England and Wales are considered to have increased since 1999 (Ref. 9.54). Wray *et al* (**Ref. 9.50**) classify lesser horseshoe bats as rarer in England and Wales. In the context of commuting routes, a value of County is attributed to lesser horseshoe in England and Wales. Despite the values quoted above, the landscape contains a myriad of linear features, and in particular hedgerows, that provide ample flightline and commuting corridors. On this basis, a valuation of Local is attributed to all species.		
Badger	**Desk Study** The desk study identified 464 records of badger. Of these, 79 were in England, and 385 were recorded within Wales. Fifteen records within England related to badger sett locations and 17 records were road collision casualties. In Wales, 35 records pertained to badger sett locations and 22 were road collision casualties. The remaining records were largely field signs and tracks. A total of eight records are within 100 m of the Newbuild Infrastructure Boundary and comprise two badger setts, three records of signs of badgers, and three roadkill events. Four records were within the Newbuild Infrastructure Boundary and	Badger and their setts are afforded protection within the UK under the Protection of Badgers Act 1992 (**Ref. 9.6**) and the WCA (**Ref. 9.2**). However, badger are not identified as a priority species. The valuation has taken into account presence of setts located across the Newbuild Infrastructure Boundary and the propensity for badger to move throughout a landscape. The surrounding landscape connected to the	Local	**Appendix 9.5 - Badger Survey Report (Volume III) (Revision B) (Confidential)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	comprised two badger setts, a single sign of badger and a single roadkill event. **Field Survey** Thirty-eight setts (S1-S38) have been recorded within the Newbuild Infrastructure Boundary. Given the sensitivity and confidentiality afforded to this species, specific information (including the location of the badger setts) is not defined here but is presented in **Appendix 9.5 - Badger Survey Report (Revision B) (Confidential) (Volume III).** These setts comprise 7 Main setts, 1 Annex sett, 7 Subsidiary setts and 23 outlier setts. All Main and Annex setts were recorded as Well-used, with Outlier and Subsidiary recorded as either well-used, partially used, or disused setts. Camera trap deployment confirmed presence of badger and active setts at S13, S29 and S31.	Newbuild Infrastructure Boundary includes extensive habitat with potential for badger sett creation and foraging.		
Riparian Mammals (Otter and water vole)	**Desk Study** The desk study identified 10 records of otter in England and one in Wales. The closest records were of spraints located along the River Gowy in 2012, approximately 619 m east of the Newbuild Infrastructure Boundary. In Wales, the single record pertained to a spraint 938 m north of the Newbuild Infrastructure Boundary at Pandy Lake Brook. The desk study identified three records of water vole in England and four in Wales. The closest record was located at Chester Zoo in 2014, approximately 731 m south of the Newbuild Infrastructure Boundary, relating to burrows and sightings of 17 water voles. In Wales, the closest record was of feeding remains and latrines 1.2 km south of the Newbuild Infrastructure Boundary at Broughton Brook where it runs through Hawarden Business Park. **Field Survey** Of the 61 watercourses surveyed, 50 watercourses have been identified with suitability to support otter and/or water vole, for either commuting, foraging and/or burrowing/resting. Eleven watercourses were determined to be unsuitable for supporting either otter or water vole and were scoped out of further surveys and assessments. Surveys identified signs of otter activity along eight individual watercourses (Thornton Uplands, Thornton Ditches 4 and 6, Gowy Tributary 2, Shropshire Union Canal, Alltami Brook, Wepre	Otter are afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). Water vole are afforded protection under the WCA (**Ref. 9.2**). Otter and Water vole are additionally listed as a SPI under the NERC Act (**Ref. 9.5**). Evidence of otter activity has been recorded on eight individual watercourses across the Newbuild Infrastructure Boundary and, given their propensity to move throughout a landscape, their presence is considered likely throughout appropriate habitat across the Newbuild Infrastructure Boundary. Evidence of water vole was recorded in select locations across the Newbuild Infrastructure Boundary, primarily within England, comprising signs of activity and burrows. The challenges faced by water vole in terms of geographic distribution and conservation status have been	Otter – Local Water Vole - County	**Appendix 9.6 - Riparian Mammal Survey Report (Volume III) (Revision C)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	Brook (sections A and B) and Northop Brook), consisting of footprints, spraints and/or possible laying-up sites. Signs of water vole, comprising burrows and activity signs such as latrines and feeding stations, were recorded along 13 watercourses (West Central Drain A and B, Hapsford Brook, River Gowy, Thornton Diches 4, 5a, 5b, 6, 7a, 7b and 8, Thornton Main Drain, and Gowy Tributary 2). In the absence of a second survey visit (due to access restrictions), a precautionary assessment has been applied with presence of otter and water vole assumed. These watercourses comprise East and West Central Drains and Elton Land Ditches, Gale Brook, Stanney Main Drain and Stanney Mill Brook, and Alltami Brook.	taken into account as part of this valuation, particularly in the knowledge of mink presence within the landscape.		
Barn Owl	**Desk Study** The desk study identified seven records of barn owl in England and 37 in Wales. The closest of these records was within Wales in 2011, approximately 19 m from the Newbuild Infrastructure Boundary. The closest record in England was 69 m from the Newbuild Infrastructure Boundary. **Field Survey** A number of features (trees and structures) have been identified with suitability to be used by roosting and/or nesting barn owl across the Newbuild Infrastructure Boundary. These comprise 13 trees and 3 barn owl boxes. Access limitations (as detailed within **Appendix 9.7 Barn Owl Survey Report (Confidential) (Revision B) (Volume III)** prohibited further surveys of three trees. Aerial tree climbed inspections and Vantage Point surveys have been undertaken to determine use or otherwise by barn owl. During the aerial tree climb inspections four features were scoped out for further surveys. Vantage Point surveys were completed on 10 features (8 trees and 2 barn owl boxes). Three features were found to contain evidence of barn owl. Barn owl evidence of a temporary rest site was recorded at T472 (SJ35006 66638). Barn owl were recorded nesting within; - BOB3 (SJ35043 66642); and - T465 (SJ 41653 71153) Where a feature was not subjected to a full suite of vantage point surveys, due to access restrictions, the likely presence of a nest	Barn owl are protected under Schedule 1 of the WCA (**Ref. 9.2**) which affords them protected against disturbance whilst nesting. Confirmed nest locations have been recorded within the Newbuild Infrastructure Boundary alongside a single potential roost site. The Newbuild Infrastructure Boundary encompasses a small proportion of the overall available foraging, roosting and nesting resource available to barn owl in the wider landscape.	County	**Appendix 9.7 - Barn Owl Survey Report (Confidential) (Volume III) (Revision B)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	site was assumed using a precautionary approach. This applies to: - T471 (SJ2642467608)			
Breeding Birds	**Desk Study** Records of 145 species of breeding bird were returned in England including: 10 Local Biodiversity Action Plan (LBAP) and 21 WCA Schedule 1 (Sch1) species. Records of 197 species of breeding birds were returned in Wales including: 118 LABP and 38 WCA Sch1 species. **Field Survey** Breeding bird surveys were undertaken in 2021, recording over 106 bird species. Species have included Schedule 1 listed birds including marsh harrier *Circus aeruginosus* and black-tailed godwit *Limosa limosa*, as well as Birds of Conservation Concern red listed species including: grey patridge *Perdix perdix* and skylark *Alauda arvensis*; and amber listed species, (for example willow warbler *Phylloscopus trochilus* and kestrel *Falco tinnunculus*.	A variety of bird species listed as LBAP (**Ref. 9.18**) and/or Schedule 1 WCA (**Ref. 9.2**) were recorded during surveys. The abundance of similar habitats with suitability to support breeding bird species beyond the Newbuild Infrastructure Boundary, has been taken into account when determining an importance value.	Local	**Appendix 9.8 - Bird Survey Report (Volume III) (Revision B)**
Wintering Birds	**Desk Study** Records of 145 species of wintering bird were returned in England, including: 10 LBAP and 21 W&CA Sch1 species. Records of 197 species of wintering birds were returned in Wales, including: 118 LBAP and 38 W&CA Sch1 species. **Field Survey** Wintering bird surveys were completed during the winters of 2020/2021 and 2021/2022. Over 105 bird species have been recorded. Species have included Schedule 1 listed birds including peregrine *Falco peregrinus* and black-tailed godwit, as well as Birds of Conservation Concern red listed species including: lapwing *Vanellus vanellus* and yellowhammer *Emberiza citronella*, and amber listed species, for example, redshank *Tringa totanus* and oystercatcher *Haematopus ostralegus*.	A variety of bird species listed as LBAP (**Ref. 9.18**) and/or Schedule 1 WCA (**Ref. 9.2**) were recorded during surveys. Species listed within citations of the Mersey Estuary SPA were recorded along the River Dee in small numbers. Redshank were recorded using the mudflats exposed by low tide along the River Dee in numbers greater than the 1% of citation population for the SPA, only during the winter months and were not recorded regularly on any other survey transect throughout the year. The abundance of similar habitats with suitability to support wintering bird species, including redshank, beyond the Newbuild Infrastructure Boundary, has been taken into account when determining an importance value.	Redshank – Regional All other species - Local	**Appendix 9.8 - Bird Survey Report (Volume III) (Revision B)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
Fish	**Desk Study** EA electrofishing surveys along the River Gowy extend from 1994 to 2014, and the fish community can be considered as well documented within this watercourse. EA surveys within 2 km of the Newbuild Infrastructure Boundary were only conducted in 2014, however, results confirmed presence of European eel *Anguilla anguilla*, a species of conservation concern, as well as European bullhead *Cottus gobio*, gudgeon *Gobio gobio*, stone loach *Barbatula barbatula*, perch *Perca fluviatilis*, roach *Rutilus rutilus* and flounder *Platichthys flesus*. Consultation with NRW and EA identified seven fish species of conservation interest including European eel *Anguilla anguilla*, brown/sea trout *Salmo trutta*, Atlantic salmon *Salmo salar*, river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus*, smelt *Osmerus eperlanus*, and European bullhead *Cottus gobio*. Fish species of conservation interest were identified at 22 watercourses; Thornton Main Drain, River Gowy, Shropshire Union Canal, Seahill Drain, Sealand Main Drain, River Dee, Railway Ditch 1, Railway Ditch 2, Broughton Brook, Chester Road Brook Tributary 2, Mancot Brook, Mancot Tributary, Oakfield Ditch 1, Chester Road Drain Tributary 1, Willow Park Brook, New Inn Brook, Alltami Brook, Wepre Brook, Wepre Brook Tributary 1, Northop Brook, Northop Brook Tributary 1, and Little Lead Brook. **Field Survey** An electrofishing survey was conducted on Backford Brook within the Newbuild Infrastructure Boundary. A single species, three-spined stickleback *Gasterosteus aculeatus*, was recoded. Seine netting surveys were conducted on the River Dee. Two species of conservation interest were recorded in the seine netting surveys carried out on the River Dee. Sea trout was recorded in March 2022, whilst smelt was recorded in May 2022. Fish e-DNA surveys were carried out on 16 watercourses. The species recorded in the e-DNA surveys include three species of conservation interest, namely European eel, brown/sea trout, and smelt.	Salmon and freshwater fish are afforded protection under the Salmon and Freshwater Fisheries act 1975 (**Ref. 9.9**). Atlantic salmon, river lamprey, sea lamprey, and bullhead are afforded protection under the Habitats Regulations (**Ref. 9.1**). European eel, brown/sea trout, Atlantic salmon, river lamprey, sea lamprey, and smelt are all listed as a SPI under the NERC Act (**Ref. 9.5**). European eel are afforded further protection under the Eels (England and Wales) Regulations 2009 (**Ref. 9.10**). European eel are listed as Critically endangered under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. Fish are known to occur and/or were recorded within the Newbuild Infrastructure Boundary. As fish are mobile, their presence is considered likely throughout appropriate habitat across the Newbuild Infrastructure Boundary.	European eel – Regional Salmon – County River Lamprey – County Sea Lamprey – County Smelt – County Other species - Local	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III) (Revision B)**
Aquatic macroinvertebrates	**Desk Study** The desk study identified EA aquatic macroinvertebrate survey data for two watercourses (River Gowy and Stanney Mill Brook)	Aquatic macroinvertebrates are afforded protection under the Habitats Regulations (**Ref. 9.1**).	Local	**Appendix 9.9 - Aquatic Ecology (Watercourses)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	during the last 10 years, within 5 km of the Newbuild Infrastructure Boundary. Results from the EA aquatic macroinvertebrate survey carried out within the River Gowy, approximately 1.8 km downstream of the Newbuild Infrastructure Boundary, in June 2019, highlighted two species of local conservation importance and two regionally notable species. The species of local conservation importance, the caddisfly *Athripsodes bilineatus* and the freshwater snail *Bithynia leachii* were recorded. The regionally notable species, the caddisfly *Brachycentrus subnubilus* and pale evening mayfly *Procloeon bifidum*, were recorded. No aquatic macroinvertebrate species of conservation importance were recorded in the EA survey conducted in Stanney Mill Brook. **Field Survey** Aquatic macroinvertebrate surveys have been completed on 19 watercourses within the Newbuild Infrastructure Boundary. Benthic macroinvertebrate grab sampling was additionally conducted on the River Dee. Aquatic macroinvertebrate species of local conservation importance were recorded at four sites. Lesser water boatman *Corixa dentipes* was recorded at Seahill Drain, leech *Erpobdella testacea* was identified at Willow Park Brook, button ramshorn snail *Anisus leucostoma* was recorded at Wervin Hall Ditch Tributary, and the caddisfly *Beraeodes minutus* was recorded at Wepre Brook. The aquatic macroinvertebrate community assemblage of the River Gowy consisted of a high diversity of taxa.	The valuation has taken into account the conservation value of the aquatic macroinvertebrate species found within the desk study and field surveys, the number and connectivity of the waterbodies and watercourses across the wider landscape, the ability for species expansion across the landscape and the expected recolonisation of species following loss from an area.		**Survey Report (Volume III) (Revision B)**
Macrophytes	**Desk Study** The desk study identified historic EA macrophyte surveys on two watercourses (River Gowy and Stanney Mill Brook) during the last 10 years, within 3 km of the Newbuild Infrastructure Boundary. Survey results included the INNS Himalayan/Indian balsam as present within the River Gowy. **Field Survey** One invasive non-native macrophyte species, water fern Azolla filiculoides, was identified in three watercourses, Thornton Ditch 4, Thornton Ditch 6, and Seahill Drain, during surveys. No protected macrophyte species were recorded in the field surveys.	No macrophytes are afforded protection under the Habs Regs (**Ref. 9.1),** the NERC Act (**Ref. 9.5**), or Schedule 8 were recorded under desk study or field surveys. The valuation has taken into account the distribution and abundance of macrophytes within the Newbuild Infrastructure Boundary and their propensity to spread across a landscape where	Less than Local	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III) (Revision B)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	One species listed on the Vascular Plant Red List for England, water violet *Hottonia palustris* was noted in Thornton Ditch 6.	connected watercourses are present.		
Invasive Non-Native Species	**Desk Study** A total of 98 records of 27 individual species of invasive plant species, identified on Schedule 9 of the W&CA, were returned during the desk study. Species included Japanese knotweed *Reynoutria japonica*, Himalayan balsam *Impatiens glandulifera*, variegated yellow archangel *Lamium galeobdolon subsp. Argentatum*, Cherry laurel *Prunus laurocerasus*, Montbretia *Crocosmia × crocosmiiflora*, Floating pennywort *Hydrocotyle ranunculoides*, and New Zealand Pigmyweed *Crassula helmsii*. The closest record pertained to giant hogweed *Heracleum mantegazzianum* and was located within the Newbuild Infrastructure Boundary. A desk study of EA data identified the INNS Himalayan/Indian balsam as present within the River Gowy. Consultation with NRW identified the presence of giant hogweed, Himalayan balsam and Chinese mitten crab *Eriocheir sinensis* on the River Dee. **Field Survey** Five species of invasive non-native plants have been recorded at varying locations within the Newbuild Infrastructure Boundary. These have included giant hogweed, rhododendron *Rhodoendron ponticum*, Japanese knotweed, Himalayan balsam and variegated yellow archangel. **Aquatic Species** The e-DNA of two invasive non-native fish species sunbleak *Leucaspius* delineates and Amur bitterling *Rhodeus sericeus* were identified within the Shropshire Union Canal. The e-DNA of one invasive non-native fish species was identified at Wepre Brook, pertaining to Wels catfish *Silurus glanis*. Five invasive non-native aquatic macroinvertebrate species were identified during the ecological surveys conducted at West Central Drain, the River Gowy, Stanney Main Drain, Stanney Mill Brook, Wervin Hall Ditch Tributary, Backford Brook, Finchetts Gutter Tributary, Seahill Drain, Sealand Main Drain, Broughton Brook, Mancot Brook, Willow Park Brook, New Inn Brook, Alltami Brook, and Wepre Brook. These species were: New Zealand mud snail *Potamopyrgus antipodarum*, the flatworm *Girardia*	Invasive species listed under Schedule 9 of the WCA Act 1981 (**Ref. 9.2**) are prohibited from release into the wild and prohibits the planting or "causing to grow" in the wild of any plant species listed under Schedule 9. The valuation has taken into consideration of the potential unintentional spread of INNS, and their current distribution within the Newbuild Infrastructure Boundary.	Less than Local	**Appendix 9.1 - Habitats and Designated Sites Survey Report (Volume III) (Revision B)** **Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III) (Revision B)** **Appendix 9.10 - Aquatic Ecology (Ponds) Survey Report (Volume III) (Revision B)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	tigrina, demon shrimp *Dikerogammarus haemobaphes*, the mollusc *Physella sp*. and the amphipod *Crangonyx pseudogracilis/floridanus*. One invasive non-native macrophyte species, water fern *Azolla filiculoides*, was identified in three watercourses, Thornton Ditch 4, Thornton Ditch 6, and Seahill Drain.			

~~Receptor~~	~~Desk Study and Field Study Results Summary~~	~~Rationale for Valuation~~	~~Importance~~	~~Relevant Appendix~~
~~Great crested newt~~	~~**Desk Study**~~ ~~The desk study identified 176 records of GCN in England, and 814 in Wales during the last 10 years. The closest record was located 84 m southeast of the Newbuild Infrastructure Boundary.~~ ~~A total of 215 waterbodies were identified within 250 m of the Newbuild Infrastructure Boundary. These were identified from aerial imagery, OS Mapping and during Phase 1 Habitat Surveys. An additional two waterbodies were identified outside the Survey Area and scoped into the assessment.~~ ~~**Field Survey**~~ ~~Habitat Suitability Index (HSI) assessments have been carried out on 147 of waterbodies and ranged from Poor to Excellent.~~ ~~eDNA surveys were completed on 11 waterbodies in 2021 with two returning as positive for the presence of GCN.~~ ~~Presence / likely absence surveys of 56 waterbodies were completed.~~ ~~Sixteen waterbodies were subject to a population size class assessment. Fourteen waterbodies were found to have a small population of GCN (of which 5 are within England and 9 in Wales), and two waterbodies (both in Wales) contained a medium GCN population.~~ ~~In total, GCN presence has been confirmed within 17 waterbodies: 6 waterbodies in England and 11 waterbodies in Wales.~~ ~~Where ponds were not able to be surveyed for a minimum of 4 visits, due to access restrictions, in Wales or in the England Red Risk Zone, the likely presence of GCN was assessed using a precautionary approach. Eleven waterbodies were precautionarily assessed as having GCN presence. This was applicable to 5 waterbodies in England and 6 in Wales.~~	~~GCN are afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). GCN are also afforded additional consideration under the NERC Act (**Ref. 9.5**)~~ ~~GCN presence was recorded within 11 ponds in Wales and 6 ponds within the red risk zone in England. A further 11 waterbodies were precautionarily assessed as having GCN presence (5 waterbodies in England and 6 in Wales). Given the proximity of Chester Zoo Ponds LWS and the Deeside and Buckley Newt SAC to the Newbuild Infrastructure Boundary the potential for GCN to use habitats within the Newbuild Infrastructure Boundary as functionally linked habitat has been considered.~~ ~~The valuation has taken into account the presence of international designated sites, the presence of suitable habitat within the Newbuild Infrastructure boundary and within the wider landscape and the consideration of GCN movement through the landscape.~~	~~National~~	~~**Appendix 9.2 - Great Crested Newt Survey Report (Volume III)**~~

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
Bats – Roosting	**Desk Study** The desk study returned 131 records of bats in England, of which seven records pertained to confirmed bat roosts during the last 10 years, the closest being 590 m southeast of the Newbuild Infrastructure Boundary and pertained to a soprano pipistrelle *Pipistrellus pygmaeus* roost, however, the roost type is unknown. In Wales, 32 records were returned, of which eight records pertained to confirmed bat roosts during the last 10 years, the closest roost record was 340 m west of the Newbuild Infrastructure Boundary and pertained to a single lesser horseshoe bat *Rhinolophus hipposideros* day roost. **Field Survey** Preliminary Bat Roost Assessment (PBRA) surveys identified trees and structures with suitability to support roosting bats by virtue of the features present within the Newbuild Infrastructure Boundary. Those identified with potential to support roosting bats were subject to further assessment through either aerial tree climb inspections, dusk emergence and/or dawn re-entry surveys, or a combination of the two methods, appropriate to the level of potential determined during the PBRA survey. A total of 90 structures were identified within the Newbuild Infrastructure Boundary, of which 79 recorded as Negligible, 6 with Low suitability, four with Moderate suitability and one with high suitability. Additionally, a total of 417 trees were identified within the Newbuild Infrastructure Boundary, of which 196 were of Low suitability, 188 of Moderate suitability and 33 of high suitability. Of those, 86 trees were subjected to aerial tree climb inspection surveys, with updated suitability as follows: - 234 trees with Low suitability; - 140 trees with Moderate suitability; - 31 trees with High suitability Twenty confirmed roosts have been recorded to date through further surveys, comprising: - B97 (single common pipistrelle *Pipistrellus pipistrellus* day roost) - B113 (single common pipistrelle day roost). - B133 (Four common pipistrelles and three soprano pipistrelles day roost) - Seventeen tree roosts comprising;	All bat species in the UK are principally afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). Certain bat species are also afforded additional consideration under the NERC Act (**Ref. 9.5**). As per the Bat Conservation Trust (BCT) Species Factsheet (**Ref. 9.53**), common pipistrelle are Britain's commonest bat species, being widely distributed across the UK. The population of common pipistrelle are considered to have increased from baseline levels in 1999 (**Ref. 9.54**) across the UK. Wray *et al* (**Ref. 9.50**) classify common pipistrelle as common in both England and Wales with roosts attributed a local valuation. Soprano pipistrelle are widely distributed across the UK and alongside the common pipistrelle are considered one of Britain's commonest species, with the population stable within the UK (**Ref. 9.55**). Wray *et al* (**Ref. 9.50**) classify soprano pipistrelle as common in both England and Wales with roosts attributed a local valuation. Noctule are considered relatively common and widespread across England and Wales (**Ref. 9.56**) with the population considered to be stable with the UK (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify noctule as rarer in England and rarest in Wales with roosts attributed a regional valuation. Brown long-eared bat are considered common and widespread across England and Wales (**Ref. 9.57**) with the population considered to be stable	Common pipistrelle – Local Soprano pipistrelle – Local Noctule – Local Brown long-eared bat – Local *Myotis* species. - Local	**Appendix 9.3 – Bat Activity Survey Report (Volume III)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	○ T1 (single common pipistrelle potential day roost); ○ T49 (single soprano pipistrelle day roost); ○ T70 (single soprano pipistrelle day roost); ○ T111 (single common pipistrelle and single *Myotis sp.* day roost); ○ T159 (single soprano pipistrelle day roost); ○ T190 (single common pipistrelle day roost); ○ T200 (single soprano pipistrelle day roost); ○ T220 (single common pipistrelle day roost); ○ T234 (single soprano pipistrelle day roost); ○ T238 (two soprano pipistrelle's day roost); ○ T283 (single common pipistrelle day roost); ○ T321 (noctule *Nyctulus noctula* maternity roost). ○ T325 (potential brown long-eared *Plecotus auritus* bat day roost along the tree line associated with T325, T326 and T327); ○ T326 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327); ○ T327 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327); ○ T365 (single common pipistrelle day roost); ○ T371 (single common pipistrelle day roost); Where structures and trees were not subjected to a full suite of dusk emergence and dawn re-entry surveys, due to access restrictions, the likely presence of a bat roost was assumed using a precautionary approach. Five structures and 31 trees were precautionarily assessed as a bat roost, comprising; - B79, B80, B125, B126, and B127; and - T4, T11, T13, T16, T17, T18, T25, T26, T27, T28, T34, T36, T37, T165, T230, T265, T349, T376, T377, T419, T422 – T431 and T435. Taking into consideration the known species and roost types identified across the DCO Proposed Development, inferences can be made on the likelihood of a similar mix of species and roost types likely found within the 31 trees and 5 buildings assessed precautionarily to contain a roost. These would primarily comprise day roosts of common species such as common pipistrelle and soprano pipistrelle, with the	within England and to have increased in Wales (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify brown long-eared bat as common in England and rarer in Wales with roosts attributed valuations of local and regional, respectively. *Myotis* species (Daubenton's bat *Myotis daubentonii,* Brandt's bat *Myotis brandtii*, whiskered bat *Myotis mystacinus*, Natterer's bat *Myotis nattereri*) are widespread across England and Wales with populations considered to be stable across both England and Wales for Daubenton's bat, whiskered bat and Brandt's bat. The Natterer's bat population is considered to have increased in both England and Wales since 1999 (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify *Myotis* species as rarer in England and Wales and a value of County is attributed to *Myotis* species roosts in England and Wales. However, given the landscape contains a myriad of suitable potential roosting locations, in the form of trees and buildings across the landscape, suitable roosting provision is available. On this basis, a valuation of Local is attributed to *Myotis sp*. A number of bat roosts have been identified within the Newbuild Infrastructure Boundary, primarily associated with roosts comprising small numbers of common bat species, but also including the presence of a noctule maternity roost. Roosts of common species (pipistrelle species and brown long-eared bat) are of a Local value, and maternity roosts of noctule species are		

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	potential occurrence of a single maternity roost of a common species. Consideration is given to the likelihood of an Annex II species significant roost within structures; however, no building was identified with potential roosting features suitable for Annex II species such as lesser horseshoe bats.	categorised as Regional value according to Wray *et al* (**Ref. 9.50).** The extent of features identified with suitability to support roosting bats across the Newbuild Infrastructure Boundary has also been taken into account as part of each species valuation. Given the common and widespread occurrence of noctule within the Newbuild Infrastructure Boundary it is considered appropriate to attribute noctule a value of Local. As the wider landscape contains habitats of similar type and quality, it is anticipated that an extensive range of features suitable to support roosting bats is present within the wider landscape beyond the Newbuild Infrastructure Boundary. Similarly, whilst brown long-eared bats are attributed Regional value within Wray, given the abundance of potential roost opportunities within the wider landscape a value of Local is considered proportionate.		
Bats – Foraging and Commuting	As part of the novel methodology (**paragraph 9.5.10**) to assess impacts to hedgerows and movement of bats, hedgerows were initially assessed and categorised as either 'Poor', 'Good' or 'Excellent'. Eighty-two 'Poor', 250 'Good' and 23 'Excellent' hedgerows were initially recorded. Hedgerows were subsequently individually assessed and, where appropriate, grouped in advance of static detector monitoring and/or activity survey assessment in the form of crossing point surveys, utilising a variation on the Defra landscape scale survey method ('Modified Defra Local Scale surveys') (**Ref. 9.58**)). Static bat detectors were located on 'Good' and 'Excellent' hedgerows to collect recordings of bat echolocation calls and help identify bat activity levels along each hedgerow. Both commuting and foraging activity has been recorded for the following species: serotine *Eptesicus serotinus*; common pipistrelle; soprano pipistrelle; Nathusius' pipistrelle *Pipistrellus nathusii*; noctule; Leisler's bat *Nyctalus leisleri*; *Myotis* sp.; brown long-eared bat; and lesser horseshoe bat. All statics with Annex II species lesser horseshoe bat activity levels were subject to interval	All bat species in the UK are principally afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). Certain bat species are also afforded additional consideration under the NERC Act (**Ref. 9.5**). As per the Bat Conservation Trust (BCT) Species Factsheet (**Ref. 9.53**), common pipistrelle are Britain's commonest bat species, being widely distributed across the UK. The population of common pipistrelle are considered to have increased from baseline levels in 1999 (**Ref. 9.54**) across the UK. Wray *et al* (**Ref. 9.50**)	Common pipistrelle – Local Soprano pipistrelle – Local Brown long-eared bat – Local *Myotis* species - Local Lesser horseshoe bat - Local	**Appendix 9.3 – Bat Activity Survey Report (Volume III)** **Appendix 9.4 - Bat & Hedgerow Assessment (Volume III)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	analysis. Once assessed, activity levels at a total of 27 hedgerows/hedgerow groups were within the upper bounds of the data during the static detector monitoring. These hedgerows remained at, or were upgraded to, Excellent categorisation. The data from the remaining static bat detectors was compared against parameters to determine whether the initial hedgerow category should be upgraded or downgraded. These parameters were based on the presence and numbers of Annex II species, presence and numbers of 'sensitive' species (*Myotis* sp. and brown long-eared bat), and total numbers of bats recorded at each hedgerow. The parameters are defined in detail within **Appendix 9.4.** As a result, the final numbers in each category are as follows: 102 Poor hedgerows, 144 Good hedgerows and 45 Excellent hedgerows. High flying, aerial hawking species and/or those that prefer more open habitats, such as noctule, Leisler's bat, serotine and Nathusius' pipistrelle, were considered within species groups given the regularity at which they will cross open habitats (i.e. they are less reliant on linear features) and the small numbers (an average of less than one pass per night across all seasons) recorded during the static monitoring assessment. These groups were *Nyctalus* sp (noctule, Leisler's bat, and unidentified *Nyctalus* sp.); NSL (serotine and unidentified NSL (noctule, Leisler's bat, or serotine)), and *Pipistrellus* sp (Nathusius' pipistrelle and unidentified *Pipistrellus* sp.). Following the static monitoring assessment, hedgerows with a final category of 'Excellent' were subject to activity survey assessments, in the form of Modified Defra Local Scale surveys. Surveys have been completed on 32 of the 45 'Excellent' hedgerows, 10 of which met the existing Defra thresholds (10 or more commuting bat passes of a single species or genus; or one commuting bat pass for Annex II species). A precautionary approach has been taken in determining hedgerows which are Important Foraging and Commuting Routes (Important FCRs) (Important FCRs are classified as those with bat activity levels considered key for the conservation of the species recorded and that are retained as, or categorisation increased to, 'Excellent' as detailed within **Bat and Hedgerows Assessment, Appendix 9.4; Volume III)** for bat foraging and commuting. As such, the 10 hedgerows which have met the existing Defra thresholds, plus the remaining 13 Excellent hedgerows which were unable to be surveyed are currently precautionarily assessed Important FCRs.	classify common pipistrelle as common. In the context of commuting routes, common pipistrelle in England and Wales are attributed a valuation of Local. Soprano pipistrelle are widely distributed across the UK and alongside the common pipistrelle are considered one of Britain's commonest species, with the population stable within the UK (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify soprano pipistrelle as common. In the context of commuting routes, soprano pipistrelle in England and Wales are attributed a valuation of Local. Brown long-eared bat are considered common and widespread across England and Wales (**Ref. 9.57**) with the population considered to be stable within England and to have increased in Wales (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify brown long-eared bat as common in England and rarer in Wales. In the context of commuting routes, brown long-eared bats are valued as Local and County, respectively. *Myotis* species (Daubenton's bat *Myotis daubentonii,* Brandt's bat *Myotis brandtii*, whiskered bat *Myotis mystacinus*, Natterer's bat *Myotis nattereri*) are widespread across England and Wales with populations considered to be stable across both England and Wales for Daubenton's bat, whiskered bat and Brandt's bat. The Natterer's bat population is considered to have increased in both England and Wales since 1999 (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify *Myotis* species as rarer in England		

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
		and Wales. In the context of commuting routes, a value of County is attributed to *Myotis* species in England and Wales. Lesser horseshoe bats are considered rare in the British Isles (**Ref. 9.59**), however, the populations in both England and Wales are considered to have increased since 1999 (**Ref. 9.54**). Wray *et al* (**Ref. 9.50**) classify lesser horseshoe bats as rarer in England and Wales. In the context of commuting routes, a value of County is attributed to lesser horseshoe in England and Wales. Despite the values quoted above, the landscape contains a myriad of linear features, and in particular hedgerows, that provide ample flightline and commuting corridors. On this basis, a valuation of Local is attributed to all species.		
Badger	**Desk Study** The desk study identified 437 records of badger. Of these, 79 were in England, and 358 were recorded within Wales. Fifteen records within England related to badger sett locations and 17 records were road collision casualties. In Wales, 32 records pertained to badger sett locations and five were road collision casualties. The remaining records were largely field signs and tracks. A total of eight records are within 100 m of the Newbuild Infrastructure Boundary and comprise three badger setts, two records of signs of badgers, and three roadkill events. Three records were within the Newbuild Infrastructure Boundary and comprised a single badger sett, a single sign of badger and a single roadkill event. **Field Survey** Thirty-eight setts (S1-S38) have been recorded within the Newbuild Infrastructure Boundary. Given the sensitivity and confidentiality afforded to this species, specific information (including the location of the badger setts) is not defined here but is presented in **Appendix 9.5 - Badger Survey Report (Confidential) (Volume III)**.	Badger and their setts are afforded protection within the UK under the Protection of Badgers Act 1992 (**Ref. 9.6**) and the WCA (**Ref. 9.2**). However, badger are not identified as a priority species. The valuation has taken into account presence of setts located across the Newbuild Infrastructure Boundary and the propensity for badger to move throughout a landscape. The surrounding landscape connected to the Newbuild Infrastructure Boundary includes extensive habitat with potential for badger sett creation and foraging.	Local	**Appendix 9.5 - Badger Survey Report (Confidential) (Volume III)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	These setts comprise 7 Main setts, 1 Annex sett, 7 Subsidiary setts and 23 outlier setts. All Main and Annex setts were recorded as Well-used, with Outlier and Subsidiary recorded as either well-used, partially used, or disused setts. Camera trap deployment confirmed presence of badger and active setts at S13, S29 and S31.			
Riparian Mammals (Otter and water vole)	**Desk Study** The desk study identified 10 records of otter in England and one in Wales. The closest records were of spraints located along the River Gowy in 2012, approximately 619 m east of the Newbuild Infrastructure Boundary. In Wales, the single record pertained to a spraint 938 m north of the Newbuild Infrastructure Boundary at Pandy Lake Brook. The desk study identified three records of water vole in England and four in Wales. The closest record was located at Chester Zoo in 2014, approximately 731 m south of the Newbuild Infrastructure Boundary, relating to burrows and sightings of 17 water voles. In Wales, the closest record was of feeding remains and latrines 1.2 km south of the Newbuild Infrastructure Boundary at Broughton Brook where it runs through Hawarden Business Park. **Field Survey** Of the 61 watercourses surveyed, 50 watercourses have been identified with suitability to support otter and/or water vole, for either commuting, foraging and/or burrowing/resting. Eleven watercourses were determined to be unsuitable for supporting either otter or water vole and were scoped out of further surveys and assessments. Surveys identified signs of otter activity along eight individual watercourses (Thornton Uplands, Thornton Ditches 4 and 6, Gowy Tributary 2, Shropshire Union Canal, Alltami Brook, Wepre Brook (sections A and B) and Northop Brook), consisting of footprints, spraints and/or possible laying-up sites. Signs of water vole, comprising burrows and activity signs such as latrines and feeding stations, were recorded along 13 watercourses (West Central Drain A and B, Hapsford Brook, River Gowy, Thornton Diches 4, 5a, 5b, 6, 7a, 7b and 8, Thornton Main Drain, and Gowy Tributary 2). In the absence of a second survey visit (due to access restrictions), a precautionary assessment has been applied with presence of otter and water vole assumed. These watercourses comprise East and West Central Drains and Elton Land Ditches, Gale Brook, Stanney Main Drain and Stanney Mill Brook, and Alltami Brook.	Otter are afforded protection under the Habitats Regulations (**Ref. 9.1**) and WCA (**Ref. 9.2**). Water vole are afforded protection under the WCA (**Ref. 9.2**). Otter and Water vole are additionally listed as a SPI under the NERC Act (**Ref. 9.5**). Evidence of otter activity has been recorded on eight individual watercourses across the Newbuild Infrastructure Boundary and, given their propensity to move throughout a landscape, their presence is considered likely throughout appropriate habitat across the Newbuild Infrastructure Boundary. Evidence of water vole was recorded in select locations across the Newbuild Infrastructure Boundary, primarily within England, comprising signs of activity and burrows. The challenges faced by water vole in terms of geographic distribution and conservation status have been taken into account as part of this valuation, particularly in the knowledge of mink presence within the landscape.	Otter – Local Water Vole - County	**Appendix 9.6 - Riparian Mammal Survey Report (Volume III)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
Barn Owl	**Desk Study** The desk study identified five records of barn owl in England and 37 in Wales. The closest of these records was within Wales in 2011, approximately 19 m from the Newbuild Infrastructure Boundary. The closest record in England was 69 m from the Newbuild Infrastructure Boundary. **Field Survey** A number of features (trees and structures) have been identified with suitability to be used by roosting and/or nesting barn owl across the Newbuild Infrastructure Boundary. These comprise 13 trees and 3 barn owl boxes. Access limitations (as detailed within **Appendix 9.7 Barn Owl Survey Report (Confidential) (Volume III)** prohibited further surveys of three trees. Aerial tree climbed inspections and Vantage Point surveys have been undertaken to determine use or otherwise by barn owl. During the aerial tree climb inspections four features were scoped out for further surveys. Vantage Point surveys were completed on 10 features (8 trees and 2 barn owl boxes). Three features were found to contain evidence of barn owl. Barn owl evidence of a potential roost site was recorded at T472 (SJ35006 66638). Barn owl were recorded nesting within; - BOB3 (SJ35043 66642); and - T465 (SJ 41653 71153)	Barn owl are protected under Schedule 1 of the WCA (**Ref. 9.2**) which affords them protected against disturbance whilst nesting. Confirmed nest locations have been recorded within the Newbuild Infrastructure Boundary alongside a single potential roost site. The Newbuild Infrastructure Boundary encompasses a small proportion of the overall available foraging, roosting and nesting resource available to barn owl in the wider landscape.	County	**Appendix 9.7 - Barn Owl Survey Report (Confidential) (Volume III)**
Breeding Birds	**Desk Study** Records of 145 species of breeding bird were returned in England including: 10 Local Biodiversity Action Plan (LBAP) and 21 WCA Schedule 1 (Sch1) species. Records of 197 species of breeding birds were returned in Wales including: 118 LABP and 38 WCA Sch1 species. **Field Survey** Breeding bird surveys were undertaken in 2021, recording over 106 bird species. Species have included Schedule 1 listed birds including marsh harrier *Circus aeruginosus* and black-tailed godwit *Limosa limosa*, as well as Birds of Conservation Concern red listed species including: grey patridge *Perdix perdix* and skylark *Alauda arvensis*; and	A variety of bird species listed as LBAP (**Ref. 9.18**) and/or Schedule 1 WCA (**Ref. 9.2**) were recorded during surveys. The abundance of similar habitats with suitability to support breeding bird species beyond the Newbuild Infrastructure Boundary, has been taken into account when determining an importance value.	Local	**Appendix 9.8 - Bird Survey Report (Volume III)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	amber listed species, (for example willow warbler *Phylloscopus trochilus* and kestrel *Falco tinnunculus*.			
Wintering Birds	**Desk Study** Records of 145 species of wintering bird were returned in England, including: 10 LBAP and 21 W&CA Sch1 species. Records of 197 species of wintering birds were returned in Wales, including: 118 LBAP and 38 W&CA Sch1 species. **Field Survey** Wintering bird surveys were completed during the winters of 2020/2021 and 2021/2022. Over 105 bird species have been recorded. Species have included Schedule 1 listed birds including peregrine *Falco peregrinus* and black-tailed godwit, as well as Birds of Conservation Concern red listed species including: lapwing *Vanellus vanellus* and yellowhammer *Emberiza citronella*, and amber listed species, for example, redshank *Tringa totanus* and oystercatcher *Haematopus ostralegus*.	A variety of bird species listed as LBAP (**Ref. 9.18**) and/or Schedule 1 WCA (**Ref. 9.2**) were recorded during surveys. Species listed within citations of the Mersey Estuary SPA were recorded along the River Dee in small numbers. Redshank were recorded using the mudflats exposed by low tide along the River Dee in numbers greater than the 1% of citation population for the SPA, only during the winter months and were not recorded regularly on any other survey transect throughout the year. The abundance of similar habitats with suitability to support wintering bird species, including redshank, beyond the Newbuild Infrastructure Boundary, has been taken into account when determining an importance value.	Redshank – Regional All other species - Local	**Appendix 9.8 - Bird Survey Report (Volume III)**
Fish	**Desk Study** EA electrofishing surveys along the River Gowy extend from 1994 to 2014, and the fish community can be considered as well documented within this watercourse. EA surveys within 2 km of the Newbuild Infrastructure Boundary were only conducted in 2014, however, results confirmed presence of European eel *Anguilla anguilla*, a species of conservation concern, as well as European bullhead *Cottus gobio*, gudgeon *Gobio gobio*, stone loach *Barbatula barbatula*, perch *Perca fluviatilis*, roach *Rutilus rutilus* and flounder *Platichthys flesus*. Consultation with NRW and EA identified seven fish species of conservation interest including European eel *Anguilla anguilla*, brown/sea trout *Salmo trutta*, Atlantic salmon *Salmo salar*, river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus*, smelt *Osmerus eperlanus*, and European bullhead *Cottus gobio*. Fish species of conservation interest were identified at 22 watercourses; Thornton Main Drain, River Gowy, Shropshire Union Canal, Seahill Drain, Sealand Main Drain, River Dee, Railway Ditch 1, Railway Ditch 2, Broughton Brook, Chester Road Brook Tributary 2, Mancot Brook,	Salmon and freshwater fish are afforded protection under the Salmon and Freshwater Fisheries act 1975 (**Ref. 9.9**). Atlantic salmon, river lamprey, sea lamprey, and bullhead are afforded protection under the Habitats Regulations (**Ref. 9.1**). European eel, brown/sea trout, Atlantic salmon, river lamprey, sea lamprey, and smelt are all listed as a SPI under the NERC Act (**Ref. 9.5**). European eel are afforded further protection under the Eels (England and Wales) Regulations 2009 (**Ref. 9.10**). European eel are listed as Critically endangered under the International Union for Conservation	European eel – Regional Salmon – County River Lamprey – County Sea Lamprey – County Smelt – County Other species - Local	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	Mancot Tributary, Oakfield Ditch 1, Chester Road Drain Tributary 1, Willow Park Brook, New Inn Brook, Alltami Brook, Wepre Brook, Wepre Brook Tributary 1, Northop Brook, Northop Brook Tributary 1, and Little Lead Brook. **Field Survey** An electrofishing survey was conducted on Backford Brook within the Newbuild Infrastructure Boundary. A single species, three-spined stickleback *Gasterosteus aculeatus*, was recoded. Seine netting surveys were conducted on the River Dee. Two species of conservation interest were recorded in the seine netting surveys carried out on the River Dee. Sea trout was recorded in March 2022, whilst smelt was recorded in May 2022. Fish e-DNA surveys were carried out on 16 watercourses. The species recorded in the e-DNA surveys include three species of conservation interest, namely European eel, brown/sea trout, and smelt.	of Nature (IUCN) Red List of Threatened Species. Fish are known to occur and/or were recorded within the Newbuild Infrastructure Boundary. As fish are mobile, their presence is considered likely throughout appropriate habitat across the Newbuild Infrastructure Boundary.		
Aquatic macroinvertebrates	**Desk Study** The desk study identified EA aquatic macroinvertebrate survey data for two watercourses (River Gowy and Stanney Mill Brook) during the last 10 years, within 5 km of the Newbuild Infrastructure Boundary. Results from the EA aquatic macroinvertebrate survey carried out within the River Gowy, approximately 1.8 km downstream of the Newbuild Infrastructure Boundary, in June 2019, highlighted two species of local conservation importance and two regionally notable species. The species of local conservation importance, the caddisfly *Athripsodes bilineatus* and the freshwater snail *Bithynia leachii* were recorded. The regionally notable species, the caddisfly *Brachycentrus subnubilus* and pale evening mayfly *Procloeon bifidum*, were recorded. No aquatic macroinvertebrate species of conservation importance were recorded in the EA survey conducted in Stanney Mill Brook. **Field Survey** Aquatic macroinvertebrate surveys have been completed on 19 watercourses within the Newbuild Infrastructure Boundary. Benthic macroinvertebrate grab sampling was additionally conducted on the River Dee. Aquatic macroinvertebrate species of local conservation importance were recorded at four sites. Lesser water boatman *Corixa dentipes* was recorded at Seahill Drain, leech *Erpobdella testacea* was identified at Willow Park Brook, button ramshorn snail *Anisus leucostoma* was	Aquatic macroinvertebrates are afforded protection under the Habitats Regulations (**Ref. 9.1**). The valuation has taken into account the conservation value of the aquatic macroinvertebrate species found within the desk study and field surveys, the number and connectivity of the waterbodies and watercourses across the wider landscape, the ability for species expansion across the landscape and the expected recolonisation of species following loss from an area.	Local	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report, Volume III**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	recorded at Wervin Hall Ditch Tributary, and the caddisfly *Beraeodes minutus* was recorded at Wepre Brook. The aquatic macroinvertebrate community assemblage of the River Gowy consisted of a high diversity of taxa.			
Macrophytes	**Desk Study** The desk study identified historic EA macrophyte surveys on two watercourses (River Gowy and Stanney Mill Brook) during the last 10 years, within 3 km of the Newbuild Infrastructure Boundary. Survey results included the INNS Himalayan/Indian balsam as present within the River Gowy. **Field Survey** One invasive non-native macrophyte species, water fern *Azolla filiculoides*, was identified in three watercourses, Thornton Ditch 4, Thornton Ditch 6, and Seahill Drain, during surveys. No protected macrophyte species were recorded in the field surveys. One species listed on the Vascular Plant Red List for England, water violet *Hottonia palustris* was noted in Thornton Ditch 6.	No macrophytes are afforded protection under the Habs Regs (**Ref. 9.1**), the NERC Act (**Ref. 9.5**), or Schedule 8 were recorded under desk study or field surveys. The valuation has taken into account the distribution and abundance of macrophytes within the Newbuild Infrastructure Boundary and their propensity to spread across a landscape where connected watercourses are present.	Less than Local	**Appendix 9.9 - Aquatic Ecology (Watercourses) Survey Report (Volume III)**
Invasive Non-Native Species	**Desk Study** A total of 173 records of 33 individual species of invasive plant species, identified on Schedule 9 of the W&CA, were returned during the desk study. Species included Japanese knotweed *Reynoutria japonica*, Himalayan balsam *Impatiens glandulifera*, variegated yellow archangel *Lamium galeobdolon subsp. Argentatum*, Cherry laurel *Prunus laurocerasus*, Montbretia *Crocosmia × crocosmiiflora*, Floating pennywort *Hydrocotyle ranunculoides*, and New Zealand Pigmyweed *Crassula helmsii*. The closest record pertained to giant hogweed *Heracleum mantegazzianum* and was located within the Newbuild Infrastructure Boundary. A desk study of EA data identified the INNS Himalayan/Indian balsam as present within the River Gowy. Consultation with NRW identified the presence of giant hogweed, Himalayan balsam and Chinese mitten crab *Eriocheir sinensis* on the River Dee. **Field Survey** Five species of invasive non-native plants have been recorded at varying locations within the Newbuild Infrastructure Boundary. These have included giant hogweed, rhododendron *Rhodoendron ponticum*, Japanese knotweed, Himalayan balsam and variegated yellow archangel.	Invasive species listed under Schedule 9 of the WCA Act 1981 (**Ref. 9.2**) are prohibited from release into the wild and prohibits the planting or "causing to grow" in the wild of any plant species listed under Schedule 9. The valuation has taken into consideration of the potential unintentional spread of INNS, and their current distribution within the Newbuild Infrastructure Boundary.	Less than Local	**Appendix 9.1 - Habitats and Designated Sites Survey Report (Volume III)** **Appendix 9.9 - Aquatic Ecology (Watercourses) Survey report (Volume III)** **Appendix 9.10 - Aquatic Ecology (Ponds) Survey Report (Volume III)**

Receptor	Desk Study and Field Study Results Summary	Rationale for Valuation	Importance	Relevant Appendix
	Aquatic Species The e-DNA of two invasive non-native fish species sunbleak *Leucaspius delineates* and Amur bitterling *Rhodeus sericeus* were identified within the Shropshire Union Canal. The e-DNA of one invasive non-native fish species was identified at Wepre Brook, pertaining to Wels catfish *Silurus glanis*. Five invasive non-native aquatic macroinvertebrate species were identified during the ecological surveys conducted at West Central Drain, the River Gowy, Stanney Main Drain, Stanney Mill Brook, Wervin Hall Ditch Tributary, Backford Brook, Finchetts Gutter Tributary, Seahill Drain, Sealand Main Drain, Broughton Brook, Mancot Brook, Willow Park Brook, New Inn Brook, Alltami Brook, and Wepre Brook. These species were: New Zealand mud snail *Potamopyrgus antipodarum*, the flatworm *Girardia tigrina*, demon shrimp *Dikerogammarus haemobaphes*, the mollusc *Physella sp.* and the amphipod *Crangonyx pseudogracilis/floridanus*. One invasive non-native macrophyte species, water fern *Azolla filiculoides*, was identified in three watercourses, Thornton Ditch 4, Thornton Ditch 6, and Seahill Drain.			

FUTURE BASELINE

9.6.29. In the event the DCO Proposed Development does not proceed, it is considered likely that habitats within the Newbuild Infrastructure Boundary would remain similar to that of the current baseline. The current land use is predominately agricultural, with a combination of arable and grazing pastures, thus it is considered that ecological conditions would be unlikely to significantly change in the absence of the DCO Proposed Development. Where agricultural management practices cease or lapse over time, natural succession would be expected.

9.6.30. Although species abundance and distribution within the Newbuild Infrastructure Boundary may naturally fluctuate, in the absence of the DCO Proposed Development it is assessed there would be no significant changes to species or habitat status aside from natural succession of habitats and natural increases and decreases in species populations and geographical extent.

9.6.31. Anthropogenic influences and future development would be anticipated within the footprint of the Newbuild Infrastructure Boundary given the presence, and likely continued expansion, of urban and suburban areas. Such developments, alone or in combination, are likely to have an effect on habitat and species distribution and number within the landscape.

9.7. SENSITIVE RECEPTORS

9.7.1. The following Sensitive Receptors have been assessed and are displayed in Table 9.9~~Table 9.9~~ below.

Table 9.9 Sensitive Receptors

Value / Sensitivity of Receptors	Receptors
Major	Statutory Designated Sites
Moderate	Non - Statutory Designated Sites
	Habitats of Conservation Importance (e.g., Priority Habitats incl. hedgerows and Ancient Woodland)
	Watercourses and Waterbodies
	Great Crested Newt
	Bats

Value / Sensitivity of Receptors	Receptors
	Badger
	Barn Owl
	Riparian Mammals (Otter and Water vole)
Minor	Wintering Birds
	Breeding Birds
	Aquatic macroinvertebrates
	Macrophytes
Negligible	Reptiles
	Other Mammals, including brown hare and hedgehog
	Ponds
	Invasive Non-Native Species (INNS)
Moderate to Major (depending on species)	Watercourse habitat
Minor to Major (depending on species)	Fish

9.7.2. In addition to the above, although INNS are not considered to be 'important' as such in a biodiversity context, INNS also require specific consideration during construction to ensure that INNS are not spread as a result of the DCO Proposed Development. INNS found within the Newbuild Infrastructure Boundary are detailed above within Table 9.8~~Table 9.8~~ and **Appendix 9.1 and 9.10 (Volume III).**

9.8. DESIGN DEVELOPMENT, IMPACT AVOIDANCE, AND EMBEDDED MITIGATION

9.8.1. Table 9.10~~Table 9.10~~ presents measures that have been embedded into the Preliminary Design of the DCO Proposed Development. These include a suite of measures to provide preliminary avoidance of important ecological features alongside mitigation to ameliorate impacts resulting from the DCO Proposed Development at the Preliminary Design stage.

Table 9.10 Embedded Mitigation Designed for the DCO Proposed Development

Receptor/Location	Reference	Description
Statutory and Non-Statutory Designated Sites & Aquatic Receptors	D-BD-007	The Preliminary Design of the DCO Proposed Development has avoided sites and habitats subject to nature conservation designations where possible. Where significant crossings are required, such as the River Dee SAC, Gowy Meadows and Ditches LWS and Shropshire Union Canal LWS, trenchless installation techniques will be employed preventing the need for open-cut construction methods. Through use of trenchless installation techniques, impacts arising from construction upon habitats and species associated with designated sites will be avoided and reduced. This includes minimising, as far as is reasonably practicable, the loss of mature trees – in particular around the Shropshire Union Canal (noting this is also a Conservation Area).
Ancient Woodland	D-BD-008	Where possible, Ancient Woodland has been excluded from the Newbuild Infrastructure Boundary. The Preliminary Design of the DCO Proposed Development has included use of trenchless installation techniques to avoid and reduce adverse effects on Ancient Woodland present within the Newbuild Infrastructure Boundary. This has been implemented in Northop Hall, where Ancient Woodland spans the entire width of the Newbuild Infrastructure Boundary.
Terrestrial Habitats	D-BD-009	Micro-siting techniques will be employed throughout the Detailed Design of the DCO Proposed Development, including during pre-construction and construction to avoid waterbodies, sensitive habitats, trees (including ancient and veteran trees and trees covered by Tree Preservation Orders and trees within Conservation Areas), hedgerows, etc., as much as practicably possible. Where opportunities exist for routing through existing gaps in hedgerows, scrub and woodlands, avoiding the need to remove vegetation, these will be prioritised.
Woodland	D-BD-010	Where practicable, areas of woodland and trees within the Newbuild Infrastructure Boundary will be retained and exclusion buffers clearly demarcated (where woodland does not encroach into the 32 m construction corridor). Identified woodlands include (shown on **Figure 9.11.1** within **Appendix 9.11 – Arboricultural Impact Assessment Report, Volume III**), but are not limited to: • G978 • G552 • G328 • G109 The extent of demarcation of retained woodlands/trees will be driven by assessed Root Protection Areas (RPA) of retained trees. Where encroachment within RPAs is required to facilitate construction, ECoW and arboriculturist advice will be sought to discuss sensitive working methods in order to protect retained trees.
Waterbodies	D-BD-011	Micro-siting techniques have been employed to avoid waterbodies (ponds) across the DCO Proposed Development. All waterbodies identified during baseline surveys, with the exception of one near Stanlow Refinery, will be retained and will not be temporarily or permanently lost to facilitate construction of the DCO Proposed Development. Retained waterbodies within the construction easement of the DCO Proposed Development will be demarcated by a minimum 5 m exclusion buffer to avoid/reduce potential adverse impacts to waterbodies, associated terrestrial bankside habitat and associated aquatic receptors from construction.
Hedgerows	D-BD-012	Where hedgerow removal is required to facilitate construction, it has been assumed this will be kept to a maximum width of 15 m (this includes both hedgerows and the trees that sit within hedgerows). Opportunities to reduce the amount of hedgerow removal required at each hedgerow crossing will be explored, with the smallest practicable width of hedgerow removal possible prioritised to facilitate construction of the DCO Proposed Development.
Trees and Hedgerows	D-BD-013	All trees and hedgerows sited above any trenchless crossing point will be retained, unless otherwise required for access, where the trenchless crossing is of adequate depth to avoid impacts to root plates and below ground vegetation structure.

Receptor/Location	Reference	Description
Terrestrial Habitats	D-BD-016	The Preliminary Design of the DCO Proposed Development has ensured that permanent built structures (Above Ground Infrastructure (AGIs) and Block Valve Stations (BVSs) are sited in locations where habitats are of low ecological value, such as poor semi-improved grassland, associated with grazing pasture, or arable fields.
Terrestrial Habitats	D-BD-017	Localised and Centralised Compounds and storage areas to facilitate construction of the DCO Proposed Development have been sited within habitats of low ecological importance such as poor semi-improved grassland, associated with grazing pasture, arable fields, or existing hardstanding/sealed surface areas.
Aquatic Habitats and Species	D-BD-018	A minimal working width at watercourse crossings will be adopted, as far as practicable, to minimise potential impacts of open cut watercourse crossings.
Aquatic Habitats and Species	D-BD-019	All entry and exit pits for all trenchless crossings will be sited a minimum of 8 m away from any main riverbank top (and/or flood defence), and 16 m away from any transitional (tidal) waters. Stand-off distances around watercourses will be implemented prior to the commencement of works and clearly demarcated through the use of physical barriers (fencing, tape or similar). These include; • A minimum 8 m buffer will be demarcated around non-tidal main river watercourses; and • A minimum 16 m buffer will be demarcated around tidal watercourses, i.e., the River Dee. With regards the crossing under the River Dee, this will be a minimum depth of at least 15m for Horizontal Directional Drilling or 8m for Micro-tunnelling (distance between the top of the casing and the riverbed).~~All entry and exit pits for all trenchless crossings will be sited a minimum of 8 m away from any main riverbank top (and/or flood defence), and 16 m away from any transitional (tidal) waters.~~ ~~Stand-off distances around watercourses will be implemented prior to the commencement of works and clearly demarcated through the use of physical barriers (fencing, tape or similar). These include;~~ ~~A minimum 8 m buffer will be demarcated around non-tidal main river watercourses; and~~ ~~A minimum 16 m buffer will be demarcated around tidal watercourses, i.e., the River Dee.~~ ~~With regards the crossing under the River Dee, this will be a minimum of 15 m depth (distance between the top of the pipe and the riverbed).~~
Habitats and Species	D-BD-053	Plant, personnel and site traffic will be constrained to a prescribed working corridor through the use of temporary barriers, where practicable, to firstly avoid and secondly minimise damage to habitats, encroachment of the construction easement, and potential direct mortality and/or disturbance of fauna located within and adjacent to the construction corridor.
Habitats	D-BD-055	In line with NPS EN-4, permanent habitat loss will be minimised along the DCO Proposed Development as far as reasonably practicable.

9.9. ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

9.9.1. This section details the preliminary assessment of predicted impacts and effects of the DCO Proposed Development during both the Construction and Operational Stages after the implementation of embedded mitigation and in the absence of secondary mitigation.

9.9.2. As stated in **Section 9.4** and **Table 9-2,** a number of receptors have been scoped out of the assessment where impacts to the receptor is considered to be less than ***Moderate adverse***.

CONSTRUCTION STAGE

9.9.3. The likely significant effects for Biodiversity associated with the Construction Stage, in the absence of secondary mitigation, are set out below in Table 9.11~~**Table 9.11**~~.

Table 9.11 Likely Significant Effects during the Construction Stage

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
Statutory Designated Sites (International and National)		Temporary land take will be required to facilitate trenchless installation techniques at the River Dee SAC and SSSI. However, at trenchless crossing locations, any temporary land take will be located on land outwith the boundary of the designated sites. Indirect impacts to water quality, hydrological and hydromorphological processes due to changes in groundwater and drainage links to the River Dee SAC during construction. Potential for pollution events, discharges of sediment, frac-out and release of drill fluid to ground or watercourses/waterbodies during construction. Potential for dispersal downstream in the event of discharge to watercourses, with potential for effects to be spread over a larger distance than the point of origin. Discharge of sediment or drill fluid may impact fauna and flora, both aquatic and terrestrial. Potential vibration caused by trenchless installation activities impacting on migratory fish / fish passage and other protected species that are features of the River Dee SAC. Potential disturbance as a result of construction activities / movements and noise to breeding and wintering birds / waterfowl which are qualifying features of the Mersey Estuary SPA & Ramsar & SSSI, and Dee Estuary SPA & Ramsar & SSSI. Potential for dust emissions, noise and vibration disturbance and artificial illumination of habitats from lighting due to the proximity of construction activities to the River Dee SAC and SSSI, Deeside and Buckley Newt Sites SAC, and Connah's Quay Ponds and Woodland SSSI. Temporary and short-term habitat severance/fragmentation of functionally linked habitat in proximity to statutory designated sites. Direct and indirect effects upon statutory designated sites, whilst temporary in nature, may result in negative effects significant at a National/International scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***
Non-Statutory Designated sites		Temporary land take will be required for construction of the DCO Proposed Development within a number of non-statutory designated sites to facilitate open cut trench techniques, including Frodsham Helsby and Ince Marshes, Gowy Meadows and Ditches, Wood West of Crabwell Manor, Saughall Bank and Brook Park Farm Wood. Potential for pollution events, discharges of sediment, frac-out and release of drill fluid to ground or watercourses/waterbodies during construction. Potential for dispersal downstream in the event of discharge to watercourses, with potential for effects to be spread over a larger distance than the point of origin. Discharge of sediment or drill fluid may impact fauna and flora, both aquatic and terrestrial. Potential noise and vibration caused by trenchless installation activities, including sheet piling, impacting on migratory fish/fish passage and other protected species, such as otter and water vole identified within non-statutory designated sites. Potential disturbance as a result of construction activities / movements and noise to breeding and wintering birds / waterfowl which are noted features of Frodsham Helsby and Ince Marshes LWS, Gowy Meadows and Ditches LWS, Wervin Meadows LWS. Potential for dust emissions, noise and vibration disturbance and artificial illumination of habitats from lighting due to the proximity of construction activities. Temporary and short-term habitat severance/fragmentation of functionally linked habitat in proximity to non-statutory designated sites. Direct and indirect effects upon non-statutory designated sites, whilst temporary in nature, may result in negative effects significant at a National scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***
Habitats of Principal Importance (excluding waterbodies and watercourses)	Woodland	Temporary short-term and permanent direct and indirect loss and/or damage (through compaction and disturbance) of woodland (including deciduous woodland functionally linked to Annex I woodland (**paragraph 9.6.12**)) within and adjacent to the footprint of the Newbuild Infrastructure Boundary due to open cut trench techniques. Woodland habitats applicable include: • Deciduous and / or Lowland Mixed Deciduous woodland located at: - Woodland within the Gowy Meadows & Ditches LWS (SJ 43854 72961) - Wood West of Crabwell Manor LWS (SJ 37962 69677) - Church Lane (SJ 30286 66981),	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
		- Small woodland at SJ 25822 67958 (Northop Hall) - Woodland strip associated with Northop Hall Brook (SJ 25462 68931) - Small woodland at SJ 25275 70122 • Ancient Woodland located at: - Flint AGI, (SJ 25245 70815) - Northop Hall (SJ 26353 67697) - Wepre Brook (SJ 27164 67443) - Alltami Brook (SJ 27620 67143); and, - Ancient Woodland associated with Deeside and Buckley Newt Sites SAC at SJ 28808 67098. Permanent and temporary fragmentation of woodland due to land clearance requirements to facilitate construction. Potential for dust emissions, noise and vibration disturbance, and artificial illumination from lighting due to the proximity of construction activities. Damage to retained habitat due to changes in hydrological conditions. Damage to retained woodland (e.g., damage to roots of trees), impacting receptor health or longevity. Where trenchless installation techniques are proposed at watercourses (e.g., the River Dee SAC and Shropshire Union Canal LWS), this may require deep excavations within adjacent terrestrial habitats to facilitate the equipment and crossing methodology. Direct and indirect effects upon Habitats of Principal Importance, including temporary and short-term impacts, and permanent impacts, may result in negative effects significant at a National scale.	
	Hedgerows	Temporary and permanent direct and indirect loss and/or damage (through compaction and disturbance) of all hedgerows within the footprint of the Newbuild Infrastructure Boundary due to open cut trench techniques. Hedgerows include: • Species-rich intact and defunct hedgerows, • Species-poor intact and defunct hedgerows; and, • Hedgerows with trees, species rich and species poor. Temporary and short-term fragmentation of hedgerows due to land clearance requirements to facilitate construction. Potential for dust emissions, noise and vibration disturbance and artificial illumination from lighting due to the proximity of construction activities. Damage to retained habitats/features (e.g., damage to roots of trees and hedgerows), impacting receptor health or longevity. Where trenchless installation techniques are proposed at watercourses (e.g., the River Dee SAC and Shropshire Union Canal LWS), this may require deep excavations within adjacent terrestrial habitats to facilitate the equipment and crossing methodology. Direct and indirect effects to hedgerows, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	
	Coastal and Floodplain	Temporary short-term and permanent direct and indirect loss and/or damage (through compaction and disturbance) of Coastal and Floodplain Grazing Marsh habitat within the footprint of the Newbuild Infrastructure Boundary due to open cut trench techniques. Coastal and floodplain grazing marsh habitat is located at Frodsham, Helsby Marshes LWS and Gowy Meadows and Ditches LWS. Damage to retained habitat due to changes in hydrological conditions.	

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
	Grazing Marsh	Potential for dust emissions, noise and vibration disturbance and artificial illumination from lighting due to the proximity of construction activities. Damage to retained habitats/features (e.g., damage to roots of trees and hedgerows), impacting receptor health or longevity. Direct and indirect effects to coastal and floodplain grazing marsh, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	
Aquatic habitat - Watercourses		Direct loss of habitat from open cut trench crossing techniques, both at the bank and in-channel resulting in a potential loss of sensitive life stage dependent habitat types, flow refugia and cover. Installation of cofferdams and overpumping of water may lead to a potential disruption in flow dynamics and associated sedimentation processes, with consequential further loss of sensitive habitat both upstream and downstream of the crossing point. Permanent direct and indirect loss and/or damage to riparian habitat associated with construction activities (for example open cut trench, trenchless crossing techniques, installation of ~~an~~the ~~-~~embedded pipe bridge option). Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage to aquatic and riparian habitats. Accidental pollution and discharge of materials (sediment/drill fluid) into watercourses (including blow-out/frac-out from trenchless installation techniques) may impact water quality, which may negatively impact aquatic ecology (for example, increased turbidity and consequent reduction in dissolved oxygen) and potentially a decrease in biodiversity through a loss of sensitive habitat. Potential for pollution event dispersal downstream in the event of discharge to watercourses, with potential for effects to be spread over a larger distance than the point of origin. Construction activities in close proximity to water may result in the spread of invasive non-native species. Direct and indirect effects to aquatic habitats, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***
Aquatic habitat - Ponds		Permanent direct loss of a single waterbody 141 at SJ 44609 74749 near Stanlow Refinery to facilitate construction. Construction activities in close proximity to water may result in the spread of invasive non-native species. Accidental pollution and discharge of materials (sediment / drill fluid) into ponds may impact water quality, which may negatively impact aquatic ecology (for example, reduction in oxygen content or increased turbidity) and potentially decrease biodiversity through loss of habitat. Direct and indirect effects to ponds, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of *Negligible significance (Not Significant)*
Great Crested Newt		Direct mortality and/or injury of GCN as a result of habitat clearance and construction activities (e.g. vehicle movement/activity, pollution events) within 250m of a confirmed GCN waterbody. GCN have been confirmed within the following waterbodies: England: 43, 46, 166, 167, 169, 171; Wales: 9, 14, 15, 31, 35, 38, 49, 154, 155, 157, 161; Where ponds were not able to be surveyed for a minimum of 4 visits to confirm GCN presence in Wales and in the Red Risk Zone in England, the likely presence of GCN was considered based on the survey results of ponds in the surrounding area and professional judgement. The following waterbodies were assessed as having precautionary GCN presence: England: 42, 47, 48, 49, 52; Wales: 10, 11, 12, 50, 121, 148. Temporary (short-term) and permanent loss and/or damage to supporting terrestrial habitats within 250 m of a confirmed GCN waterbody, for example as a result of topsoil stripping and vegetation clearance, and temporary removal of connective features, such as hedgerows to facilitate construction.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
		Temporary short-term reduction in foraging and sheltering opportunities and temporary severance of commuting habitats. Whilst waterbodies are to be retained, with the exception of one waterbody, given the proximity of works, potential for temporary disturbance of GCN within or adjacent to waterbodies as a result of indirect impacts (e.g. light spill, dust, vibration). Direct and indirect effects to great crested newt, including both temporary and short term, and permanent effects, may result in negative effects significant at a National scale.	
Bats	Roosts	Direct mortality and/or injury of bats as a result of habitat clearance (particularly trees with bat roosts or bat roost potential) and construction activities. Construction of the DCO Proposed Development may result in the direct permanent loss of bat roosts and/or features with the potential to support roosting bats. Bat roosts (shown in **Appendix 9.3 – Bat Activity Report (Revision B) (Volume III); Figure 9.3.3 - Confirmed Bat Roosts (Revision B))** have been recorded within: - B97 (single common pipistrelle day roost) - B113 (single common pipistrelle day roost) - B133 (Four common pipistrelle's and three soprano pipistrelle's day roost) - Seventeen tree roosts comprising: o T1 (single common pipistrelle potential day roost) o T49 (single soprano pipistrelle day roost) o T70 (single soprano pipistrelle day roost) o T111 (single common pipistrelle and a single Myotis sp. day roosts) o T159 (single soprano pipistrelle day roost) o T190 (single common pipistrelle day roost) o T200 (single soprano pipistrelle day roost) o T220 (single common pipistrelle day roost) o T234 (single soprano pipistrelle day roost) o T238 (two soprano pipistrelle's day roost) o T283 (single common pipistrelle day roost) o T321 (noctule maternity roost) o T325 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327) o T326 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327) o T327 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327) o T365 (single common pipistrelle day roost) o T371 (single common pipistrelle day roost) - Five structures and 35 trees were precautionarily assessed as a bat roost (due to access restrictions), comprising: o B79, B80, B125, B126, and B127; and	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
		○ T4, T11, T13, T16, T17, T18, T25, T26, T27, T28, T34, T36, T37, T165, T230, T265, T349, T376, T377, T419, T422 – T431, T435, T491, T495, T496 and T499. Construction (including 24 hour working at trenchless crossing locations over a four week duration (TRS 01, TRS 02, TRS 28, TRS 31/32, TRS 38 and TRS 37)) may result in temporary short-term disturbance of roosting bats and potential for permanent or temporary functional loss of a roost, or roosts, due to the proximity to construction and associated disturbance (noise, vibration, and light levels). Direct and indirect effects to roosting bats, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	
	Foraging and Commuting Bats	Construction (including 24-hour working at trenchless crossing locations over a four week duration (TRS 01, TRS 02, TRS 28, TRS 31/32, TRS 38 and TRS 37), may result in temporary short-term disturbance of foraging and commuting bats due to the proximity to construction and associated disturbance (noise, vibration, and light levels). Permanent or temporary (short-term) loss of foraging and commuting habitats as a result of construction of the DCO Proposed Development. A number of 'Excellent' hedgerows (as defined in **Appendix 9.4 - Bats and Hedgerow Assessment (Revision C) (Volume III)** will be impacted through the removal of sections of hedgerow to facilitate construction. Excellent hedgerows identified comprise H28, H66, H67, H82, H91, H145, H196, H199, H202, H206, H229, H236, H237, H238, H247, H267, H283, H289, H348, H349, H350, H353, H354, H374, H398, H399, H400, H402, H403, H405, H406, H414, H419, H420, H421, H422, H429, H482, H488, H489, H491, H940, H974, H1004 and H1011. Of these, 23 hedgerows are currently considered Important FCRs on a precautionary basis and comprise: H66, H67, H145, H199, H202, H206, H229, H237, H267, H349, H350, H354, H399, H400, H402, H405, H406, H419, H421, H488, H491, H940, H974. Permanent or temporary (short-term) severance of habitats, for example hedgerows, as a result of construction of the DCO Proposed Development. Given the short term, temporary and localised nature of construction of the DCO Proposed Development, despite the localised severance of hedgerows to facilitate construction, alternative linear features and flight lines will remain intact. In the context of the impacts of construction of the DCO Proposed Development a value of Local is considered proportionate for all species. Direct and indirect effects to foraging and commuting bats, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***
Badger		Direct permanent and / or temporary (short-term) functional loss of three outlier setts (S19, S20 and S26) and a single annex sett (S32) may occur as a result of construction. Direct mortality and/or injury to badger as a result of construction activities (e.g., entrapment in voids or vehicle collision risk). Temporary and permanent loss of habitat, such as scrub, grassland and hedgerows impacting foraging and commuting opportunities, as well as potential sett building habitat. Temporary short-term indirect impacts, for example noise, light, dust, visual and vibration disturbance, may occur as a result of construction of the DCO Proposed Development. Temporary short-term disturbance to foraging and commuting badgers may occur at trenchless crossing locations where 24 hour working is proposed over a four-week duration (TRS 01, TRS 02, TRS 28, TRS 31/32, TRS 38 and TRS 37), Temporary short-term and permanent habitat fragmentation/severance. Direct and indirect effects to commuting badger, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of *Minor adverse significance (Not Significant)*
Riparian Mammals (Otter and Water vole)		Direct mortality and/or injury to riparian mammals as a result of construction activities. Direct loss of resting places (holts and burrows) as a result of permanent or temporary land take to facilitate construction. Water vole burrows are present within West Central Drain A, West Central Drain B, Hapsford Brook, Thornton Ditches, Thornton Main Drain, Gowy Tributary 2 and the River Gowy. Potential otter holts or lay-ups were recorded on Thornton Uplands, Thornton Ditch 4 and 6 and Wepre Brook. Watercourses which have been precautionarily assessed for the presence of otter and water vole include East and West Central Drains and Elton Land Ditches, Gale Brook, Stanney Main Drain and Stanney Mill Brook, and Alltami Brook. Permanent direct and indirect loss and/or damage to riparian habitat associated with construction (for example open cut trench, trenchless crossing techniques, installation of ~~an~~the ~~-~~embedded pipe bridge option).	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse***

Ecological Receptor	Potential Impacts and Effects	Likely Significant Effects
	Temporary and short-term loss of foraging and commuting habitats as a result of construction activities. Temporary and short-term disturbance (through noise, vibration, and light) and displacement of animals through loss of suitable sheltering, foraging or commuting habitat during construction activities along and adjacent to watercourses. Temporary and short-term riparian habitat degradation and alteration of aquatic habitats and water quality as a result of pollution events in the absence of mitigation, resulting in impacts to foraging and commuting opportunities. Direct and indirect effects to riparian mammals, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	*significance* ***(Significant)***
Barn Owl	Direct mortality and/or injury of barn owl as a result of construction activities. Permanent and temporary short-term loss and/or damage to habitat used by foraging and commuting barn owls e.g. loss of grassland and hedgerows. Permanent and/or temporary short-term loss and disturbance to nesting and / or roosting sites. Confirmed nesting sites comprise BOB3 (SJ35043 66642) and T465 (SJ 41653 71153), with T471 precautionarily assessed as a nesting site (due to access restrictions). Temporary and short-term disturbance and displacement due to increased noise, vibration, visual, dust and light pollution during construction which may also lead to reduced breeding and fledging of chicks. Temporary short-term disturbance to foraging and commuting barn owls and temporary short-term disturbance and displacement of potential nesting and / or roosting sites may occur at trenchless crossing locations where 24-hour working is proposed over a four-week duration (TRS 01, TRS 02, TRS 28, TRS 31/32, TRS 38 and TRS 37). Direct and indirect effects to barn owl, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***
Wintering Birds (including redshank)	Direct mortality and/or injury to wintering birds as a result of construction activities. Temporary (short-term) and permanent loss, including functional loss, of foraging, commuting, and sheltering habitats used by wintering birds. Temporary short-term disturbance and displacement effects associated with construction affiliated operations, including increased noise, light, vibration and plant or personnel movements. This is also applicable at the River Dee trenchless crossing location (TRS 28) where 24 hour working is proposed over a four-week duration. Increased disturbance may lead to increased use of energy resources coupled with a decrease in foraging time, leading to depletion of fat reserves and overall decline in condition and breeding success. This is of particular importance for redshank. Given the topography of the landscape comprising steep sided banks associated with the river at low tide (when birds utilise the mud flats), redshank (and other bird species) are likely to be sheltered from disturbance effects, particularly personnel movements, associated with construction. On the northern bank in particular, given the presence of a popular cycle pathway, any birds using mudflats along this stretch will be habituated to a degree of disturbance associated with recreational movements along the riverbank (e.g. cyclists, dog walkers, walkers). Redshank were recorded using the bare banks of the River Dee during winter months and were not recorded regularly on any other survey transect throughout the year. Given the above, redshank are assessed to be of Local value. Temporary short-term habitat degradation through incidental pollution events, such as chemical spills and construction drainage run-off, impacting waterbodies and terrestrial habitat that may be used for foraging or roosting. Direct and indirect effects to wintering birds, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* ***(Significant)***
Breeding Birds	Direct mortality and/or injury as a result of construction activities; accidental loss of nests either directly or indirectly (e.g. through displacement of parent birds leading to loss of chicks/eggs). Temporary (short-term) and permanent loss of nesting and foraging habitats during construction, for example hedgerow, individual trees, and scrub. Temporary short-term disturbance and displacement associated with construction affiliated operations, including increased noise, light, vibration and plant or personnel movements. This is also applicable at trenchless crossing locations where 24-hour working is proposed over a four-week duration (TRS 01, TRS 02, TRS 28, TRS 31/32,	In the absence of secondary mitigation, construction could lead to effects of *Minor adverse*

Ecological Receptor	Potential Impacts and Effects	Likely Significant Effects
	TRS 38 and TRS 37). Increased disturbance may lead to increased use of energy resources coupled with a decrease in foraging time, leading to depletion of fat reserves and overall decline in condition and breeding success. Temporary (short-term habitat degradation through incidental pollution events, such as chemical spills and construction drainage run-off, impacting waterbodies and terrestrial habitat that may be used for foraging or nesting. Direct and indirect effects to breeding birds, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	*significance (Not significant)*
Fish	Direct and indirect loss of sensitive fish habitat which may impact fish populations as a result of construction techniques (e.g., open cut trench crossing techniques). Habitat severance and barriers to fish migration may occur where there is a requirement for the creation of dry-works areas and temporary culverts. Temporary short-term disturbance and/or dispersal of fish populations from works areas due to increased noise, light and vibration impacts associated with construction including open cut trench and trenchless crossings, and installation of ~~an~~the ~~-~~embedded pipe bridge option (for example, drilling activities, pile driving and vehicle/plant movements), leading to disturbances to fish migrations, spawning and embryo mortality. Use of artificial lighting during proposed 24-hour working associated with the River Dee (TRS 28) trenchless crossing may result in temporary short-term disturbance and / or dispersal of fish populations. Temporary short-term habitat and water quality degradation as a result of incidental pollution events (suspended sediment or pollutant run off) may result in direct and indirect mortality and/or injury of fish. Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage of habitats. Direct and indirect effects to fish, including both temporary and short term, and permanent effects, may result in negative effects significant at a Regional scale.	In the absence of secondary mitigation, construction could lead to effects of ***Major adverse*** *significance* ***(Significant)***
Aquatic Macroinvertebrates	Temporary short-term direct and indirect habitat loss through open cut trench crossing techniques. Temporary short-term disturbance and/or dispersal of aquatic macroinvertebrates from works areas due to increased noise, light and vibration impacts associated with construction of open cut trench crossings and installation of ~~an~~the ~~-~~embedded pipe bridge option (for example, pile driving and vehicle/plant movements). Temporary short-term habitat and water quality degradation as a result of incidental pollution events (suspended sediment or pollutant run off) may result in direct and indirect mortality. Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage of habitats. Direct and indirect effects to aquatic macroinvertebrates, including both temporary and short term, and permanent effects, may result in negative effects significant at a local scale.	In the absence of secondary mitigation, construction could lead to effects of *Minor adverse significance (Not significant)*
Macrophytes	Open cut trench crossing techniques have the potential to impact macrophyte communities both directly, through riverbank and channel bed removal, and indirectly through water quality degradation as a result of incidental pollution events (suspended sediment or pollutant run off). Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage of habitats. Direct and indirect effects to macrophytes, including both temporary and short term, and permanent effects, may result in negative effects significant at a less than local scale.	In the absence of secondary mitigation, construction could lead to effects of *Negligible significance (Not Significant)*

Ecological Receptor	Potential Impacts and Effects	Likely Significant Effects
Statutory Designated Sites (International and National)	Temporary land take will be required to facilitate trenchless installation techniques at the River Dee SAC and SSSI. However, at trenchless crossing locations, any temporary land take will be located on land outwith the boundary of the designated sites. Indirect impacts to water quality, hydrological and hydromorphological processes due to changes in groundwater and drainage links to the River Dee SAC during construction. Potential for pollution events, discharges of sediment, frac-out and release of drill fluid to ground or watercourses/waterbodies during construction. Potential for dispersal downstream in the event of discharge to watercourses, with potential for effects to be spread over a larger distance than the point of origin. Discharge of sediment or drill fluid may impact fauna and flora, both aquatic and terrestrial. Potential vibration caused by trenchless installation activities impacting on migratory fish / fish passage and other protected species that are features of the River Dee SAC. Potential disturbance as a result of construction activities / movements and noise to breeding and wintering birds / waterfowl which are qualifying features of the Mersey Estuary SPA & Ramsar & SSSI Dee Estuary SPA & Ramsar & SSSI. Potential for dust emissions, noise and vibration disturbance and artificial illumination of habitats from lighting due to the proximity of construction activities to the River Dee SAC and SSSI, Deeside and Buckley Newt Sites SAC and Connah's Quay Ponds and Woodland SSSI. Temporary and short-term habitat severance/fragmentation of fuctionally linked habitat in proximity to statutory designated sites. Direct and indirect effects upon statutory designated sites, whilst temporary in nature, may result in negative effects significant at a National/International scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)
Non-Statutory Designated sites	Temporary land take will be required for construction of the DCO Proposed Development within a number of non-statutory designated sites to facilitate open cut trench techniques, including Frodsham Helsby and Ince Marshes, Gowy Meadows and Ditches, Wood West of Crabwell Manor, Saughall Bank and Brook Park Farm Wood. Potential for pollution events, discharges of sediment, frac-out and release of drill fluid to ground or watercourses/waterbodies during construction. Potential for dispersal downstream in the event of discharge to watercourses, with potential for effects to be spread over a larger distance than the point of origin. Discharge of sediment or drill fluid may impact fauna and flora, both aquatic and terrestrial. Potential noise and vibration caused by trenchless installation activities including sheet piling impacting on migratory fish/fish passage and other protected species, such as otter and water vole identified with non-statutory designated sites. Potential disturbance as a result of construction activities / movements and noise to breeding and wintering birds / waterfowl which are noted features of Frodsham Helsby and Ince Marshes LWS, Gowy Meadows and Ditches LWS, Wervin Meadows LWS . Potential for dust emissions, noise and vibration disturbance and artificial illumination of habitats from lighting due to the proximity of construction activities. Temporary and short-term habitat severance/fragmentation of fuctionally linked habitat in proximity to non-statutory designated sites. Direct and indirect effects upon non-statutory designated sites, whilst temporary in nature, may result in negative effects significant at a National scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
Habitats of Principal Importance (excluding waterbodies and watercourses)	Woodland	Temporary short-term and permanent direct and indirect loss and/or damage (through compaction and disturbance) of woodland (including deciduous woodland functionally linked to Annex I woodland (**paragraph 9.6.12**)) within the footprint of the Newbuild Infrastructure Boundary due to open cut trench techniques. Woodland habitats applicable include; • Deciduous and / or Lowland Mixed Deciduous woodland located at; - Woodland within the Gowy Meadows & Ditches LWS (SJ 43854 72961) - Wood West of Crabwell Manor LWS (SJ 37962 69677) - Church Lane (SJ 30286 66981), - Small woodland at SJ 25822 67958 (Northop Hall) - Woodland strip associated with Northop Hall Brook (SJ 25462 68931) - Small woodland at SJ 25275 70122 • Ancient Woodland located at: - Flint AGI, (SJ 25245 70815) - Northop Hall (SJ 26353 67697); - Wepre Brook (SJ 27164 67443); and, - Alltami Brook (SJ 27620 67143). Permanent and temporary fragmentation of woodland due to land clearance requirements to facilitate construction. Potential for dust emissions, noise and vibration disturbance and artificial illumination from lighting due to the proximity of construction activities. Damage to retained habitat due to changes in hydrological conditions Damage to retained woodland (e.g., damage to roots of trees), impacting receptor health or longevity. Where trenchless installation techniques are proposed at watercourses (e.g., the River Dee SAC and Shropshire Union Canal LWS), this may require deep excavations within adjacent terrertrial habitats to facilitate the equipment and crossing methodology. Direct and indirect effects upon Habitats of Principal Importance, including temporary and short term impacts and permanent impacts, may result in negative effects significant at a National scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)
	Hedgerows	Temporary and permanent direct and indirect loss and/or damage (through compaction and disturbance) of all hedgerows within the footprint of the Newbuild Infrastructure Boundary due to open cut trench techniques. Hedgerows include: • Species-rich intact and defunct hedgerows, • Species-poor intact and defunct hedgerows; and, • Hedgerows with trees, species rich and species poor) Temporary and short-term fragmentation of hedgerows due to land clearance requirements to facilitate construction. Potential for dust emissions, noise and vibration disturbance and artificial illumination from lighting due to the proximity of construction activities. Damage to retained habitats/features (e.g., damage to roots of trees and hedgerows), impacting receptor health or longevity.	

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
		Where trenchless installation techniques are proposed at watercourses (e.g., the River Dee SAC and Shropshire Union Canal LWS), this may require deep excavations within adjacent terrertrial habitats to facilitate the equipment and crossing methodology. Direct and indirect effects to hedgerows, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	
	Coastal and Floodplain Grazing Marsh	Temporary short-term and permanent direct and indirect loss and/or damage (through compaction and disturbance) of Coastal and Floodplain Grazing Marsh habitat within the footprint of the Newbuild Infrastructure Boundary due to open cut trench techniques. Coastal and floodplain grazing marsh habitat is located at Frodsham, Helsby Marshes LWS and Gowy Meadows and Ditches LWS. Damage to retained habitat due to changes in hydrological conditions. Potential for dust emissions, noise and vibration disturbance and artificial illumination from lighting due to the proximity of construction activities. Damage to retained habitats/features (e.g., damage to roots of trees and hedgerows), impacting receptor health or longevity. Direct and indirect effects to coastal and floodplain grazing marsh, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	
Aquatic habitat - Watercourses		Direct loss of habitat from open cut trench crossing techniques, both at the bank and in-channel resulting in a potenial loss of senstiive life stage dependent habitat types, flow refuigia and cover. Installation of cofferdams and overpumping of water may lead to a potential disruption in flow dynamics and assocaited sedimentation processes, with consequential further loss of sensitive habtiat both upstream and downstream of the crossing point. Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage of habitats. Accidental pollution and discharge of materials (sediment/drill fluid) into watercourses (including blow-out/frac-out from trenchless installation techniques) may impact water quality, which may negatively impact aquatic ecology (for example, increased turbidity and consequent reduction in dissolved oxygen) and potentially a decrease in biodiversity through a loss of sensitive habtiat. Potential for pollution event dispersal downstream in the event of discharge to watercourses, with potential for effects to be spread over a larger distance than the point of origin. Construction activities in close proximity to water may result in the spread of invasive non-native species. Direct and indirect effects to aquatic habitats, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)
Aquatic habitat - Ponds		Permanent direct loss of a single waterbody 141 at SJ 44609 74749 near Stanlow Refinary to facilitate construction. Construction activities in close proximity to water may result in the spread of invasive non-native species Accidental pollution and discharge of materials (sediment / drill fluid) into ponds may impact water quality, which may negatively impact aquatic ecology (for example, reduction in oxygen content or increased turbidity) and potentially decrease biodiversity through loss of habtiat. Direct and indirect effects to ponds, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of *Negligible significance* (*Not Significant*)

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
Great Crested Newt		Direct mortality and/or injury of GCN as a result of habitat clearance and construction activities (e.g. vehicle movement/activity, pollution events) within 250m of a confirmed GCN waterbody. GCN have been confirmed within the following waterbodies; England: 43, 46, 166, 167, 169, 171; Wales: 9, 14, 15, 31, 35, 38, 49, 154, 155, 157, 161; Where ponds were not able to be surveyed for a minimum of 4 visits to confirm GCN presence in Wales and in the Red Risk Zone in England, the likely presence of GCN was considered based on the survey results of ponds in the surrounding area and professional judgement. The following waterbodies were assessed as having precautionary GCN presence: England: 42, 47, 48, 49, 52; Wales: 10, 11, 12, 50, 121, 148. Temporary (short-term) and permanent loss and/or damage to supporting terrestrial habitats within 250 m of a confirmed GCN waterbody, for example as a result of topsoil stripping and vegetation clearance, and temporary removal of connective features, such as hedgerows to facilitate construction. Temporary short-term reduction in foraging and sheltering opportunities and temporary severance of commuting habitats. Whilst waterbodies are to be retained, with the exception of one waterbody, given the proximity of works, potential for temporary disturbance of GCN within or adjacent to waterbodies as a result of indirect impacts (e.g. light spill, dust, vibration). Direct and indirect effects to great crested newt, including both temporary and short term, and permanent effects, may result in negative effects significant at a National scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)
Bats	Roosts	Direct mortality and/or injury of bats as a result of habitat clearance (particularly trees with bat roosts or bat roost potential) and construction activities. Construction of the DCO Proposed Development may result in the direct permanent loss of bat roosts and/or features with the potential to support roosting bats. Bat roosts (shown in **Appendix 9.3 – Bat Activity Report (Volume III); Figure 9.3.3 - Confirmed Bat Roosts** have been recorded within: - B97 (single common pipistrelle day roost) - B113 (single common pipistrelle day roost) - B133 (Four common pipistrelle's and three soprano pipistrelle's day roost) - Seventeen tree roosts comprising; o T1 (single common pipistrelle potential day roost) o T49 (single soprano pipistrelle day roost) o T70 (single soprano pipistrelle day roost) o T111 (single common pipistrelle and a single *Myotis sp.* day roosts) o T159 (single soprano pipistrelle day roost) o T190 (single common pipistrelle day roost) o T200 (single soprano pipistrelle day roost)	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)

Ecological Receptor		Potential Impacts and Effects	Likely Significant Effects
		○ T220 (single common pipistrelle day roost) ○ T234 (single soprano pipistrelle day roost) ○ T238 (two soprano pipistrelle's day roost) ○ T283 (single common pipistrelle day roost) ○ T321 (noctule maternity roost) ○ T325 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327) ○ T326 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327) ○ T327 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327) ○ T365 (single common pipistrelle day roost) ○ T371 (single common pipistrelle day roost) - Five structures and 31 trees were precautionarily assessed as a bat roost (due to access restrictions), comprising; ○ B79, B80, B125, B126, and B127; and ○ T4, T11, T13, T16, T17, T18, T25, T26, T27, T28, T34, T36, T37, T165, T230, T265, T349, T376, T377, T419, T422 – T431 and T435. Construction may result in temporary short-term disturbance of roosting bats and potential for permanent or temporary functional loss of a roost, or roosts, due to the proximity to construction and associated disturbance (noise, vibration, and light levels). Direct and indirect effects to roosting bats, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	
	Foraging and Commuting Bats	Construction may result in temporary short-term disturbance of foraging and commuting bats due to the proximity to construction and associated disturbance (noise, vibration, and light levels). Permanent or temporary (short-term) loss of foraging and commuting habitats as a result of construction of the DCO Proposed Development. A number of 'Excellent' hedgerows (as defined in **Appendix 9.4 - Bats and Hedgerow Assessment, Volume III)** will be impacted through the removal of sections of hedgerow to facilitate construction. Excellent hedgerows identified comprise H28, H66, H67, H82, H91, H145, H196, H199, H202, H206, H229, H236, H237, H238, H247, H267, H283, H289, H348, H349, H350, H353, H354, H374, H398, H399, H400, H402, H403, H405, H406, H414, H419, H420, H421, H422, H429, H482, H488, H489, H491, H940, H974, H1004 and H1011. Of these, 23 hedgerows are currently considered Important FCRs on a precautionary basis and comprise: H66, H67, H145, H199, H202, H206, H229, H237, H267, H349, H350, H354, H399, H400, H402, H405, H406, H419, H421, H488, H491, H940, H974. Permanent or temporary (short-term) severance of habitats, for example hedgerows, as a result of construction of the DCO Proposed Development. Given the short term, temporary and localised nature of construction of the DCO Proposed Development, despite the localised severance of hedgerows to facilitate construction, alternative linear features and flight lines will remain intact. In the context of the impacts of construction of the DCO Proposed Development a value of Local is considered proportionate for all species. Direct and indirect effects to foraging and commuting bats, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse significance*** (***Significant***)

Ecological Receptor	Potential Impacts and Effects	Likely Significant Effects
Badger	Direct permanent and / or temporary (short-term) functional loss of three outlier setts (S19, S20 and S26) and a single annex sett (S32) may occur as a result of construction. Direct mortality and/or injury to badger as a result of construction activities (e.g., entrapment in voids or vehicle collision risk). Temporary and permanent loss of habitat, such as scrub, grassland and hedgerows impacting foraging and commuting opportunities, as well as potential sett building habitat. Temporary short-term indirect impacts, for example noise, light, dust, visual and vibration disturbance, may occur as a result of construction of the DCO Proposed Development. Temporary short-term and permanent habitat fragmentation/severance. Direct and indirect effects to commuting badger, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of *Minor adverse significance (Not Significant)*
Riparian Mammals (Otter and Water vole)	Direct mortality and/or injury to riparian mammals as a result of construction activities. Direct loss of resting places (holts and burrows) as a result of permanent or temporary land take to facilitate construction. Water vole burrows are present within West Central Drain A, West Central Drain B, Hapsford Brook, Thornton Ditches, Thornton Main Drain, Gowy Tributary 2 and the River Gowy. Potential otter holts or lay-ups were recorded on Thornton Uplands, Thornton Ditch 4 and 6 and Wepre Brook. Watercourses which have been precautionarily assessed for the presence of otter and water vole include East and West Central Drains and Elton Land Ditches, Gale Brook, Stanney Main Drain and Stanney Mill Brook, and Alltami Brook. Temporary and short-term loss of foraging and commuting habitats as a result of construction activities. Temporary and short-term disturbance (through noise, vibration, and light) and displacement of animals through loss of suitable sheltering, foraging or commuting habitat during construction activities along and adjacent to watercourses. Temporary and short-term riparian habitat degradation and alteration of aquatic habitats and water quality as a result of pollution events in the absence of mitigation, resulting in impacts to foraging and commuting opportunities. Direct and indirect effects to riparian mammals, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)
Barn Owl	Direct mortality and/or injury of barn owl as a result of construction activities. Permanent and temporary short-term loss and/or damage to habitat used by foraging and commuting barn owls, e.g, loss of grassland and hedgerows. Permanent and/or temporary short-term loss and disturbance to nesting and / or roosting sites. Confirmed nesting sites comprise BOB3 (SJ35043 66642) and T465 (SJ 41653 71153). Temporary and short-term disturbance and displacement due to increased noise, vibration, visual, dust and light pollution during construction which may also lead to reduced breeding and fledging of chicks. Direct and indirect effects to barn owl, including both temporary and short term, and permanent effects, may result in negative effects significant at a County scale.	In the absence of secondary mitigation, construction could lead to effects of ***Moderate adverse*** *significance* (***Significant***)
Wintering Birds (including redshank)	Direct mortality and/or injury to wintering birds as a result of construction activities.	In the absence of secondary

Ecological Receptor	Potential Impacts and Effects	Likely Significant Effects
	Temporary (short-term) and permanent loss, including functional loss, of foraging, commuting, and sheltering habitats used by wintering birds. Temporary short-term disturbance and displacement effects associated with construction affiliated operations, including increased noise, light, vibration and plant or personnel movements. Increased disturbance may lead to increased use of energy resources coupled with a decrease in foraging time, leading to depletion of fat reserves and overall decline in condition and breeding success. This is of particular importance for redshank. Given the topography of the landscape comprising steep sided banks associated with the river at low tide (when birds utilise the mud flats), redshank (and other bird species) are likely to be sheltered from disturbance effects, particularly personnel movements, associated with construction. On the northern bank in particular, given the presence of a popular cycle pathway, any birds using mudflats along this stretch will be habituated to a degree of disturbance associated with recreational movements along the riverbank (e.g. cyclists, dog walkers, walkers). Redshank were recorded using the bare banks of the River Dee during winter months and were not recorded regularly on any other survey transect throughout the year. Given the above, redshank are assessed to be of Local value. Temporary short-term habitat degradation through incidental pollution events, such as chemical spills and construction drainage run-off, impacting waterbodies and terrestrial habitat that may be used for foraging or roosting. Direct and indirect effects to wintering birds, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	mitigation, construction could lead to effects of *Minor adverse significance* (*Not Significant)*
Breeding Birds	Direct mortality and/or injury as a result of construction activities; accidental loss of nests either directly or indirectly (e.g. through displacement of parent birds leading to loss of chicks/eggs). Temporary (short-term) and permanent loss of nesting and foraging habitats during construction, for example hedgerow, individual trees, and scrub. Temporary short-term disturbance and displacement associated with construction affiliated operations, including increased noise, light, vibration and plant or personnel movements. Increased disturbance may lead to increased use of energy resources coupled with a decrease in foraging time, leading to depletion of fat reserves and overall decline in condition and breeding success. Temporary (short -term habitat degradation through incidental pollution events, such as chemical spills and construction drainage run-off, impacting waterbodies and terrestrial habitat that may be used for foraging or nesting. Direct and indirect effects to breeding birds, including both temporary and short term, and permanent effects, may result in negative effects significant at a Local scale.	In the absence of secondary mitigation, construction could lead to effects of *Minor adverse significance* (*Not significant)*
Fish	Direct and indirect loss of sensitive fish habitat which may impact fish populations as a result of construction techniques (e.g., open cut trench crossing techniques). Habitat severance and barriers to fish migration may occur where there is a requirement for the creation of dry works areas. Temporary short-term disturbance and/or dispersal of fish populations from works areas due to increased noise, light and vibration impacts associated with construction of both open cut trench and trenchless crossings (for example, drilling activities, pile driving and vehicle/plant movements), leading to disturbances to fish migrations, spawning and embryo mortality. Temporary short-term habitat and water quality degradation as a result of incidental pollution events (suspended sediment or pollutant run off) may result in direct and indirect mortality and/or injury of fish. Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage of habitats.	In the absence of secondary mitigation, construction could lead to effects of ***Major adverse*** *significance* (***Significant***)

Ecological Receptor	Potential Impacts and Effects	Likely Significant Effects
	Direct and indirect effects to fish, including both temporary and short term, and permanent effects, may result in negative effects significant at a Regional scale.	
Aquatic Macroinvertebrates	Temporary short-term direct and indirect habitat loss through open cut trench crossing techniques. Temporary short-term disturbance and/or dispersal of aquatic macroinvertebrates from works areas due to increased noise, light and vibration impacts associated with construction of open cut trench crossings (for example, pile driving and vehicle/plant movements). Temporary short-term habitat and water quality degradation as a result of incidental pollution events (suspended sediment or pollutant run off) may result in direct and indirect mortality. Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage of habitats. Direct and indirect effects to aquatic macroinvertebrates, including both temporary and short term, and permanent effects, may result in negative effects significant at a local scale.	In the absence of secondary mitigation, construction could lead to effects of *Minor adverse significance* (*Not significant)*
Macrophytes	Open cut trench crossing techniques have the potential to impact macrophyte communities both directly, through river bank and channel bed removal, and indirectly through water quality degradation as a result of incidental pollution events (suspended sediment or pollutant run off). Where temporary culverts are to be installed at watercourse crossing points, there is potential for direct impacts through localised loss and/or damage of habitats. Direct and indirect effects to macrophytes, including both temporary and short term, and permanent effects, may result in negative effects significant at a less than local scale.	In the absence of secondary mitigation, construction could lead to effects of *Negligible significance* (*Not Significant)*

OPERATIONAL STAGE

9.9.4. The likely significant effects for Biodiversity associated with the Operational stage of the DCO Proposed Development are presented below. Receptors not listed here are not considered at risk of impacts from the operational stage of the DCO Proposed Development.

9.9.5. ~~The~~ The majority of the DCO Proposed Development entails the construction of the underground Newbuild Carbon Dioxide Pipeline. The operational Newbuild Carbon Dioxide Pipeline is therefore of negligible concern to ecological receptors. The DCO Proposed Development does include the construction of permanent above ground infrastructure associated with AGIs, BVSs and the optional Alltami Brook embedded pipe bridge (if taken forward), located within the Newbuild Infrastructure Boundary. Other permanent above ground infrastructure includes Cathodic Protection Transformer Rectifier Cabinets and Test Posts, and Marker Posts. Whilst maintenance of the Newbuild Carbon Dioxide Pipeline may be required throughout its life, this is likely to be a rare occurrence and impacts associated with such maintenance activities would be short term, temporary and localised. There are currently no planned maintenance activities across the design life of the system; these would only be required in case of extraordinary events.

~~9.9.5.~~ Operation of the DCO Proposed Development will require new external lighting at each of the AGI and BVS locations, where perimeter, local task and emergency lighting would be required. Where lighting is required, this would be of short duration during personnel site presence and during low-light conditions (e.g., winter and night-time working) and would otherwise as default be unlit/ turned off. Stanlow AGI will require permanent lighting, however, given its siting within a highly industrialised location where extensive lighting is already present; the requirement for permanent lighting at the AGI is considered to be of negligible significance. No permanent lighting or provision of power is anticipated to be required at the embedded pipe bridge option at Alltami Brook~~majority of the DCO Proposed Development entails the construction of the underground Newbuild Carbon Dioxide Pipeline. The operational Newbuild Carbon Dioxide Pipeline is therefore of negligible concern to ecological receptors. The DCO Proposed Development does however include the construction of permanent above ground infrastructure associated with AGIs and BVSs, located within the Newbuild Infrastructure Boundary. Other permanent above ground infrastructures include Cathodic Protection Transformer Rectifier Cabinets and Test Posts, and Marker Posts. Whilst maintenance of the Newbuild Carbon Dioxide Pipeline may be required throughout its lifecycle, this is likely to be a rare occurrence and impacts associated with such maintenance activities would be short term, temporary and localised. There are currently no planned maintenance activities across the~~

~~design life of the system; these would only be required in case of extraordinary events.~~

9.9.6. ~~Operation of the DCO Proposed Development will require new external lighting at each of the AGI and BVS locations, where perimeter, local task and emergency lighting would be required. Where lighting is required, this would be of short duration during personnel site presence and during low-light conditions (e.g., winter and night-time working) and would otherwise as default be unlit/ turned off. Stanlow AGI will require permanent lighting, however, given its siting within a highly industrialised location where extensive lighting is already present; the requirement for permanent lighting at the AGI is considered to be of negligible significance~~.

9.9.7. Operation of the AGIs and BVSs will also result in a marginal increase in noise levels, potentially increasing indirect impacts of noise disturbance, particularly in proximity to AGI locations where baseline noise levels are minimal. This is likely to be short-term, infrequent, and associated with pipeline maintenance pigging activity and are therefore considered to be negligible significance. There will be cooling fans operating continuously at the AGIs, however given the worst-case predicted noise levels (65dBA at 1m, see **Chapter 15 – Noise and Vibration, Volume II** for additional detail) this is considered to be of negligible significance.

9.9.8. Receptors that are potentially sensitive to disturbance as a result of operation of AGI and BVS locations within the DCO Proposed Development comprise roosting, commuting, and foraging bats, breeding and wintering birds, barn owl, badger and other mammals such as brown hare and hedgehog.

9.9.9. It is anticipated that these receptors will avoid areas where lighting exists, and where light spill illuminates any areas beyond the boundaries of the AGIs and BVSs or else will become habituated to their presence. Given the temporary nature of active lighting (i.e. default to being off), impacts associated with lighting are likely to be minimal. It should also be noted that light sources can have a beneficial effect on some receptors, namely foraging bats, as invertebrates, a food source of bats, can be attracted to lights; however, this is primarily limited to *Pipistrellus* species only and does not represent a benefit to all species.

9.9.10. The species considered are known to be common across the local landscape and the existing baseline proximity of urban and suburban areas, the majority of receptors will be tolerant of urban lighting already, as well as disturbance associated with noise and movement.

9.9.11. Drainage associated with AGI and BVS locations will contain appropriate filtration and treatment devices and designed as such to prevent adverse impacts to watercourses, where drainage leads to outfalls to existing watercourses.

9.9.12. If taken forward, the Alltami Brook embedded pipe bridge option will be a long-term feature on the banks of the Alltami Brook, and a vertical clearance of a minimum of 1.5m in height above the watercourse has been assumed for this assessment.

9.9.13. Foraging and commuting opportunities for mobile species, both terrestrial and aquatic, are not anticipated to be permanently restricted due to the location and clearance of the embedded pipe bridge option which will continue to allow species to commute and traverse the banks and watercourse channel.

~~9.9.11.~~9.9.14. The shading effects associated with the embedded pipe bridge option are not anticipated to result in the restriction of fish passage, due to the set-back design of the bridge abutments; or a change in macrophyte community, due to the absence of this receptor at Alltami Brook within the baseline assessment. Therefore, the embedded pipe bridge option at Alltami Brook is considered to be of Negligible significance during the operation phase.

~~9.9.12.~~9.9.15. Acknowledging the above, impacts arising during the Operational Stage of the DCO Proposed Development is therefore assessed to be of *Negligible significance (not significant).*

~~9.9.13.~~9.9.16. Decommissioning Stage

~~9.9.14.~~9.9.17. Full decommissioning details are described within **Section 3.9** of **Chapter 3 - Description of the DCO Proposed Development (Volume II).** Decommissioning will include the removal of AGIs and BVSs, with ground conditions restored to their previous condition and the Newbuild Carbon Dioxide Pipeline and existing Flint Connection to PoA Terminal Pipeline will be decommissioned safely, filled with nitrogen and left *in situ*.

9.9.18. In advance of decommissioning works, ecology surveys will be undertaken, where required, to determine the ecological baseline and presence, or otherwise, of protected and/or notable species to determine any mitigation or licensing requirements in advance of decommissioning works commencing.

9.9.19. Significant effects on ecological receptors during decommissioning are assessed to be of *Negligible significance (not significant)*.

9.9.20. If taken forward, the Alltami Brook embedded pipe bridge option will be removed, with ground conditions restored to the condition recorded pre-construction or else restored in line with/complementing the habitat baseline recorded at the time of decommissioning, where possible. The buried Newbuild Carbon Dioxide Pipeline sections will be capped and left in situ. It is anticipated that the dismantling and removal of the embedded pipe bridge and associated abutments, will largely follow the same process as the Construction Stage, with access and site preparation works required, which will include the removal of vegetation adjacent to the embedded pipe bridge. Ecology surveys will be undertaken to determine the requirement for, and extent of, appropriate

mitigation and/or licencing to ensure decommissioning works do not have a significant impact on ecological receptors.

9.9.21. When considering decommissioning, similar impacts to those identified during the construction stage are anticipated. With the implementation of appropriate mitigation measures prior to, during and following decommissioning, likely significant effects on ecological receptors during decommissioning are precautionarily assessed to be of no more than *Minor Adverse significance (not significant).*

~~9.9.15. Significant effects on ecological receptors during decommissioning are assessed to be of *Negligible significance (not significant).* T~~

9.10. MITIGATION, COMPENSATION AND ENHANCEMENT MEASURES

9.10.1. Table 9.12~~**Table 9.12**~~ sets out the details of mitigation and compensation measures that have been developed for the DCO Proposed Development, relating to ecology during the Construction Stage. No additional Operational Stage mitigation or enhancement measures are required as these have been incorporated within embedded mitigation.

9.10.2. On the basis that the Carbon Dioxide Pipeline will remain *in situ,* impacts arising from decommissioning are not anticipated. Decommissioning of above ground infrastructure may require mitigation; however, any such requirements will be clarified upon completion of an appropriate suite of ecological surveys to establish the baseline at that time. Prescription of the need for ecological surveys ahead of any proposed decommissioning have been provided (**D-BD-065** of the **Register of Environmental Actions and Commitments (REAC), Document Reference: D.6.5.1**)).

9.10.3. Construction Stage measures have been devised to address the significant effects as assessed in **Section 9.9.**

9.10.4. Embedded mitigation measures (see **Section 9.8**) have been included within the Preliminary Design of the DCO Proposed Development. The DCO Proposed Development is subject to additional measures as detailed within the **REAC (Document reference: D.6.5.1.)** that has been produced and accompanies the DCO Application. This details delivery mechanisms and activities to be adhered to throughout construction and will be further developed during Detailed Design, where required.

9.10.5. Within this Section, the terms ‘mitigation’, ‘compensation’ and ‘enhancement’ are defined as follows:

- **Mitigation –** the methods, processes and actions put in place to avoid or reduce the potential adverse impacts of the DCO Proposed Development on ecological receptors.
- **Compensation –** the measures taken to offset effects as a result of the loss of, or permanent damage to, ecological receptors despite mitigation.
- **Enhancement** – measures proposed to enhance the status and / or condition of ecological receptors within the DCO Proposed Development.

HABITATS

9.10.6. Construction of the DCO Proposed Development will result in the loss of habitats, for which mitigation and compensation will be undertaken. Habitat creation has been developed and incorporated into the **Landscape Layouts (Document Reference: D.2.14)** and **Landscape and Ecological Mitigation Plan (Document Reference: D.6.5.10.1)**. The landscape design incorporates ecological mitigation measures to reduce the significance of effects, maintain and improve connectivity and mitigate the effects of fragmentation and displacement.

9.10.7. Measures incorporated into the landscape design include:

- Retention of existing vegetation where possible **(D-BD-010** of the **REAC, Document Reference: D.6.5.1)**;
- Reinstatement of habitat features where possible maintaining connectivity to existing retained habitat features **(D-BD-032, D-BD-062** of the **REAC, Document Reference: D.6.5.1)**;
- Habitat creation to compensate for the habitat loss, e.g., hedgerows and trees **(D-BD-030, D-BD-055** of the **REAC, Document Reference: D.6.5.1)**;
- Use of native species and plant stock of local provenance within the mitigation planting design **(D-BD-032, D-LV-063** of the **REAC, Document Reference: D.6.5.1)**;
- Creation and planting of detention basins to enhance their value to local wildlife **(D-BD-004, D-BD-066** of the **REAC, Document Reference: D.6.5.1)**

Woodland and Individual Tree Mitigation

9.10.8. To facilitate the construction of the DCO Proposed Development, the loss of trees, both individual trees and those from woodlands, will be required. A reasonable worst-case scenario has been assessed against those trees/woodlands assessed as ‘at risk’ of removal as assessed within **Appendix 9.11 - Arboricultural Impact Assessment Report (Volume III).** It is not possible to reinstate trees above or within 12 m either side of the Newbuild Carbon Dioxide Pipeline. Where practicable, trees will be planted as close as

possible to those lost, however, these are likely to form a mixture of replacement hedgerows and trees.

9.10.9. A reasonable worst-case scenario has been applied to determine those trees at risk of removal (see **Appendix 9.11 - Arboricultural Impact Assessment Report (Volume III)**) and for which mitigation has been identified. Thirteen areas of land across the Newbuild Infrastructure Boundary have been identified for tree planting to mitigate and compensate for the loss of trees to facilitate construction and are included within the **Landscape and Ecological Mitigation Plan (Document Reference: D.6.5.10.1)**.

9.10.10. Areas identified have been prioritised where tree planting will tie into existing woodlands/green infrastructure or else enhance green infrastructure corridors across the landscape. A planting ratio of 3:1 has been adopted with species to be planted to remain in-keeping with the green infrastructure being enhanced or in line with the wider landscape tree community, comprising native trees of local provenance.

ECOLOGICAL ENHANCEMENT

9.10.11. Enhancement opportunities will be considered further at Detailed Design (as detailed within **the REAC (Document Reference: D.6.5.1)** but may include the following:

- Where possible, cleared deadwood, felled trees and arisings from site clearance works will be used in a variety of locations to benefit wildlife. These locations will be determined by the ECoW and based on site conditions at the time. Materials will be stored in a suitable location away from the working area to prevent risk of damage and then placed within areas of retained woodland or woodland planting at an appropriate time.
- Additional bat and bird nest boxes could be installed on suitable mature trees/structures or mounted on poles. Bat boxes will be installed in unlit areas on multiple aspects (including facing south, west or east) at a height of a minimum of 3 m and have a clear flight path to the access point. The bat boxes will be located within existing or newly created suitable foraging and commuting habitats. The requirements of the bird boxes will be specific to the type installed and manufacturers advice will be followed. The bat and bird boxes could be placed within existing retained woodlands, during construction or once mature, the boxes could be placed within newly created woodlands, (on poles or mature existing trees along the edge), post-construction.

Table 9.12 Design and Mitigation Measures and their Delivery Mechanisms

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
Entire Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-001	Prior to construction, a team of suitably qualified and experienced Ecological Clerk of Works (ECoWs) will be appointed to support, oversee and monitor the Construction Contractor with the implementation of measures defined within the **OCEMP (Document reference: D.6.5.4).** ECoWs may be required during construction to ensure appropriate oversight of multiple active works locations. Broadly, the ECoW will: - Provide ecological advice to the Construction Contractor over the entire construction programme, at all times as required. - Undertake or oversee pre-construction surveys for protected species in the areas affected by the DCO Proposed Development. - Monitor ecological conditions during the Construction Stage to identify additional constraints that may arise as a result of natural changes to ecological baseline over time, e.g., the monitoring of badger activity within and in close proximity to construction works. - Provide ecological toolbox talks to site personnel to make them aware of ecological constraints and information; highlight mitigation to minimise impacts; and make site personnel aware of their responsibility with regards to wildlife and sensitive habitats in the context of legislation and policy. Toolbox talks will include, as required, all ecological receptors considered within the ES as a minimum. - Monitor the implementation of mitigation measures during the Construction Stage to ensure compliance with protected species legislation, licensing, and commitments within the ES. The ECoW will have previous experience in similar ECoW roles and be approved by the Applicant. The ECoW will be appointed in advance of the main construction programme commencing to ensure pre-construction surveys are undertaken and any advance mitigation measures required are implemented.	To ensure implementation of mitigation measures, track compliance with commitments and legal requirements.
Entire Newbuild Infrastructure Boundary	Pre-construction	D-BD-002	All necessary permits, licenses and assents will be applied for from relevant bodies in advance of construction or enabling works commencing. Only once licence/permit applications have been granted, and any initial licenced actions completed, can works commence. Licences and permits are likely to include, but are not limited to, derogation licences for protected species, permits for in-water works, etc. Assents are likely to be required for works in proximity to statutory designated sites.	To protect sites, habitats and fauna
Entire Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-003	The Applicant will appoint an external, third-party to conduct Environmental Compliance Audits during construction of the DCO Proposed Development. The 'Auditing ECoW' will undertake checks of the Construction Contractor and their ECoW(s) reporting on compliance of construction works, mitigation and activities on site against the ES and detailed CEMPs, as well as any obtained licenses, permits or assents. The Auditing ECoW will produce monthly reports (or otherwise agreed reporting deadlines in response to on site activities) and provide written and verbal feedback to the Construction Contractor and ECoW on	To ensure implementation of mitigation measures and legal requirements.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			performance and adherence with the ES, detailed CEMPs, licenses, permits and assents throughout the construction period, as required.	
Entire Newbuild Infrastructure Boundary	Design, Construction, Post-construction	D-BD-004	Ecological mitigation measures as detailed within the **Outline Landscape and Ecological Management Plan (OLEMP) (Document Reference: D.6.5.10**) will be implemented, with a Detailed Landscape and Ecological Management Plan (LEMP) to be produced at Detailed Design. The Detailed LEMP is included as a Requirement of the **Draft DCO (Document Reference: D.3.1)**	To maintain and enhance ecological features within the landscape.
Entire Newbuild Infrastructure Boundary~~Entire Newbuild Infrastructure Boundary~~	Design, Pre-construction~~Design, Pre-construction~~	D-BD-005~~D-BD-005~~	A pre-commencement walkover survey will be completed by the ECoW (or appointed ecologist) of areas within the Newbuild Infrastructure Boundary (extended where necessary to encompass a relevant zone of influence as determined by the ECoW/ecologist) of any areas that could not be accessed during baseline surveys completed in 2021 and 2022. The walkover survey shall include a ground level assessment of land in search of presence or activity of protected and or notable species. The walkover survey results will determine the need for additional survey, mitigation and/or licensing beyond that included within the ES; to be carried out in advance of construction commencement. Results of surveys and any needs for mitigation and licensing will be discussed with relevant stakeholders (.e.g Natural England, Natural Resources Wales, Environment Agency) where required, with amendments captured within the detailed CEMPs to be approved for the DCO Proposed Development.~~A pre-commencement walkover survey will be completed by the ECoW (or appointed ecologist) of areas within the Newbuild Infrastructure Boundary (extended where necessary to encompass a relevant zone of influence as determined by the ECoW/ecologist) of any areas that could not be accessed during baseline surveys completed in 2021 and 2022. The walkover survey shall include a ground level assessment of land in search of presence or activity of protected and or notable species. The walkover survey results will determine the need for additional survey, mitigation and/or licensing beyond that included within the ES; to be considered in advance of construction commencement. Results of surveys and any needs for mitigation and licensing will be discussed with relevant stakeholders (e.g. Natural England, Natural Resources Wales, Environment Agency) where required, with updates captured within the detailed CEMPs for the DCO Proposed Development.~~	To update baseline survey results and protect species and habitats.
Entire Newbuild Infrastructure Boundary	Pre-construction	D-BD-006	The need for pre-construction surveys to update baseline results across the Newbuild Infrastructure Boundary will be assessed by the appointed ecologist/ECoW following confirmation of Detailed Design of the DCO Proposed Development. Pre-construction surveys may be necessary to update baseline results in advance application of protected species licenses/permits/exemptions required to facilitate construction of the DCO Proposed Development.	To protect species.
Entire Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-014	Site/ vegetation clearance and tree felling will be kept to a minimum as far as practicable to reduce the impacts of habitat loss and fragmentation. Areas of clearance, particularly those within temporary works, shall be identified within a works plan and agreed with the ECoW.	To reduce impacts to flora and fauna, reduce habitat loss and fragmentation.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			Site clearance of dense vegetation will be undertaken carefully (where possible using hand tools) and by experienced contractors to reduce the risk of mortality to wildlife. Care will be afforded to dense stands of bramble or similar vegetation, which may be used by sheltering hedgehog or other wildlife, particularly during the winter months. Where trees and other woody vegetation are to be felled/ cleared, the felled material will, where practicable, be used to create hibernacula within appropriate retained habitats rather than being chipped. Locations will be identified by the appointed ECoW and agreed during Detailed Design of the DCO Proposed Development/during construction.	
Entire Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-015	Where lighting is required during construction, a suitable lighting design (where necessary on a case-by-case basis) for implementation across the DCO Proposed Development in accordance with best practice guidance on lighting with regards to protected species (**Ref. 9.60**), will broadly include: - Avoidance of direct lighting on any buildings or trees that contain bat roosts or barn owl nest/ roost sites; - Avoidance of artificial lighting of watercourses as far as practicable, particularly during the hours of darkness to prevent impacts to fish behaviour or passage, - Avoidance of light spill using directional and or baffled lighting; - The use of movement triggers, thus lighting only turns on when people (large objects) move through the area (use within Construction Compounds); - Positioning of lighting columns away from habitats of value to foraging and commuting bats and other nocturnal fauna (e.g. hedgerows, trees, woodland); - Reducing the height of lighting columns to reduce light spill onto adjacent habitats; - Undertaking works during daylight hours (broadly 08:00 to 18:00) reducing the need for night-time lighting; and/or - Avoid use of blue-white short wavelength lights and high UV content. The lighting design will be developed at Detailed Design based on guidance for lighting with regards to protected species **(Ref. 9.54)** and approved by the LPA. Bespoke lighting designs will be prepared for works locations where 24-hour working is required (e.g. River Dee crossing, A494 crossing, Church Lane crossing).	To reduce disturbance to fauna.
Entire Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-020	It is currently assumed that the Detailed Design alignment of the DCO Proposed Development will maintain a 30 m buffer from all sett entrances associated with the following identified main badger setts: • Sett 24 • Sett 29	To comply with conservation legislation and protect badger.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			• Sett 31 Where a 30 m buffer cannot be maintained, this will be discussed with the ECoW and may be reduced dependent on the type, extent and duration of works proposed. No direct impacts to main setts are anticipated as result of construction. Any indirect impacts to main badger setts will be assessed and associated mitigation to ameliorate impacts will be captured with a method statement. Where required, a Protected Species Licence (PSL) application will be made and subject to approval by NE/NRW. Only upon receipt of a granted licence can mitigation be implemented. Construction in the area of an identified main sett will only commence following completion of all licence requirements and implementation of all necessary mitigation.	
Entire Newbuild Infrastructure Boundary	Pre-Construction, Construction	D-BD-021	Prior to works commencing a pre-commencement walkover survey for badger will be undertaken of the works area and a 30 m buffer (extended at the discretion of the ECoW/appointed ecologist). The walkover survey will be undertaken by the ECoW to confirm that baseline results remain accurate and relevant. This is recommended to be undertaken at least three months in advance of works commencement. The Detailed Design alignment of the Newbuild Carbon Dioxide Pipeline will, wherever practicable, maintain a 30 m buffer from all sett entrances associated with annex, subsidiary and outlier setts. Where this is not possible, at the discretion of the ECoW and in response to the type, duration and extent of works, a reduction in exclusion buffer size may be granted. Where not possible, appropriate mitigation measures will be devised and captured within a method statement alongside an application for a PSL (where considered necessary). Mitigation measures may include the temporary or permanent closure and destruction of a sett under licence. Only upon receipt of a granted licence and following completion of all necessary licence requirements/mitigation can works commence. The following setts have been identified at risk of direct impacts as a result of construction of the DCO Proposed Development and will require full closure and destruction under licence to facilitate construction. • Sett 19 – Outlier • Sett 20 – Outlier • Sett 26 – Outlier • Sett 32 - Annex Setts requiring closure will be subject to PSL applications detailing proposed closure methods, mitigation recommendations (where necessary) and timeframes, in advance of construction commencement. The process and method of sett closure will be detailed within method statements, accompanying any licence application. Methods are broadly to follow: • Preparation of method statement and licence application with submission to relevant body.	To avoid adverse impacts to protected species and comply with conservation legislation

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			• Appointment of an appropriately experienced and licensed ecologist to oversee the closure process and adherence to licence requirements following granted licence receipt. • Installation of wire mesh and one-way gates on and around sett entrance/s. • A minimum period of 21 days monitoring post gate installation, to determine whether badger have vacated a sett. • If signs of badger re-entry are recorded, exclusion measures will be repaired and extended (as required) and the 21-day monitoring period restarted. • Following successful conclusion of 21-day period without badger activity or evidence, destruction of the sett by careful excavation under the supervision of the licensed ecologist (or named accredited agent). Sett closure and destruction is restricted to the period July to November inclusive. Only once the entirety of the sett exclusion period has been successfully completed (i.e. no evidence of badgers occupying or utilising the sett) can destruction of the sett take place and construction commence thereafter. Should a badger sett or activity be discovered within a zone of influence of proposed construction works, mitigation will be developed and, where required, an application for a derogation licence from NE / NRW will be applied for in advance of construction. Any necessary mitigation to facilitate construction will be implemented in advance of construction commencement (within that zone of influence) following receipt of a granted licence.	
Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-022	Due to the presence of badger within the Newbuild Infrastructure Boundary, badger permeable fencing will be used, where fencing is required to allow the free movement of badger through the landscape. It may be necessary to implement temporary badger-resistant fencing around spoil heaps/storage locations to prevent any attempts of sett creation/excavation. Where possible, spoil will be stored in heaps with shallow angles to dissuade badger from sett creation attempts. Spoil heaps will be left *in situ* for as short a duration as possible, or else covered and secured with appropriate material (e.g., tarpaulin), where considered required by the ECoW.	To avoid adverse impacts to badger movement within the landscape
Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-023	To prevent entrapment of wildlife, where trenches or voids are to be left overnight, a suitable means of escape will be provided (such as a ramp at no greater than a 45° angle) at regular intervals along the excavated trench channel/excavations. Any void/trench channel should be visually inspected prior to re-starting works each morning to confirm the absence of entrapped wildlife. All escape measures will be discussed and agreed with the ECoW to ensure they are suitable for the size of void and wildlife that may become trapped. Any exposed tunnels or pipes will, where practicable, be covered or capped to prevent access to wildlife. If deemed appropriate, the ECoW may enforce additional measures such as the installation of temporary amphibian/ reptile fencing around voids / trenches to prevent entry.	To protect wildlife.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
Confirmed Bat Roosts	Pre-construction and Construction	D-BD-024	Bat roosts (excluding maternity or hibernation roosts) have been identified during baseline surveys. Bat roosts identified to date include: - B97 (single common pipistrelle Pipistrellus pipistrellus day roost); - B113 (single common pipistrelle day roost); and - B133 (Four common pipistrelles and three soprano pipistrelles day roost). Seventeen tree roosts comprising; - T1 (single common pipistrelle potential day roost); - T49 (single soprano pipistrelle day roost); - T70 (single soprano pipistrelle day roost); - T111 (single common pipistrelle and single Myotis sp. day roost); - T159 (single soprano pipistrelle day roost); - T190 (single common pipistrelle day roost); - T200 (single soprano pipistrelle day roost); - T220 (single common pipistrelle day roost); - T234 (single soprano pipistrelle day roost); - T238 (two soprano pipistrelle's day roost); - T283 (single common pipistrelle day roost); - T325 (potential brown long-eared Plecotus auritus bat day roost along the tree line associated with T325, T326 and T327); - T326 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327); - T327 (potential brown long-eared bat day roost along the tree line associated with T325, T326 and T327); - T365 (single common pipistrelle day roost);and - T371 (single common pipistrelle day roost). Where structures and trees were not subjected to a full suite of dusk emergence and dawn re-entry surveys, due to access restrictions, the likely presence of a bat roost was assumed using a precautionary approach. Five structures and 35 trees were precautionarily assessed as a bat roost, comprising;	To protect the Conservation Status of local bat populations.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			- B79, B80, B125, B126, and B127; and - T4, T11, T13, T16, T17, T18, T25, T26, T27, T28, T34, T36, T37, T165, T230, T265, T349, T376, T377, T419, T422 – T431, and T435, T491, T495, T496 and T499. Where practicable, trees containing roosts will be retained and an exclusion buffer of a minimum of 10 m demarcated around the identified tree to reduce disturbance during construction. The ECoW will assess potential for disturbance in response to the type, duration and extent of works proposed in proximity to known roosts, advising of the need to implement mitigation or else apply for a European Protected Species Licence (EPSL) to facilitate works. A EPSL application will be required where trees with confirmed bat roosts cannot be retained or safeguarded, and roosts will be lost. Further surveys to ascertain roost type, species present and number of bats may be required in advance of any EPSL application to allow the preparation of a suitable method statement detailing methods of felling and necessary mitigation for roost loss. Works will be undertaken in compliance with the licence when granted.	
Confirmed Bat Roosts	Pre-construction and Construction	D-BD-025	Maternity or hibernation bat roosts identified during baseline and pre-commencement surveys will be retained and an exclusion buffer of a minimum of 30m physically demarcated around any identified tree or structure to safeguard roosts from construction affiliated impacts. Should the ECoW determine that construction works type, duration, extent poses a risk to the integrity of a roost it may be necessary to implement seasonal restrictions on work outwith the recognised maternity or hibernation period for the species identified. Where this is not possible it will be necessary to apply for an EPSL, devising appropriate mitigation to mitigate for loss/disturbance to a roost. Maternity roosts known to date include T321 (noctule *Nyctulus noctula* maternity roost). It is not currently anticipated that any maternity or hibernation roosts will be lost as a result of construction of the DCO Proposed Development.	To avoid adverse impacts on protected species To protect the Conservation Status of local bat populations.
Confirmed Bat Roosts	Pre-construction and Construction	D-BD-026	The Detailed Design alignment of the Newbuild Carbon Dioxide Pipeline will wherever practicable, physically demarcate a minimum 10 m exclusion buffer around all buildings with confirmed bat roosts. Where this is not possible, potential impacts to roosts will be assessed in respect of the type, extent and duration of works proposed, by the ECoW. At the discretion of the ECoW it may be possible to reduce the exclusion buffer. Where risk of damage/disturbance of a roost persists after assessment, an EPSL will be applied for, with works only allowed to proceed following receipt of a granted licence from NE/NRW and implementation of any necessary mitigation.	To avoid adverse impacts on protected species To protect the Conservation Status of local bat populations.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
All trees within the Newbuild Infrastructure Boundary	Pre-Construction, Construction	D-BD-027	Trees proposed for felling that recorded Moderate or High suitability for roosting bats (see **Bat Activity Survey Report, Appendix 9.3; Volume III**) will be subject to an aerial tree-climbed inspection by a suitably licensed ecologist, and/or dusk emergence or dawn re-entry survey no more than 24 hours prior to pruning/felling to confirm that baseline conditions remain the same. Should a bat roost be recorded, a method statement detailing appropriate mitigation will accompany an EPSL application for submission to the relevant statutory body. Only upon receipt of a granted licence and implementation of necessary mitigation (as detailed within the licence application) can works take place.	To confirm the presence or absence of roosting bats.
Trees and Structures with suitability to support roosting bats	Pre-construction and Construction	D-BD-028	Pre-commencement surveys will be completed to update baseline survey results to inform the EPSL application or the Bat Mitigation Class Licence (if suitable). Surveys will be undertaken during the active bat season before construction commencement (May to August inclusive). Full details of mitigation and compensation will be presented within the EPSL Method Statement and associated documents. Works will also be completed under a bat method statement, associated documents and work schedule (as part of the EPSL) and a PWMS (for land which falls outside the licensable extent) which will detail: - The method, scope and requirement of pre-commencement surveys. - The timing of works, which will be agreed in advance with the relevant statutory body and dependant on the species and type of roost identified, following completion of updated pre-commencement baseline surveys. - Felling protocols. - Compensation requirements (for example, erection of compensatory bat boxes at an expected ratio of 3:1), which will be required to be installed ahead of any felling of trees covered within the EPSL. - Toolbox talks which will be carried out by the Named Ecologist (or accredited agent) and will provide a briefing to the site operatives to outline the planned works at each roost location, actions required if a bat is found, and their legal responsibility regarding bats and their roosts. Mitigation and compensation requirements are subject to agreement with NE/NRW.	To protect the Conservation Status of local bat populations
Trees with Moderate and High suitability for roosting bats (but not confirmed roosts)	Pre-construction and Construction	D-BD-029	Upon completion of the update pre-construction baseline surveys, those trees where suitability for roosting bats remain as Moderate or High suitability and although presence of a roost has not been confirmed, will be soft felled under ecological supervision (by a suitability experienced and licenced ECoW). Soft felling will consist of the removal of major branches and limbs followed by section felling of the main trunk. Sections of trees with features will suitability to support bats will be lowered to the ground for inspection by the bat licenced ECoW. In the event a bat or roost is identified works will cease and liaison with NE/NRW sought for further advice.	To protect potential roosting bats.
All trees within the Newbuild	Pre-construction and Construction	D-BD-030	Where practicable, and as the primary position, and at the discretion of the ECoW, where trees with features suitable for roosting bats (but absent of roosting bats as determined through surveys) are	To maintain roosting opportunities for bats.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
Infrastructure Boundary			required to be felled to facilitate construction, these will be felled in such a way so as to retain the potential roost feature/s. These features will then be translocated and erected on nearby retained trees under direction of the ECoW or suitably bat licensed ecologist to retain future viability of the feature as a roost. Secondly to the above, where trees with suitable roost features (but absent of bat roosts as determined through surveys) are to be lost, and it is not practicable or possible to retain potential roost features for erection on nearby retained trees; veteranisation of retained trees and creation of monoliths will be explored within the Newbuild Infrastructure Boundary under direction of the ECoW or suitably bat licensed ecologist, to enhance landscape opportunities to support roosting bats. Monoliths may be moved from the original tree location and erected in alternative areas under the supervision of a bat licensed ecologist. Where trees with potential roost features are felled, nearby retained trees will be assessed for the potential of veteranisation, with a view to creating future roosting opportunities. Veteranisation will be conducted by a suitably experienced practitioner under the advisement of a bat licensed ecologist.	
Hedgerows within the Construction Easement	Construction and Post-Construction/Operation	D-BD-031	Where open cut trenching results in loss of sections of good or excellent assessed hedgerows, artificial (faux) hedgerow measures will be employed during construction to maintain the 'structure' of hedgerows to ensure bat foraging and commuting routes are not adversely impacted during works. Poor hedgerows will only be considered for artificial hedgerow deployment where they provide key connectivity into an excellent hedgerow, but as a default position will not be subject to faux hedgerow deployment. To mitigate impacts on identified bat foraging and commuting routes, artificial hedgerows will be utilised following removal of hedgerow sections throughout the construction period and until such time that reinstatement planting has been completed for good hedgerows, and until planting has established for excellent hedgerows. Establishment will be assessed by the ECoW (as part of post-construction monitoring of reinstated habitats – see the **OLEMP Document Reference: D.6.5.10)** and faux hedgerows only removed once establishment is considered successful (i.e. akin to the structure of retained hedgerow sections). Faux hedgerow design will be determined during Detailed Design of the DCO Proposed Development, but may include the use of straw bales, tall shrubs in pots, live willow screening.	To avoid adverse impacts to protected species and comply with conservation legislation. To maintain commuting and foraging routes,
Hedgerows within the Construction Easement	Construction and Post-Construction/Operation	D-BD-032	Post construction, all hedgerows subject to hedgerow loss to facilitate construction will be reinstated with native species of local provenance in-keeping with the overall species compositions of hedgerows. Reinstatement will comprise a combination planting of whips and standard-sized shrubs. Planting shall be selected in order to match as close as possible, the height of any adjacent retained hedgerow. Hedgerows directly impacted as a result of Newbuild Carbon Dioxide Pipeline construction (i.e. those not impacted as a result of Construction Compounds) will be reinstated within 1 year of impact. Hedgerows identified as Important Foraging and Commuting Routes (Important FCRs) will be planted with whips alongside double the amount of standard-sized shrubs to provide more instant hedgerow structure.	To avoid adverse impacts to protected species and comply with conservation legislation. To maintain commuting and foraging routes.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			Important FCRs are classified as those with bat activity levels considered significant for the conservation of the species recorded and that are retained as, or categorisation increased to, 'Excellent' as detailed within **Bat and Hedgerows Assessment, Appendix 9.4; Volume III.**	
Hedgerows within the Construction Easement	Construction and Post-Construction/Operation	D-BD-033	Following planting of all impacted hedgerows post construction, those hedgerows identified as Important FCRs will be supplemented through the installation of temporary flight lines (the design of which to be agreed at Detailed Design) to maintain linear structure whilst planted sections establish. In addition, such hedgerows will be subject to monitoring through monthly crossing point surveys during the first active bat season following hedgerow reinstatement (period May to September inclusive) to determine use (or otherwise) by target species (for example lesser horseshoe *Rhinolophus hipposideros* and activity levels considered sufficiently high to affect the favourable conservation status of other species (e.g. brown long-eared bat *Plecotus auritus* and *Myotis* species). Where absence of use or reduced use when compared with baseline survey results is recorded, additional measures will be considered and introduced, for example, potential planting of larger shrub species to provide greater hedgerow structure. In instances where further planting is required, further crossing point surveys undertaken on a monthly basis across the subsequent active bat season will be carried out. Only once the planted hedgerow section has established to levels akin to the unimpacted hedgerow, as assessed by an appropriately experienced ecologist, can the artificial flight line be removed.	To avoid adverse impacts to protected species and comply with conservation legislation To maintain commuting and foraging routes
Watercourses of Moderate/High/Confirmed suitability for riparian mammals	Pre-construction	D-BD-034	A pre-commencement survey in search of evidence/activity of riparian mammals (namely otter and water vole) in watercourses crossed by the DCO Proposed Development, and those within an appropriate buffer of proposed works. Surveys should include all sections of watercourses within the Working Width, extending to 150 m either side of the Working Width, as a minimum. This should also include watercourses not crossed but within potential disturbance distance of construction works at the discretion of the ECoW/appointed ecologist. Surveys will be undertaken at least 3 months prior to construction works commencing to confirm baseline conditions and mitigation proposals remain accurate or else inform requirements for new mitigation and/or licencing.	To protect riparian mammals and update riparian mammal baseline data to inform an EPS Licence application.
West Central Drain, Hapsford Brook, Thornton Ditch 3, 5 & 7, River Gowy Trib 2	Pre-construction and Construction	D-BD-035	At watercourses with confirmed water vole presence (West Central Drain A and B, Hapsford Brook, River Gowy, Thornton Diches 4, 5a, 5b, 6, 7a, 7b and 8, Thornton Main Drain, and Gowy Tributary 2), vegetation clearance will be required as part of displacement method mitigation techniques, under licence as per best practice guidance. In the absence of a second survey visit (due to access restrictions), a precautionary assessment has been applied with presence of water vole assumed. These watercourses comprise East and West Central Drains and Elton Land Ditches, Gale Brook, Stanney Main Drain and Stanney Mill Brook, and Alltami Brook. Vegetation clearance (by strimming or turf stripping) will aim to make habitat unsuitable for water vole and will cover a maximum span of 50 m along each bank from proposed crossing locations where open-cut trenching is required. Vegetation clearance will be completed between February and April inclusive under	To avoid adverse impacts to water vole and comply with conservation legislation.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			supervision of a licensed ecologist and will be maintained until such time that works commence to ensure continued discouragement of water vole from proposed crossing locations. Vegetation clearance will only take place following confirmation that nesting birds are absent from the area of works if undertaken during the nesting bird season March to August inclusive. At the commencement of works, banks will be excavated under supervision of the ECoW (or other licensed ecologist) and burrows carefully excavated and destroyed. In the unlikely event water vole are encountered during the excavation process works will cease and consultation sought from NE/NRW.	
Watercourses	Pre-construction and Construction	D-BD-036	Where culverts are to be installed, provision of mammal ledges to facilitate passage of mammals will be included, where practicable and where culvert design allows. This will include the incorporation of mammal ledges into the culvert design to provide safe passage for mammals. Where temporary culverts are to be installed, these will remain in place for as short a time as practicable only to serve facilitating construction. Reinstatement of habitats following culvert removal will be undertaken where considered necessary by the ECoW, or else left to naturally regenerate.	To avoid adverse impacts to protected species and comply with conservation legislation.
Location of compensation barn owl boxes	Pre-construction and Construction	D-BD-037	Whilst known barn owl roost and nest sites will be avoided and retained where possible, exclusion of barn owls from barn owl boxes and other features may be required under licence. Where this is required, a minimum of 30 days prior to the exclusion works compensatory barn owl boxes (at a ratio 1:1) will be erected in suitable locations under supervision of an appropriately licensed ecologist, where practicable, within 250 m of the feature/box being excluded to compensate for the temporary loss of roosting and/or nesting sites. Erected boxes will be sited in locations that will not be subject to disturbance or impact by construction under the advice of a barn owl licensed ecologist. The following features are currently known to require exclusion prior to construction commencement: • Barn Owl Box - BOB3; and • Tree T465 Where a feature was not subjected to a full suite of vantage point surveys, due to access restrictions, the likely presence of a nest site was assumed using a precautionary approach. This applies to; • T471 Following the completion of construction works and the removal of Construction Compounds, any barn owl features temporarily excluded will be re-opened for use by barn owl.	To compensate for the temporary loss of barn owl nesting / rooting sites and protect barn owl.
Barn owl features	Pre-construction	D-BD-038	Trees listed within the Newbuild Infrastructure Boundary that recorded suitability for barn owl (**Barn Owl Survey Report (Confidential), Appendix 9.7, Volume III)** will be subject to an ecological inspection during the winter period (October – February inclusive) prior to works commencing. Where no evidence of nesting barn owl is visible, features will be temporarily blocked up until construction works and activities	To reduce the impact to barn owl disturbance

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			within a 250 m buffer have been completed. Upon completion of construction works, features will be unblocked.	
Within proximity of a known barn owl roost	Pre-construction and Construction	D-BD-039	Known barn owl roost or nest sites will be avoided and retained where possible. Where this is not possible, and where barn owl are likely to be temporarily impacted, suitable mitigation measures will be employed under licence, and will include the use of exclusion techniques (e.g. blocking up of features with material or otherwise affixing an exclusion device over a feature) on features suitable for use by barn owl (e.g., barn owl boxes or trees) prior to the nesting season (March to August). The means of exclusion will be assessed, and installation supervised by an appropriately licensed ecologist.	To comply with conservation legislation and protect barn owl
Within proximity of a known barn owl roost	Pre-construction and Construction	D-BD-040	Construction in proximity to barn owl nest sites that have not been subject to temporary exclusion measures (i.e. nests that have established after construction commencement) will be temporarily and spatially restricted to avoid or reduce impacts of disturbance in accordance with the below criteria (developed in accordance with good practice); • Pedestrian movement of a Low to Medium Disturbance Risk, e.g., site personnel walking near nests / roosts, will implement a Minimum Protection Zone of 20 m • Artificial lighting of a Low to Medium Disturbance Risk, e.g., illumination of works area (no direct lighting or nest/roost), will implement a Minimum Protection Zone of 30 m • Vehicular movements of a Medium Disturbance Risk, e.g., vehicles or heavy plant moving past nest / roost sites, will implement a Minimum Protection Zone of 40 m • General light building and landscape works of a Medium to High Disturbance Risk, e.g., laying concrete, using mechanised plant will implement a Minimum Protection Zone of 60 m • Heavy construction of a High Disturbance Risk, e.g., piling or compaction works, ground levelling, crushing of materials will implement a Minimum Protection Zone of 175 m It is assumed that works will be undertaken during daylight hours, however, some night-time work will be required. Where works need to be conducted within the minimum protection zone these will be discussed with the ECoW, and where necessary a barn owl licensed ecologist, who will assess the proposed works, duration and extent and potential use of mitigation to facilitate works. Where works are deemed to pose a significant risk to nesting barn owl, licensing may be required and/or the rescheduling of works to periods outwith the most sensitive period (March to June inclusive), however, this would be at the discretion of the ECoW/barn owl licensed ecologist.	To comply with conservation legislation and protect barn owl

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
Entire Newbuild Infrastructure Boundary	Pre-construction, Construction	D-BD-041	Invasive Non-Native Species (INNS) are present within the Newbuild Infrastructure (**Habitats and Designated Sites Survey Report, Appendix 9.1; Volume III**). A Biosecurity Method Statement will be implemented throughout the construction of the DCO Proposed Development. The Biosecurity Method Statements will detail the locations and extent of any INNS and other biosecurity concerns, appropriate measures to control, prevent further spread or eradicate the species from the area if necessary. Appropriate good hygiene measures (e.g., Check, Clean, Dry methods) will also be included. Workers should be equipped with the necessary equipment, Personal Protective Equipment (PPE) and substances to implement biosecurity control measures, including effective hygiene and sanitation practices. This will most frequently comprise disinfectant tablets, sprayers, and brushes to clean and disinfect equipment and PPE prior to entering/leaving construction areas. Other noteworthy biosecurity considerations (e.g. avian flu, bovine TB) will also be referenced within the Biosecurity Management Plan, as included as a Requirement of the **Draft DCO** (**Document Reference: D.3.1**).	To prevent the spread of invasive species and manage other biosecurity concerns.
Entire Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-042	Where INNS are located and within the construction corridor, engagement of an INNS specialist will be sought whom will provide options for treatment and or removal in advance of construction. Any remaining stands of INNS will be subject to exclusion zones which will be clearly and physically demarcated and enforced around areas of invasive species to avoid spread or propagation. The extent of buffer will be determined by the species and in consultation with the ECoW. Biosecurity measures, as detailed within a Biosecurity Management Plan to be prepared at Detailed Design will be implemented during construction to prevent the spread of INNS.	To prevent the spread of invasive species and manage other biosecurity concerns.
Entire Newbuild Infrastructure Boundary	Pre-construction and Construction	D-BD-043	Vegetation and site clearance works will be undertaken outside the bird nesting period, recognised as March to August inclusive, to avoid damage or destruction of nests. Where this is not possible, site clearance will be preceded by an inspection from an experienced ECoW within 24 hours of clearance works commencing to confirm the absence of active nests or nesting activity. If an active nest is recorded, a minimum exclusion zone of 5 m, where practicable, within which no works can take place (exclusion zone size will be at the discretion of the ECoW and in response to the species of bird encountered) and remain in place until the nest is confirmed inactive (either eggs hatch and chicks have fledged, or the nest attempt fails). All cleared vegetation will be rendered unsuitable for nesting birds, for example, by covering or chipping depending on the end purpose of the vegetation or will be removed from the works area.	To protect nesting birds.
Within 250 m of confirmed GCN ponds	Pre-construction and Construction	D-BD-044	Given the confirmed presence of GCN within the below listed waterbodies, an EPS Licence will be required to enable the construction of the DCO Proposed Development. England: 43, 46, 166, 167, 168, 169, 171; Wales: 9, 14, 15, 31, 35, 38, 49, 154, 155, 157, 161. The following ponds have been assessed as precautionarily having GCN presence:	To protect the Conservation Status of local GCN populations.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			England: 42, 47, 48, 49, 52; Wales: 10, 11, 12, 50, 121, 148. Although only a single pond (Pond 141) will be permanently lost as a result of the DCO Proposed Development, suitable terrestrial habitat in close proximity to known GCN ponds will be temporarily or permanently impacted. Works will proceed under a GCN Precautionary Working Method Statement (PWMS) under ECoW supervision. This will include a provision for suitable timing of works to take place, i.e., where terrestrial habitat suitable for overwintering GCN is to be cleared, this will only be done during the active GCN season, generally from March to September, when overnight temperatures are consistently above 5°C. Clearance of such terrestrial habitat will be subject to inspection, at the discretion of the ECoW, in advance of clearance. Within England, works pertaining to great crested newt will be carried out under a Natural England District Level Licence. However, areas within the Red Risk Zone within England will not be covered under a District Level Licence and will be subject to a traditional EPS licence application, with avoidance and any necessary mitigation captured within the PWMS, supporting the licence application.	
Suitable terrestrial habitat within 250m of confirmed GCN ponds	Pre-construction and Construction	D-BD-045	Where suitable GCN terrestrial habitat will be impacted, either temporarily or permanently, habitat clearance will take place prior to construction works. This will be undertaken under a PWMS and ECoW supervision and will include; - Prior to the commencement on site, it is recommended all site operatives attend a briefing from the ECoW. This will include a description of the location of known GCN populations in proximity to the works area, legislative policy, identification of GCN and other amphibians, how works will proceed under a PWMS and what occurs in the event a GCN, or other species, is found. - The gradual strimming of vegetation following ECoW inspection of vegetation to a short sward. Vegetation should be inspected by the ECoW, and if clear, strimmed to 10 cm; then checked again by the ECoW before strimming to ground level. Vegetation should then be maintained as a short sward for the duration of the construction works. - The deployment of newt-proof fencing to isolate works areas. The use of GCN Detection Dogs will also be employed to aid the ECoW prior to works commencing. GCN Detection Dogs will be used across large areas of habitat, and will include woodland, hedgerows and grassland habitat that requires clearance or will be impacted by construction activities.	To protect GCN and other amphibians
Watercourses	Pre-construction, Construction	D-BD-046	Where practicable, construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release. The Detailed Design construction programme will seek to target construction activities involving watercourses during drier summer months to reduce this risk, whilst taking into account the seasonal windows for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.	To avoid adverse impacts on water quality and aquatic species

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			Where this is not possible, the ECoW will assess the need for mitigation and/or permits to facilitate construction to prevent adverse impacts as a result of construction. Only once mitigation and/or permits are in place can works then proceed.	
Watercourses	Construction	D-BD-047	Turbidity monitoring to be undertaken by an Ecological Clerk of Works (ECoW) during the Construction Stage where deemed required due to the sensitivity of aquatic species receptors. The need and frequency of turbidity monitoring will be determined by the regulatory authority and detailed in any required permits for undertaking work within or near watercourses.	To avoid adverse impacts on water quality and aquatic species
Watercourses	Design, Construction	D-BD-048	Channel and banks will be reinstated to mimic baseline conditions as far as practicable to ensure more natural bank forms and in-channel features and morphological diversity. This includes reinstatement of an appropriate vegetation assemblage and structure within the riparian zone along with enhancements to the riparian zone to off-set impacts. Any tree loss will be compensated for in accordance with the site wide replanting strategy.	To minimise and avoid impacts to waterbodies and associated riparian and aquatic receptors
Watercourses	Design, Construction	D-BD-049	Where practicable, any habitats within watercourses that have been removed will be reinstated, such as riffles, pools, point bars, berms, large wood, log jams, cross-sectional and planform variation. Any reinstatement will be ensured to not cause other potential impacts, such as increase flood risk.	To minimise and avoid impacts to aquatic habitats
Fish	Construction	D-BD-050	Where necessary and practicable, the installation of temporary culverts and causeways/access routes within watercourses will avoid sensitive fish migration and spawning periods; • 1 October to 31 April - European eel, lamprey and salmonids. • 15 March to 15 June - Coarse fish. The requirement for such structures would be determined during the Detailed Design stage of the DCO Proposed Development. Where unable to be accommodated outwith fish migration and spawning periods, liaison with NRW/EA will be required with applications for exemptions sought.	To avoid adverse impacts to protected species and comply with conservation legislation
Fish	Design, Construction	D-BD-051	Temporary culverts required on main watercourses (i.e. not field ditches) will be suitability sized and designed/installed to Environment Agency Fish Pass standards (**Ref. 9.65)** to facilitate passage of eel, lamprey, salmonids and coarse fish species.	To avoid adverse impacts to protected species and comply with conservation legislation.
Aquatic species	Construction	D-BD-052	Temporary culverts and causeways/access routes will be removed as soon as practicable when no longer required.	To avoid adverse impacts to protected species and comply with conservation legislation
Watercourses	Construction	D-BD-054	Temporary discharges will comply with the requirements for permits on Main Rivers from the Environment Agency, both regarding acceptable discharge volumes and water quality.	To avoid adverse impacts to sensitive watercourses

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
				and comply with conservation legislation
Fish	Pre-construction, Construction	D-BD-056	Where fish communities have been identified at a crossing point location, updated surveys will be undertaken prior to works commencing and where practicable, works will avoid risk of impacts to fish populations through seasonal timings of works to account for migration and spawning periods. Where it is not possible to avoid seasonal sensitivities, applications for exemptions from the Environment Agency or NRW will be sought on a case-by-case basis. Only upon receipt of granted exemptions and implementation of any necessary required mitigation can works commence.	To avoid adverse impacts to protected species and comply with conservation legislation
Fish	Pre-construction, Construction	D-BD-057	Sensitivity (to noise and vibration) of those fish species present will be considered to ensure that appropriate construction methods can be implemented to minimise and avoid disturbance or avoidance behaviour. Implementation of a Noise and Vibration Management Plan, is included as a Requirement of the **Draft DCO** (**Document Reference: D.3.1**), to be prepared at the Detailed Design stage, will include, where practicable; soft-starts to pile driving to enable fish dispersal, utilisation of press or vibratory pile driving methods, and phased or intermittent work schedules (break periods) to allow for windows of fish recovery and movement through the works area.	To avoid adverse impacts to protected species and comply with conservation legislation
Fish	Pre-construction, Construction	D-BD-058	Where possible and practicable, seasonal timings of works will aim to avoid risk of impacts to fish populations to account for sensitive life cycle stages (migration and spawning). Where this is not possible, the Construction Contractor will seek exception from Environment Agency on a case-by-case basis. Seasonal restrictions for consideration are: • 1 October to 31 April - European eel, lamprey and salmonids. • 15 March to 15 June - Coarse fish. Only upon receipt of granted exemptions and implementation of any necessary required mitigation can works commence.	To avoid adverse impacts to protected species and comply with conservation legislation
Watercourses	Construction / Operation	D-BD-059	Where works are required on the watercourse banks, or in-channel, vegetation clearance will be restricted to the minimum required for the construction working area and will be undertaken only immediately prior to the commencement of those works, except for other circumstances where earlier clearance may be required due to the presence of protected species. Vegetation will be re-established as soon as practicable. If necessary, and where practicable, additional measures such as geotextiles (biodegradable and non-biodegradable), willow whips, mulching, brushwood mattresses etc. will be used to protect soils before vegetation has re-established, particularly on the watercourse banks.	To minimise adverse impacts to watercourses and associated riparian and aquatic receptors.
Watercourses	Construction / Operation	D-BD-060	Seeded biodegradable fibre matting will be used to encourage re-vegetation after works on, or near, the banks of each watercourse (except field drains unless otherwise advised by the ECoW) disturbed by the works to reduce establishment time and to help support bank structure. A suitable seed mix appropriate for the production of a tussocky species-rich sward will be used to mitigate for the loss of habitats suitable to support riparian mammals. Where appropriate, willow whips will be installed to both provide green bank	To minimise adverse impacts to watercourses and associated riparian and aquatic receptors.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			protection and to mitigate loss of riparian habitat. A sediment boom will be used downstream of the temporary crossing to intercept any sediment artificially mobilised during the Construction Stage.	
Watercourses	Construction	D-BD-061	During any river dewatering and/or in-channel working, an ecological watching brief and fish rescue plan will be employed. Where areas are required to be temporarily dewatered to facilitate construction activities, fish will be removed by means of electrofishing under Environment Agency consent and relocated upstream prior to dewatering. Suitable temporary channels may be implemented to divert water during culvert construction works. Any environmental permit(s) shall be obtained and in place prior to the creation of a temporary dry channel. The construction of a temporary channel shall be undertaken in accordance with the mitigation measures contained within the within the detailed CEMPs and any other relevant measures prescribed by granted permits from NRW/EA. Works will be subsequently undertaken under ECoW supervision. A pump may be required to divert flows during construction. Where this occurs, the ECoW shall be in attendance and a 2 mm screen fitted on the transfer intake to minimise the risk of fish and eel entrainment.	To avoid adverse impacts to protected species and comply with conservation legislation
Newbuild Infrastructure Boundary	Construction, Post-construction	D-BD-062	Reinstatement of HPI habitats will take place post construction, however, recognising the need to reinstate with alternative habitats should former habitats potentially interfere with the buried pipeline (e.g. where trees are removed and cannot be reinstated, scrub will be planted as an alternative). Species will comprise native species of local provenance and will comprise a mixture of species (**OLEMP (Document Reference: D.6.5.10**)). Planting should be undertaken in the appropriate planting season but as soon as possible following completion of the works to reduce the likelihood of undesired colonisation by flora or INNS. Non-HPI/BAP habitats impacted by construction will be reinstated on a like-for-like basis at the locations of loss/impact. Where adjudged appropriate, certain habitats may be left to naturally recover or otherwise be left to be managed by landowners, rather than be subject to dedicated mitigation planting/sowing (e.g. arable fields, pasture grassland). Habitats requiring mitigation planting/sowing will be determined during the Detailed Design of the DCO Proposed Development and captured within a final **Landscape and Ecological Management Plan**. Reinstated habitats will be monitored and managed for a minimum 5-year period post reinstatement. Any dead or dying plants will be removed and replaced during the monitoring period.	To compensate for the loss of habitats.
Woodland and trees	Construction, Post-construction	D-BD-063	Where woodland and trees are to be lost to facilitate construction of the DCO Proposed Development, these will be mitigated for through the planting of trees across areas identified within the **D.2.4 -Work Plans**. Trees will be replaced at a ratio of 3:1 and will comprise planting of native species of local provenance, in-keeping with woodland within the wider landscape. Areas for planting have sought to prioritise areas on the basis of connections to, and to enhance, existing green infrastructure, for example the inclusion of areas associated with functionally linked woodland of the Deeside and Buckley Newt SAC either side of Alltami Brook. Management of newly planted woodland and trees will be prescribed by the detailed LEMP but will broadly follow management across a 10-year period during establishment, to be	To mitigate for the loss of woodland and trees.

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
			developed at Detailed Design. Management of other habitat types (e.g. scrub and riparian planting) will be subject to a 5-year management plan.	
Watercourses	Construction	D-BD-064	The Construction Contractor will, as far as practicable, seek to reduce watercourse crossings for those watercourses that do not intersect the Newbuild Infrastructure Boundary, and/or those with a partial extent or reach within the Newbuild Infrastructure Boundary.	To minimise impacts on aquatic fauna and flora through a reduction of potential watercourse crossings
Entire Newbuild Infrastructure Boundary	Decommissioning	D-BD-065	In advance of decommissioning works, ecology surveys will be undertaken, where required, to determine the ecological baseline and presence, or otherwise, of protected and/or notable species to determine any mitigation or licensing requirements in advance of decommissioning works commencement.	To minimise adverse impacts on protected/notable species and habitats.
Entire Newbuild Infrastructure Boundary	Construction	D-BD-066	Opportunities for enhancement will be identified during the Detailed Design and throughout construction of the DCO Proposed Development. Enhancement opportunities will be reflected within the detailed CEMPs as and where identified, but may include: • Where possible, cleared deadwood, felled trees and arisings from site clearance works will be used in a variety of locations to benefit wildlife. These locations will be determined by the ECoW and based on site conditions at the time. Materials will be stored in a suitable location away from the working area to prevent risk of damage and then placed within areas of retained woodland or woodland planting at an appropriate time. • Additional bat and bird nest boxes could be installed on suitable mature trees/structures or mounted on poles. Bat boxes will be installed in unlit areas on multiple aspects (including facing south, west or east) at a height of a minimum of 3m and have a clear flight path to the access point. The bat boxes will be located within existing or newly created suitable foraging and commuting habitats. The requirements of the bird boxes will be specific to the type installed and manufacturers advice will be followed. The bat and bird boxes could be placed within existing retained woodlands, during construction or once mature, the boxes could be placed within newly created woodlands, (on poles or mature existing trees along the edge), post-construction.	To provide opportunities for biodiversity
Entire Newbuild Infrastructure Boundary~~Entire~~	Construction~~Construction~~	D-BD-067~~D-BD-067~~	During or following Detailed Design, the Construction Contractor will undertake a sensitivity test of the Habitats Regulations Assessment (HRA) should any of the project parameters change (as assessed within the HRA). The sensitivity test will seek to confirm that the conclusions of the HRA remain valid.	To protect biodiversity and ensure legal compliance

Receptor/Location	Timing of Mitigation Measure	Ecological Mitigation Measure REAC Reference	Description	Mitigation Purpose or Objective
~~Newbuild Infrastructure Boundary~~			~~During or following Detailed Design, the Construction Contractor will undertake a sensitivity test of the Habitats Regulations Assessment (HRA) should any of the project parameters change (as assessed within the HRA). The sensitivity test will seek to confirm that the conclusions of the HRA remain valid. If the assessment or conclusions within the HRA change, the Construction Contractor will produce an updated HRA for review and agreement with the statutory regulator(s).~~	with the Habitats Regulations
Entire Newbuild Infrastructure Boundary	Operation	D-BD-068	Post construction monitoring will be undertaken in accordance with the proposed LEMP as included as a Requirement of the **Draft DCO** (**Document Reference: D.3.1**). Protected species licences required to facilitate construction will also require a period of monitoring post implementation which will be included within the LEMP and the Operations and Maintenance Environment Management Plan (which is as a Requirement of the **Draft DCO (Document Reference: D.3.1)**. The Operations and Maintenance Environment Management Plan will be developed from the detailed CEMPs and the LEMP and will detail monitoring and management requirements and future maintenance arrangements that must be adhered to through the operation of the DCO Proposed Development.	To protect and maintain biodiversity and comply with conservation legislation

9.11. RESIDUAL EFFECTS

9.11.1. No significant residual effects are anticipated as a result of construction, operation or decommissioning of the DCO Proposed Development. Table 9.13~~**Table 9.13**~~ below summarises the assessment of likely significant effect classifications for ecological receptors and the measures employed to reduce the significance of effect. Measure references correspond to those presented in Table 9.10~~**Table 9.10**~~ and Table 9.12~~**Table 9.12**~~**.**

9.11.2. If taken forward, the Alltami Brook embedded pipe bridge option would result in a change in the residual effects ~~within **Section 9.11** of Chapter 9 **[AS-025]** and ES Addendum 1 **[CR1-124]**~~ during the decommissioning stage only.

9.11.3. In the event that the Alltami Brook embedded pipe bridge is taken forward, potential residual effects upon the below receptors have been precautionarily identified. These have been identified based on the impacts of decommissioning and removal of the embedded pipe bridge being akin to those anticipated during the construction stage. Following the implementation of mitigation, the following receptors have been precautionarily assessed to be at risk of residual effects that are *Minor Adverse (Not Significant)***:** Statutory Designated Sites (consideration of functionally linked woodland habitat), Non-statutory Designated Sites; Woodland and Ancient Woodland; Aquatic Habitat-Watercourses; Bats-Roosts; Riparian Mammals; and Fish.

Table 9.13 Summary of Residual Effects

Description of the effect		Significant Effects	Mitigation and Enhancement measure	Residual Effect		
				Construction	Operation	Decommissioning
Statutory Designated Sites		***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-007, D-BD-009, D-BD-013, D-BD-015, D-BD-018, D-BD-019, D-BD-041, D-BD-042, D-BD-054, D-LV-036, D-PD-001, D-PD-004, D-AQ-004,	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Minor adverse significance (Not significant)*
Non-Statutory Designated Sites		***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-007, D-BD-009, D-BD-013, D-BD-015, D-BD-018, D-BD-019, D-BD-041, D-BD-042, D-BD-054, D-LS-001, D-LV-034, D-LV-036, D-PD-004, D-AQ-004, D-WR-067	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Minor adverse significance (Not significant)*
Habitats of Conservation Importance	Woodland and Ancient Woodland	***Moderate adverse (Significant)***	D-BD-001, D-BD-004, D-PD-004, D-BD-008, D-BD-009, D-BD-010, D-BD-013, D-BD-015, D-BD-062, D-BD-063, D-LV-014, D-LV-015, D-LV-017, D-LV-018, D-LV-019, D-LV-020, D-LV-026, D-LV-028, D-LV-030, D-LV-031, D-LV-032, D-LV-033, D-LV-034, D-LV-036, , D-AQ-004	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Minor adverse significance (Not significant)*
	Hedgerows	***Moderate adverse (Significant)***	D-BD-001, D-BD-004, D-PD-004, D-BD-009, D-BD-012, D-BD-013, D-BD-015, D-BD-031, D-BD-032, D-BD-033, D-BD-062, D-LV-016, D-LV-026, D-LV-028, D-LV-032, D-LV-033, D-LV-034, D-LV-036, D-AQ-004	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
	Coastal and Floodplain Grazing Marsh	***Moderate adverse (Significant)***	D-BD-001, D-BD-004, D-BD-009, D-BD-015, D-BD-062, D-LS-001, D-LS-026, D-LV-034, D-LV-036 , D-AQ-004	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Aquatic habitat – Watercourses		***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-011, D-BD-015, D-BD-018, D-BD-019, D-BD-046, D-BD-048, D-BD-049, D-BD-052, D-BD-054, D-BD-059, D-BD-060, D-BD-064, D-LS-026, D-LV-034, D-PD-004, D-PD-009, , D-AQ-004, D-WR-003, D-WR-005, D-WR-009, D-WR-022, D-WR-023, D-WR-027, D-WR-028, D-WR-029, D-WR-035, D-WR-044, D-WR-050, D-WR-062, D-WR-063	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Minor adverse significance (Not significant)*

Description of the effect		Significant Effects	Mitigation and Enhancement measure	Residual Effect		
				Construction	Operation	Decommissioning
Aquatic habitats - Ponds		*Negligible (Not Significant)*	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-011, D-BD-015, D-LS-026, D-LV-034, D-PD-004 , D-AQ-004, D-WR-003, D-WR-028, D-WR-035, D-WR-044	*Negligible (Not Significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Amphibians (incl. great crested newt)		***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-011, D-BD-015, D-BD-023, D-BD-044, D-BD-045, D-LV-034, D-PD-004, D-AQ-004	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Bats	Roosts	***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-015, D-BD-024, D-BD-025, D-BD-026, D-BD-027, D-BD-028, D-BD-029, D-BD-030, D-BD-066, D-LV-034, D-PD-004, D-PD-013,	*Negligible (Not Significant)*	*Negligible (Not Significant)*	*Minor adverse significance (Not significant)*
	Foraging and commuting bats	***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-015, D-BD-031, D-PD-004, D-PD-013,	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Badger		*Minor adverse (Not Significant)*	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-015, D-PD-004, D-PD-013, D-PD-014, D-BD-020, D-BD-021, D-BD-022, D-BD-023, D-LV-034, D-AQ-004	*Negligible (Not Significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Barn Owl		***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-015, D-PD-004, D-PD-013, D-PD-014, D-BD-037, D-BD-038, D-BD-039, D-BD-040, D-BD-066, D-LV-034, D-AQ-004	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Riparian Mammals (Otter and Water vole)		***Moderate adverse (Significant)***	D-BD-001, D-BD-002, D-BD-004, D-BD-009, D-BD-015, D-BD-018, D-BD-019, D-BD-034, D-BD-035, D-BD-036, D-BD-050, D-BD-059, D-BD-060, D-LV-034, D-PD-004, D-AQ-004, D-WR-027, D-WR-028, D-WR-029, D-WR-062, D-WR-063	*Minor adverse significance (Not Significant)*	*Negligible (Not Significant)*	*Minor adverse significance (Not significant)*
Wintering Birds (including redshank)		***Moderate adverse (Significant)***	D-BD-001, D-PD-004, D-BD-004, D-BD-009, D-BD-015, D-PD-013, D-PD-014, D-LV-034, D-NV-009	*Minor adverse significance (Not Significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*

Description of the effect	Significant Effects	Mitigation and Enhancement measure	Residual Effect		
			Construction	Operation	Decommissioning
Breeding Birds	*Minor adverse (Not significant)*	D-BD-001, D-BD-004, D-PD-004, D-BD-009, D-BD-015, D-BD-043, D-BD-066, D-LV-034, D-PD-013, D-PD-014,	*Negligible (Not Significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Fish	***Major adverse (Significant)***	D-BD-001, D-BD-004, D-BD-002, D-BD-009, D-BD-015, D-BD-018, D-BD-019, D-BD-050, D-BD-051, D-BD-054, D-BD-056, D-BD-057, D-BD-058, D-LV-034, D-PD-004, D-WR-009, D-WR-022, D-WR-023, D-WR-027	*Minor adverse significance (Not significant)*	*Negligible (Not Significant)*	*Minor adverse significance (Not significant)*
Aquatic macroinvertebrates	*Minor adverse (Not significant)*	D-BD-001, D-BD-004, D-BD-009, D-BD-011, D-BD-015, D-BD-018, D-BD-019, D-BD-054, D-LV-034, D-WR-009, D-WR-022, D-WR-023	*Negligible (Not Significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*
Macrophytes	*Negligible (Not Significant)*	D-BD-004, D-BD-009, D-BD-011, D-BD-019, D-BD-060, D-LV-034, D-WR-027, D-WR-028, D-WR-029	*Negligible (Not Significant)*	*Negligible (Not Significant)*	*Negligible (Not Significant)*

9.12. IN-COMBINATION CLIMATE CHANGE IMPACTS

9.12.1. The in-combination climate change impact assessment considered the extent to which climate change may alter the effects which have already been identified within this Chapter and the potential change in the ecological baseline as detailed in the Future Baseline (**Section 9.6**).

9.12.2. **Chapter 7 – Climate Resilience (Volume II**) provides an overview of expected climatic changes in the location of the DCO Proposed Development up to the 2050s.

9.12.3. It has been predicted that the local area will experience wetter winters and drier summers, with an increased likelihood of extreme events such as drought and storms. There are also expected to be increases in both summer and winter temperatures, and the sea level is predicted to rise by 0.24m.

9.12.4. These climatic changes may have long-term effects on habitat type and extent in the area around the Newbuild Infrastructure Boundary and may impact the coverage of certain species within these areas. However, assuming all appropriate mitigation is incorporated into the DCO Proposed Development, all residual effects are expected to be either minor adverse or negligible and not significant. As a result, there are not expected to be any significant effects resulting from the DCO Proposed Development in combination with predicted climate change.

9.13. MONITORING

CONSTRUCTION MONITORING

9.13.1. Monitoring requirements during construction have been detailed within Table 9.13~~Table 9.13~~ as appropriate and within **Appendices 9.1 - 9.10 (Volume III),** in relation to protected species licencing and the **OLEMP** (**Document Reference: D.6.5.10)**.

9.13.2. During construction an ECoW and/or team of ECoWs will monitor the construction works of the Construction Contractor to ensure compliance with, for example and not limited to, the detailed CEMP, any permits or exemptions, protected species licences and best practice construction guidelines and standards. The ECoW will additionally ensure compliance with all mitigation prescriptions detailed within this ES, as well as any subsequent mitigation prescriptions following pre-construction survey completion.

POST-CONSTRUCTION MONITORING

9.13.3. Monitoring upon completion of construction will be undertaken to confirm the successful establishment of all reinstated habitats as well as mitigation planting areas, and any additional ecological mitigation features. Post-construction monitoring will be undertaken in accordance with the proposed LEMP to be

developed at Detailed Design. The LEMP will be included within the Operations and Maintenance Environment Management Plan, provided to the Applicant post-construction.

9.13.4. The HEMP will be developed from the detailed CEMP and the LEMP, detailing monitoring and management requirements (e.g., associated with protected species licence conditions), and future maintenance arrangements that must be adhered to through the operation of the DCO Proposed Development.

9.13.5. Protected species licences required to facilitate construction of the DCO Proposed Development are likely to require a period of monitoring post implementation to ensure mitigation performs as expected and as required of any licence. Post-completion monitoring surveys may be required for species subject to protected species licencing and will be specific to the individual species/feature/receptor.

REFERENCES

- **Ref. 9.1 -** HMSO (Her Majesty's Stationery Office) (2017). *Conservation of Habitats and Species Regulation*. HMSO, London.
- **Ref. 9.2 -** HMSO (1981). *Wildlife and Countryside Act (as amended by the Countryside and Rights of Way Act 2000)*. HMSO, London.
- **Ref. 9.3 -** HMSO (2016). *Environment (Wales) Act 2016*. Welsh Government**.**
- **Ref. 9.4 –** HMSO (2000). *Countryside Rights of Way Act 2000.* HMSO, London.
- **Ref. 9.5 –** HMSO (2006). *Natural Environment and Rural Communities Act*. HMSO, London.
- **Ref. 9.6 –** HMSO (1992). *The Protection of Badgers Act*. HMSO, London.
- **Ref. 9.7 –** HMSO (1997). *The Hedgerow Regulations.* HMSO, London.
- **Ref. 9.8 –** HMSO (1996). *The Wild Mammals (Protection) Act*. HMSO, London.
- **Ref. 9.9 –** HMSO (1975). *Salmon and Freshwater Fisheries Act 1975*. HMSO, London.
- **Ref. 9.10 –** HMSO (2009). *The Eels (England and Wales) Regulations 2009.* HMSO, London
- **Ref. 9.11 –** HMSO (2017). *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (2000/60/EC).* HMSO, London.
- **Ref. 9.12 –** HMSO (2021). *Environment Act 2021.* HMSO, London.
- **Ref. 9.13 –** Welsh Government, (2021). *Planning Policy Wales* – Edition 11, Adopted February 2021. Welsh Government.
- **Ref. 9.14 -** The Ministry of Housing, Communities and Local Government (MHCLG), (2021). *National Planning Policy Framework*. MHCLG, London.
- **Ref. 9.15 -** The Department for Business, Energy, and Industrial Strategy (BEIS), (2011). *National Policy Statements (NPS) - Overarching NPS for Energy (EN-1).* BEIS, London.
- **Ref. 9.16 -** The Department for Business, Energy, and Industrial Strategy (BEIS), (2021). *National Policy Statements (NPS) - NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4).* BEIS, London.
- **Ref. 9.17 –** The Office of the Deputy Prime Minister (ODPM), (2005). *Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact Within the Planning System*. ODPM, London.

- **Ref. 9.18** – Cheshire West and Chester Council, (2015). *Cheshire West and Chester Local Plan 2015 – 2030.* Available at: *http://consult.cheshirewestandchester.gov.uk/file/4844198*
- **Ref. 9.19** - Flintshire County Council, (2020). *Supporting Nature in Flintshire 2020-2023*. Available at: https://www.flintshire.gov.uk/en/PDFFiles/Countryside--Coast/Biodiversity/Supporting-Nature-in-Flintshire-Plan-ENGLISH.pdf
- **Ref. 9.20** – Flintshire County Council, (2019). *Flintshire Local Development Plan 2015-2030 Deposit Plan,* Under consultation, available at: https://www.flintshire.gov.uk/en/PDFFiles/Planning/Key-Stage-Documents-Policy/LDP-KSD-DEP1-Deposit-Plan-Sept-2019-%E2%80%93-written-statement.pdf
- **Ref. 9.21** – CIEEM (2021). *Good Practice Guidance for Habitats and Species.* Version 3. CIEEM, Winchester.
- **Ref. 9.22** – CIEEM, (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland.* CIEEM, Winchester.
- **Ref. 9.23** - Natural England (2022) *Biodiversity Metric 3.0 (JP039) Auditing and accounting for biodiversity: User Guide*. [Online] [redacted]
- **Ref. 9.24 –** CIEEM (2017) *Guidelines for Preliminary Ecological Appraisal.*, Second Edition. CIEEM, Winchester.
- **Ref. 9.25 –** JNCC (2010). *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit and Assessment.* JNCC, Peterborough.
- **Ref. 9.26 –** Rodwell, J.S. (2006). *NVC Users' Handbook*, JNCC, Peterborough.
- **Ref. 9.27 –** Gurnell, A., England, J., Shuker, L. and Wharton, G. (2019). *The MoRPh Survey: Technical Reference Manual.* 2019 Version.
- **Ref. 9.28 –** Pond Action (2002). *A guide to monitoring the ecological quality of ponds and canals using PSYM*. Pond Action, Oxford.
- **Ref. 9.29 –** Oldham, R.S., Keeble, J., Swan, M.J.S., and Jeffcote, M. (2000). *Evaluating the suitability of habitat for the great crested newt*. Herpetological Journal 10: 143-155.
- **Ref. 9.30 –** Amphibian and Reptile Groups of the United Kingdom (2010). *ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.* ARG UK, UK.
- **Ref. 9.31 –** Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Griffiths, R.A., Foster, J., Wilkinson, J., Arnett, A., Williams, P., and Dunn, F. (2014). *Analytical and methodological development for improved*

surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

- **Ref. 9.32 –** English Nature (2001). *Great Crested Newt Mitigation Guidelines.* English Nature, Peterborough.
- **Ref. 9.33 –** Gent, A. and Gibson, S. (1998) *Herpetofauna Workers Manual.* Joint Nature Conservation Committee, Peterborough.
- **Ref. 9.34 –** Collins, J., (ed.) (2016). *Bat surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London.
- **Ref. 9.35 –** Harris, Cresswell and Jefferies (1989). *(Report) Surveying Badgers*. The Mammal Society. Bristol.
- **Ref. 9.36 –** Roper, T.J. (2010). *Badger.* Harper Collins.
- **Ref. 9.37 –** Andrews, R. (2013). *The classification of badger Meles meles setts in the UK: A review and guidance for surveyors*. In Practice, Edition 82, Institute of Ecology and Environmental Management (IEEM) (Now CIEEM).
- **Ref. 9.38 –** Chanin, P. (2003). *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough.
- **Ref. 9.39 –** Dean, M., Strachan, R, Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (the Mammal Society Mitigation Guidance series).* Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.
- **Ref. 9.40 –** Shawyer, C. R. (2011). *Barn Owl Tyto alba Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting*. IEEM, Winchester.
- **Ref. 9.41 –** Gillings, S., Wilson, A.M., Conway, G.J., Vickery, J.A., Fuller, R.J., Beavan, P., Newson, S.E., Noble, D.G. & Toms, M.P. (2008). *Winter Farmland Bird Survey.* BTO, Hertfordshire.
- **Ref. 9.42 –** Gilbert, G., Gibbons, D.W., Evans, J. (1998). *Bird Monitoring Methods; A Manual of Techniques for Key UK Species*. RSPB, Bedfordshire.
- **Ref. 9.43. –** Bibby, C.J., Burgess, N.D., Hill, D.A., Mustoe, S.H. (2000). *Bird Census Techniques*. Second Edition. Elsevier Ltd.
- **Ref. 9.44 –** British Standards Institution (2003). BS EN 14011:2003: Water Quality Sampling of Fish with Electricity. London, BSI.
- **Ref. 9.45 –** Environment Agency (2001). *Electric fishing Code of Practice. EAS/6100/4/02.* Environment Agency, Bristol.

- **Ref. 9.46 –** Environment Agency (2007). *Technical reference material: WFD electric-fishing in rivers. Operational instruction.* Environment Agency, Bristol.
- **Ref. 9.47 –** British Standards Institution (2012). BS EN ISO 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters. London. BSI.
- **Ref. 9.48 –** Environment Agency (2017). *Freshwater macroinvertebrate sampling in rivers: Operational Instruction 018 08*. Issued 01/03/17. Environment Agency, Bristol.
- **Ref. 9.49 –** Water Framework Directive – United Kingdom Technical Advisory Group (WFDUKTAG). (2014). *UKTAG River Assessment Method. Macrophytes and Phytobenthos: Macrophytes (River LEAFPACS2).* WFD-UKTAG, Stirling.
- **Ref. 9.50 –** Wray *et al.*, (2010). *Valuing Bats in Ecological Impact Assessment.* In Practice, CIEEM, No. 70, Dec 2010. ISSN 1754-4882.
- **Ref. 9.51 -** CIEEM, IEMA and CIRIA (2016). *Biodiversity Net Gain: Good practice principles for development*. Accessible online at: [redacted]
- **Ref. 9.52 –** Natural England (2021). *GCN Risk Zones (Cheshire).* Accessible online at: [redacted]
- **Ref. 9.53** – Bat Conservation Trust (2010) – *Common Pipistrelle Factsheet* - [redacted] (accessed August 2022)
- **Ref. 9.54 –** Bat Conservation Trust (2021). *The National Bat Monitoring Programme Annual Report 2021.* Bat Conservation Trust, London. Accessible online at: https://cdn.bats.org.uk/uploads/pdf/Our%20Work/NBMP/National-Bat-Monitoring-Programme-Annual-Report-2021.pdf?v=1655151480
- **Ref. 9.55 -** Bat Conservation Trust (2010) – *Soprano Pipistrelle Factsheet* [redacted] (Accessed August 2022)
- **Ref. 9.56 -** Bat Conservation Trust (2010) – *Noctule Bat Factsheet* https://cdn.bats.org.uk/uploads/pdf/About%20Bats/noctule_11.02.13.pdf?v=1541085182 (Accessed August 2022)
- **Ref. 9.57 -** Bat Conservation Trust (2010) – *Brown Long-Eared Factsheet* https://cdn.bats.org.uk/uploads/pdf/About%20Bats/brownlongeared_11.02.13.pdf?v=1541085177 (Accessed August 2022)

- **Ref. 9.58 –** Berthinussen, A. & Altringham, J. (2016)., *WC1060 Development of a Cost-Effective Method for Monitoring the Effectiveness of Mitigation for Bats Crossing Linear Transport Infrastructure.* University of Leeds/DEFRA.
- **Ref. 9.59 -** Bat Conservation Trust (2010) – *Lesser Horseshoe Bat Factsheet* https://cdn.bats.org.uk/uploads/pdf/About%20Bats/lesserhorseshoe_11.02.13.pdf?v=1541085180 (Accessed August 2022)
- **Ref. 9.60**– Bat Conservation Trust (BCT) & Institution for Lighting Professionals (ILP), (2018). *Bats and Artificial Lighting Guidance Note.* ILP Warwickshire and BCT, London.
- **Ref**. **9.61 -** Multi Agency Geographic Information for the Countryside (MAGIC) Accessible online at: https://magic.defra.gov.uk/
- **Ref. 9.62 -** Environment Agency (EA) (2021). Ecology and Fish Data Explorer. Accessible online at: [redacted]
- **Ref. 9.63 -** Natural Resource Wales (2021). Request Environmental Data. Available online: https://naturalresources.wales/evidence-and-data/accessing-our-data/request-environmental-data/?lang=en
- **Ref. 9.64 -** NBN Atlas Wales (2021). Available online: [redacted]
- **Ref. 9.65** – Environment Agency (EA) (2010). *Environment Agency Fish Pass Manual, Document GEHO 0910 BTBP-E-E.* Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/298053/geho0910btbp-e-e.pdf