



Llywodraeth Cymru
Welsh Government

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**A494 RIVER DEE BRIDGE
REPLACEMENT SCHEME**

Environmental Statement

Volume 1: Technical Assessment Report

Chapter 16: Marine Environment

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16. Marine Environment

16.1 Introduction

- 16.1.1 This Marine Environment chapter provides an assessment of likely significant effects on receptors identified as being at risk from the impacts of construction, operation and maintenance associated with the proposed A494 River Dee Bridge replacement scheme (hereafter referred to as ‘the Scheme’).
- 16.1.2 For further information on the Scheme, please refer to Chapter 2: The Project and the outline CEMP (Appendix 18A). For detailed construction information, refer to the Constructability Report and Construction Programme (Doc ref: 395318-MMD-00-XX-RP-Z-0034).
- 16.1.3 There are several potential effect pathways which are relevant and are considered within this chapter. These include, but are not limited to, the following:
- a) Pre-construction activities – ground investigations, site preparation.
 - b) Construction phase – construction and demolition, noise and vibration, temporary lighting, habitat loss from land take, pollution incidents and sediment disturbance.
 - c) Operational phase – permanent habitat loss, change in hydrology, permanent lighting, road run-off, alteration to hydrodynamics.
- 16.1.4 For the purposes of this chapter, ‘biodiversity’ and ‘ecology’ relate to the marine environmental features, namely designations, habitats, and species, within the defined scheme area. The information presented in this chapter identifies and assesses marine environmental features using baseline data gathered from both desk-based searches and site surveys. It also defines the likely ‘Zone of Influence’ (Zoi) for the proposed works, based on construction information available to date and outlines the basis for scoping in the assessment of marine biodiversity. Please refer to Chapter 8 (Terrestrial Biodiversity) for an assessment of the terrestrial ecology receptors.
- 16.1.5 An assessment of the likely significant effects (LSE) resulting from construction, operation and maintenance of the Scheme is included for each marine ecological receptor (within the categories of protected designations, areas, and

species). Based on these effects, avoidance and mitigation measures to prevent, reduce, or offset any adverse effects are described. Following this, the effects are reassessed for each receptor and the Scheme as a whole, considering all primary, secondary, and tertiary mitigation to then determine any residual effects.

16.1.6 Other chapters of the environmental statement (ES) which cover impacts that are related to the marine environment are:

- a) Chapter 7: Road Drainage and the Water environment
- b) Chapter 8: Terrestrial Biodiversity
- c) Chapter 12: Noise and Vibration
- d) Chapter 15: Climate Change & Greenhouse Gases

16.2 Legislation and Policy Framework

16.2.1 This assessment has been undertaken in accordance with relevant legislation, having regard to national and local plans and policies.

16.2.2 The principal legislative and planning context in relation to the assessment of the environmental effects of the Scheme on the marine environment is summarised below.

National legislation and planning policy of Wales

16.2.3 This chapter has been prepared with reference to the following UK nature conservation legislation and key national policies, which influence the marine environment assessments:

National Legislation

- a) The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019¹

¹ European Commission (1979) Council Directive on the Quality Required of Shellfish Waters. Available at: eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31979L0923

- b) The Wildlife and Countryside Act (WCA) 1981²
- c) The Marine and Coastal Access Act 2009³
- d) The Natural Environment and Rural Communities (NERC) Act 2006⁴
- e) Environment Act 2021⁵
- f) Environment (Wales) Act 2016⁶
- g) The Water Environment (Water Framework Directive (WFD)) (England and Wales) Regulations 2003 (amended)⁷
- h) The Wellbeing of Future Generations (Wales) Act 2015⁸
- i) UK Government cross-border byelaws to protect Atlantic salmon⁹ and sea trout¹⁰

National Policies

- a) The Marine Policy Statement 2011¹¹
- b) National Planning Policy Framework (NPPF) 2012 and revised 2021¹²
- c) 2024 UK Biodiversity Framework¹³ (superseding the UK Post-2010 Biodiversity Framework 2012)¹⁴

16.2.4 In particular, under the Environment (Wales) Act 2016, public bodies, including Local Authorities, have a statutory duty “*to seek to maintain and enhance biodiversity in Wales*” when carrying out their normal functions. Under the

² UK Government (1981) Wildlife and Countryside Act 1981. Available at: [Wildlife and Countryside Act 1981](#)

³ UK Government (2009) Marine and Coastal Access Act 2009. Available at: [Marine and Coastal Access Act 2009](#)

⁴ UK Government (2006) Natural Environment and Rural Communities Act 2006. Available at: [Natural Environment and Rural Communities Act 2006](#)

⁵ UK Government (2021) Environment Act 2021. Available at: [Environment Act 2021](#)

⁶ Welsh Government (2016) Environment (Wales) Act 2016. Available at: [Environment \(Wales\) Act 2016](#)

⁷ UK Government (2017) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available at: [The Water Environment \(Water Framework Directive\) \(England and Wales\) Regulations 2017](#)

⁸ Welsh Government (2016) The Well-being of Future Generations (Wales) Act 2015. Available at: [Well-being of Future Generations \(Wales\) Act 2015 | Law Wales](#)

⁹ Natural Resources Wales. Salmon open seasons and method restrictions. Available at: [Natural Resources Wales / Salmon open seasons and method restrictions](#)

¹⁰ Natural Resources Wales. Sea trout open seasons and method restrictions. Available at: [Natural Resources Wales / Sea trout open seasons and method restrictions](#)

¹¹ Defra (2011) UK Marine Policy Statement. Available at: [UK marine policy statement - GOV.UK](#)

¹² UK Government (2012) National Planning Policy Framework. Available at: [National Planning Policy Framework - GOV.UK](#)

¹³ JNCC (2024) UK Biodiversity Framework

¹⁴ JNCC (2012) UK Post-2010 Biodiversity Framework (2012-2019). Available at: [UK Post-2010 Biodiversity Framework \(2012–2019\) | JNCC Resource Hub](#)

Section 7a list of species and habitats of principal importance to the conservation of biodiversity in Wales (also known as 'priority' or 'Section 7' species and habitats) was drawn up and acts as an aid to guide public bodies in implementing their duty. The Local Authority must consider the impact of the proposed works on these Section 7 habitats and species.

16.2.5 Consideration of the legal protection of designated sites, habitats and species under the above context has informed the assessment of scale and 'importance' of each receptor (in line with relevant guidance), as well as the assessment and mitigation requirement; with the aim to:

- a) Promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;
- b) Ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;
- c) Ensure that statutory designated sites are properly protected and managed;
- d) Safeguard protected species; and
- e) Promote the functions and benefits of soils/sediments, and in particular their function as a carbon store.

16.2.6 The Conservation of Habitats and Species Regulations 2017 (as amended) ensures the protection of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the UK, which no longer form part of the EU's Natura 2000 ecological network. The amended Regulations have created a National Site Network (NSN) on land and at sea, including both the inshore and offshore marine areas in the UK. The NSN includes existing SACs and SPAs, new SACs and SPAs are designated under these Regulations.

16.2.7 A network of nationally designated sites has been established through the designation of Sites of Special Scientific Interest (SSSIs) under the Wildlife and Countryside Act 1981 (as amended). The protection given under the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation (SNCO). The protection for SSSIs is used to underpin the designation of areas within the NSN. The Welsh Government has

responsibilities with respect to SSSIs under Section 28G of the Wildlife and Countryside Act 1981.

16.2.8 All wild birds, their nests and eggs are protected under Part 1, Section 1 of the Wildlife and Countryside Act. Birds listed in Schedule 1 of the Act are subject to special protection. Wild animals listed in Schedule 5 are protected under Section 9. Plants listed in Schedule 8 are protected under Section 13 of the Act. For this chapter, the protection of waterbirds and waders and intertidal plant habitats (i.e saltmarsh) are relevant and considered.

16.2.9 The Wildlife and Countryside Act also includes provisions for the control of invasive non-native species (INNS). Under these provisions it is an offence to:

- a) Release, or allow to escape into the wild, any animal which is not ordinarily resident in, or a regular visitor to, Great Britain or is included in Schedule 9 of the Act.
- b) Plant, or otherwise cause to grow in the wild, any plant which is included in Schedule 9 of the Act.

16.2.10 The Environment (Wales) Act 2016 introduces a new, enhanced Biodiversity and Resilience of Ecosystem Duty on public bodies to ensure that biodiversity is an integral part of decision making. Public authorities will be required to report on the actions they are taking to improve biodiversity and promote ecosystem resilience.

Planning Policy Wales

16.2.11 The Welsh Government published Planning Policy Wales (PPW) Edition 12 in February 2024. It states that the main planning principles for coastal places, which reflect the principles of Integrated Coastal Zone Management, are to support urban and rural development, while at the same time being aware of, and appropriately responsive to, the challenges resulting from the dynamic interaction of natural and development pressures in coastal areas¹⁵.

¹⁵ Welsh Government (2024) Planning Policy Wales (Edition 12)

Technical Advice Note 5: Nature Conservation and Planning

16.2.12 The PPW is supplemented by 21 topic-based Technical Advice Notes (TAN). In particular TAN 5 – Nature Conservation and Planning¹⁶ provides advice about how the land use planning system should underwrite the protection and enhancement of biodiversity and geological conservation.

UK Biodiversity Frameworks 2024

16.2.13 As a result of new drivers and requirements, the 'UK Biodiversity Framework', published in July 2012, has succeeded the UK Biodiversity Action Plan (BAP). Particularly, due to devolution and the creation of country-level biodiversity strategies, much of the work previously carried out under the UK BAP is now focused at a country level. The UK BAP lists of priority species and habitats remain; however, important and valuable reference sources. Notably, they have been used to help draw up statutory lists of priority species and habitats in Wales under The Environment (Wales) Act 2016¹⁷.

16.2.14 The Environment (Wales) Act 2016 aims to build greater resilience for ecosystems. The Wales Biodiversity Partnership (WBP)¹⁸ supports the Act and stating that *'Biodiversity and well-functioning ecosystems provide natural solutions that build resilience, which in turn help society create jobs, support livelihoods and human well-being, adapt to the adverse impacts of climate change and contribute to sustainable development'*.

Local Planning Policy

Flintshire Local Development Plan

16.2.15 At a local level, planning policies are set out within the Flintshire Local Development Plan¹⁹ (adopted in January 2023).

¹⁶ Welsh Government (2009). Planning Policy Wales - Technical Advice Note 5: Nature Conservation and Planning. [online]. Available at: [Technical advice note \(TAN\) 5: nature conservation and planning | GOV.WALES](https://gov.wales/technical-advice-note-5-nature-conservation-and-planning)

¹⁷ <https://www.biodiversitywales.org.uk/Environment-Wales-Act>

¹⁸ [Home - Wales Biodiversity Partnership](#)

¹⁹ [Flintshire Local Development Plan](#)

16.2.16 The following policies are considered relevant to this chapter:

- a) Policy STR13: Natural and Built Environment, Green Networks and Infrastructure;
- b) Policy STR14: Climate Change and Environmental Protection;
- c) Policy EN2: Green Infrastructure;
- d) Policy EN3: Undeveloped Coast and Dee Estuary Corridor; and
- e) Policy EN6: Sites of Biodiversity Importance.

16.2.17 Policy STR13 states:

“Development should identify, respect, protect, enhance and connect Flintshire’s environmental assets, to create a multifunctional network of natural and historic resources. Development should:

- i. Protect open countryside and the undeveloped coastline;*
- ii. Protect the open character and appearance of green wedges;*
- iii. Conserve, protect and enhance the quality and diversity of Flintshire’s natural environment including landscape, biodiversity, the Dee Estuary and the Clwydian Range and Dee Valley National Landscape (formerly known as an AONB);*
- iv. Promote opportunities to enhance biodiversity and ensure resilience;*
- v. Maintain, enhance and contribute to green infrastructure;*
- vi. Create and protect green spaces and open space / play environments that encourage and support good health, well-being and equality;*
- vii. Conserve, protect and enhance the local distinctiveness and quality of Flintshire’s built and historic environment including listed buildings, conservation areas, registered historic parks, gardens and landscapes, scheduled ancient monuments and other locally important historic assets;*
- viii. Make financial contributions where appropriate, to facilitate and maintain the favourable conservation status of key environmental assets;*

- ix. *Support measures to minimise the consequences of climate change;*
- x. *Protect playing fields and open space from development; and*
- xi. *Ensure adequate new open space and playing fields are provided as part of new housing development.”*

16.2.18 Policy STR14 states:

“The Council will seek to mitigate the effects of climate change and ensure appropriate environmental protection in the County through:

- i. *Ensuring new development is sustainably located and designed so as to reduce the need for travel by private car;*
- ii. *Encouraging the use and development of appropriate or suitable brownfield land;*
- iii. *Adopting a sustainable approach to water resource management including supply, surface water run-off and waste water treatment;*
- iv. *Directing development away from flood risk areas, assessing the implications of development in areas at risk of flooding and ensuring that new development does not increase the risk of flooding elsewhere;*
- v. *Encouraging energy efficient development, environmentally acceptable renewable and zero / low carbon energy generation and combined heat and power and communal / district heating networks;*
- vi. *Ensuring that new development has regard to the protection of the environment in terms of air, noise and light pollution, unstable and contaminated land and former landfill sites;*
- vii. *Designing development to be adaptable and resilient to future effects of climate change.”*

16.2.19 Policy EN2 states:

“Development proposals will be required to protect, maintain and enhance the extent, quality and connectivity of the green infrastructure network, including designated and non-designated green spaces (as shown on the proposals maps and listed in the table below), and where appropriate:

- a. create new green infrastructure linkages from the proposed development to the existing local network;*
- b. fill in gaps in the existing network to improve connectivity.*

Where the loss or damage of existing green infrastructure is unavoidable, appropriate mitigation and compensation will be required.”

16.2.20 Policy EN3 states:

“Within the undeveloped coast development will only be permitted where:

- a. it can be demonstrated a coastal location is essential;*
- b. it conserves and enhances the open character of the coast;*
- c. it would not unacceptably harm areas of nature conservation, landscape or biodiversity;*
- d. it would not harm existing or proposed recreational or active travel routes;*
- e. extensive coastal protection measures are not required; and*
- f. it would not be potentially at risk of flooding nor unacceptably increase erosion or flooding or interfere with natural coastal processes.”*

16.2.21 Policy EN6 states:

“Development will not be permitted that would result in an adverse effect on the integrity of sites of international nature conservation importance. Proposals where adverse effects on site integrity cannot be ruled out would not be supported.

Development likely to impact the special features of a Nationally Designated Site will only be granted in exceptional circumstances where appropriate compensation can be provided.

Development proposals that would have a significant adverse effect on locally designated sites or site with other biodiversity and / or geological interest, including priority species, will only be permitted where:

- a. it can be demonstrated that the need for the development outweighs the biodiversity or geological importance of the site; and*
 - b. it can be demonstrated that the development cannot reasonably be located elsewhere; and c. any unavoidable harm is minimised by effective mitigation to ensure that there is no reduction in the overall biodiversity value of the area.*
- Where this is not feasible compensation measures designed to create, restore and enhance biodiversity must be provided.*

Development that results in the restoration, enhancement and creation of habitats will be supported especially where this promotes the resilience of ecosystems.”

Shoreline Management Plan

16.2.22 The relevant Shoreline Management Plan (SMP) for the Scheme is the North West England and North Wales Coastal Group Shoreline Management Plan (SMP 22 –Great Ormes Head to Solway Firth, 11a 5.3)²⁰. The policy rationale states to “*maintain existing defences into the long term. Potential for a secondary set-back defence to be built for flood storage or habitat creation, depending on outcome of further studies*”.

²⁰ North Wales Coastal Group (2023). Shoreline management. Available at: [Shoreline Management Plans – North West Coastal Group](#)

Flintshire County Council Environment Act – Section 6 Biodiversity Duty Delivery Plan (update 2020)²¹

16.2.23 A document which outlines how Flintshire County plan to maintain and enhance biodiversity under the Environment (Wales) Act 2016. Objectives comprise:

- a) Objective 1: Engage and support participation and understanding to embed biodiversity throughout decision making at all levels;
- b) Objective 2: Safeguard species and habitats of principle importance and improve their management;
- c) Objective 3: Increase the resilience of our natural environment by restoring degraded habitats and habitat creation;
- d) Objective 4: Tackle key pressures on species and habitats;
- e) Objective 5: Improve our evidence, understanding and monitoring; and
- f) Objective 6: Put in place a framework of governance and support for delivery.

Nature Recovery Plan for Coastal and Marine Habitats in North East Wales²²

16.2.24 The Nature Recovery Action Plan outlines targets for short-term (up to 12 months), medium-term (1 to 5 years), and long-term (5+ years) for nature conservation in North East Wales, focusing on four broad habitat types; Woodland, Wetland, Grassland, and Coastal/Marine.

²¹ Flintshire County Council, 2020. Biodiversity Duty Delivery Plan. Available at: [Flintshire County Council Environment Act - Section 6 Biodiversity Duty Delivery Plan \(update 2020\)](#)

²² Bionet Wales, 2025. Coastal and Marine Nature Recovery Action Plan. Available at: [Coastal and Marine - Bionet](#)

Technical guidelines

16.2.25 Ecological assessments were undertaken in compliance with the following relevant guidance and best practice:

- a) Chartered Institute of Ecology and Environmental Management (CIEEM) (2022) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Version 1.3)²³
- b) Joint Nature Conservation Committee (JNCC) (2022) The Marine Habitat Classification for Britain and Ireland (Version 22.04)²⁴
- c) Natural Resources Wales (NRW) Marine Licensing: Environmental Impact Assessment for Marine Activities Guidance²⁵

16.3 Consultation

16.3.1 A summary of the consultation responses from stakeholders or consultees in relation to the proposed scope of the Marine Environment assessment, plus subsequent correspondence since the EIA Scoping report, is set out in Table 16-1 below.

Table 16-1 Consultation responses associated with the Marine Environment

Date	Consultee	Issues Raised	How has this been Addressed?
26 th May 2022	Environmental Liaison Group (ELG) Meeting (NMWTRA, Welsh Government, SMW, NRW, Flintshire CC, CPAT, ECAT, RML, MM)	Agreed that the Greenfield site is an additional area for saltmarsh enhancement and was a positive measure to that could be attributable to the Scheme. Any enhancements which is not mitigation for loss/damage of saltmarsh as a result of the Scheme is a positive measure.	Noted in this report as a habitat enhancement area for the Scheme, as well enhancing the shaded area below the existing River Dee bridge (once bridge deck is removed) to replace the area of saltmarsh habitat expected to deteriorate due to shading of the replacement bridge.

²³ CIEEM (2022) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Version 1.3 – Updated September 2024. Available at: [Guidelines for Ecological Impact Assessment \(EcIA\) | CIEEM](#)

²⁴ JNCC (2022) The Marine Habitat Classification for Britain and Ireland Version 22.04. Available at: [JNCC Marine Habitat Classification](#)

²⁵ [Natural Resources Wales / Environmental Impact Assessment for marine activities](#)

Date	Consultee	Issues Raised	How has this been Addressed?
31 st January 2025	Natural Resources Wales (NRW) – EIA Scoping Opinion	Recommend adding a list of works that are deemed to require a Marine Licence.	Permits and licences consents tracker is in progress and will be completed for the Draft Order application.
31 st January 2025	Natural Resources Wales (NRW) – EIA Scoping Opinion	Given location and scale of development a report to inform Habitats Regulations Assessment (HRA) will be required and should be included in the EIA.	As well as the EIA process to assess the potential environmental impacts of the Scheme, a separate HRA screening and appropriate assessment report has been prepared (Doc Ref: 395318-RML-00-XX-RP-L-0006).
31 st January 2025	Natural Resources Wales (NRW) – EIA Scoping Opinion	Advise that the assessment of impact to other receptors (e.g. benthic ecology, water quality, fish) caused by the generation of SSC plumes during the construction phase (e.g. piling for bridge supports, dredging at the ALOF [Airbus Loading Operations Function], disturbance of the riverbank caused by plant activity) needs to use the maximum spring tide excursion of the tidal River Dee, to define the spatial extent of impact upstream and downstream of the proposed works.	See Section 16.9 of this Chapter – Assessment of Construction Activities, which assesses the impact on designated sites, fish, marine invertebrates and waterbirds. Water quality has been addressed in Chapter 7 (Water Environment). Note: assessment of ALOF has been removed as this is no longer part of the Scheme.
31 st January 2025	Natural Resources Wales (NRW) – EIA Scoping Opinion	Fisheries - NRW indicated agreement with the sites and features scoped in for further assessment, i.e. Migratory fish features of the river Dee and Bala Lake and Dee Estuary Special Area of Conservation (SACs). However, we advise that European smelt (<i>Osmerus eperlanus</i>) is a feature of both the river Dee and Dee estuary Site of Special Scientific Interest	European smelt has been included in Section 16.6 (Baseline) and assessments of land take, construction and operation (Sections 16.8, 16.9, and 16.10, respectively).

Date	Consultee	Issues Raised	How has this been Addressed?
		(SSSI) and should be included in the assessment.	
31 st January 2025	Natural Resources Wales (NRW) – EIA Scoping Opinion	NRW indicated disagreement with the statement that all the protected species do not feed on the journey up the estuary. European eels will likely feed and be resident in the channelised section. In addition, river lamprey primarily reside in estuaries feeding on estuarine fish, such as herring and flatfish (Maitland 2003).	This has been addressed and added to the Section 16.6 - Baseline Conditions.
31 st January 2025	Natural Resources Wales (NRW) – EIA Scoping Opinion	Indirect impacts on marine Dee Estuary SAC features should be included in the assessment in relation to piling/dredging activities of the bridge construction, as well and decommissioning of the existing bridge. Although the proposed site is outside of the Dee Estuary SAC (approx. 1km upstream) there is potential for secondary impacts on the SAC features i.e. intertidal mudflats and sandflats and Estuaries features, from sedimentation and/or release of contaminants from piling and dredging activities. Although these impacts will likely be temporary, full details should be included as part of the ES. Inclusion of marine biosecurity to minimise the risk of introduction and spread of marine invasive non-native species (INNS).	See Section 16.9 – Assessment of Construction Activities, which assesses the impact on designated sites, fish, marine invertebrates and waterbirds. Biosecurity/INNS is covered in Section 16.7 (Mitigation). Note: Dredging is no longer part of the construction methodology so has been removed from the assessment.
31 st January 2025	Natural Resources Wales (NRW) – EIA Scoping Opinion	Further assessment should be provided to understand if the works have the potential to displace or disturb overwintering	Waterbirds and waders have been added into Section 16.6 - Baseline Conditions and are part of the assessments of land take,

Date	Consultee	Issues Raised	How has this been Addressed?
		and passage bird features of the Dee Estuary SPA, RAMSAR and SSSI. If the construction works are undertaken outside of the months of August to March inclusive, there will be no impact pathway to the overwintering and passage bird features of the Dee Estuary SPA, RAMSAR and SSSI.	construction and operational activities.
8 th April 2025	Natural Resources Wales (NRW) Fisheries team – EIA Scoping Response	Demolition works: The proposed demolition of the existing road bridge should be included in the Environmental Statement (ES) under the 'Rochdale' envelope principle to ensure a realistic worst-case scenario is considered. Furthermore, we advise that for the full ES, further details and assessment of in-river works, demolition and removal of the existing river piles is required, and that timing restrictions to protect migratory fish may be necessary for works, such as use of breakers and diamond saw wires. Piling methods: New foundation piles constructed using rotary bored piles followed by oscillation/vibration piling. NRW welcomes this and advises that as no percussion piling will be used, the proposed timing restrictions detailed under 'Mitigation' on page 7 (EIA Scoping report) to reduce disturbance to migratory fish are acceptable. However, should percussive piling be deemed	Noted and addressed in this report and the HRA screening and appropriate assessment (Doc Ref: 395318-RML-00-XX-RP-L-0006).

Date	Consultee	Issues Raised	How has this been Addressed?
		necessary, this will require further consultation with NRW and assessment in the ES, including underwater noise modelling. Temporary sheet piling: The need to install temporary sheet piles on the northeastern riverbank is noted; however, it is not clear whether these will be installed within the 'wet' (at high water) river channel, if the site is outside the river, or whether installation will only occur at low tide. If installed in the river channel using non-percussive piling methods, the timing restrictions mentioned above should be applied. If percussive piling is needed then consultation with NRW would be required, alongside a full assessment in the ES, potentially including underwater noise modelling (Volume 3; Appendix 16.C).	

16.4 Assessment Methodology

- 16.4.1 Please refer to Chapter 4 (Approach to EIA) of this Environmental Statement for the general methodology to the EIA. Chapter 4 sets out the overall approach to the assessment of the likely effects of the Scheme and includes details of the overall legislative framework and consultation undertaken.

Gathering of baseline information

Study Area

- 16.4.2 For the purposes of this assessment, the Study Area used has been defined with reference to the Red Line Boundary (RLB) of the Scheme (also referred to as 'the Scheme Boundary'), outlined in Chapter 2 (The Project).

River characteristics and terminology

- 16.4.3 The Scheme is found on the canalised section of the River Dee. This River originates in Snowdonia, Wales and flows through North Wales and Cheshire, England, before entering the Dee Estuary. The River Dee SSSI and the River Dee & Bala Lake SAC extends through the entire river from its source, downstream just beyond the Flintshire/A548 Bridge to the start of the Dee Estuary Ramsar, SAC and SPA (National Grid Reference (NGR): SJ 28906 71135). The River Dee is tidally influenced up to the Chester Weir fish trap (NGR: SJ 40797 65841).
- 16.4.4 The Dee Estuary is a large, sheltered estuary, which flows from the River Dee into Liverpool Bay. The Dee Estuary is a designated Ramsar site, SAC and SPA and extends from the mouth of the Estuary by Talacre upstream on the southwestern bank, just past Harwarden railway bridge (NGR: SJ 31415 69115).
- 16.4.5 For the purposes of this chapter, the use of the River Dee and Dee Estuary will follow the extents of the abovementioned designations.

Zone of Influence (Zol)

16.4.6 The CIEEM guidance (Version 1.3)²⁶ on ecological assessments recommends that all ecological features that occur within a Zol for a proposed development are considered; therefore, the Zol for the Scheme is the area in which desktop searches are undertaken to ensure that all potential ecological features are considered in the determination of potential effects. The Zol includes:

- a) Areas directly within the land take for the proposed development and access;
- b) Areas that will be temporarily affected during construction;
- c) Areas likely to be impacted by hydrological disruption (hydrologically connected); and
- d) Areas where there is a risk of pollution and noise disturbance during construction and / or operation.

16.4.7 The Zol is normally variable, depending on the ecological features concerned and the construction activities planned. For this assessment, the Zol is outlined in Table 16-2 Note: this chapter covers marine and coastal designations, for terrestrial and freshwater ecological designations, please refer to Chapter 8 (terrestrial biodiversity).

Table 16-2 Zone of Influence for this assessment

Site	Zol	Justification
Non-statutory designated sites	1km	Based upon the information currently available for the intended works, this reflects a precautionous distance within which designated sites and qualifying features associated with non-statutory designated sites may be affected.
Statutory designated sites	2km	Based upon the information currently available for the intended works, this reflects a precautionous distance within which designated features may be affected. This is in line with requirements for assessment of impacts against water framework directive ²⁷

²⁶ <https://cieem.net/wp-content/uploads/2018/08/EcIA-Guidelines-v1.3-Sept-2024.pdf>

²⁷ Environment Agency (2017) Water Framework Directive assessment: estuarine and coastal waters. Available at: [Water Framework Directive assessment: estuarine and coastal waters - GOV.UK](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/618811/WFD_assessment_estuarine_and_coastal_waters.pdf)

Site	ZoI	Justification
Hydrologically connected statutory designated sites	12km	If any harmful substances were to enter the water, this distance covers the potential maximum dispersion. This is based on twice the length of the closest tidal excursion (with a maximum of 12km downstream/ upstream from site, due to lower tidal influence) ²⁸ .

Desk study

16.4.8 A baseline desktop study was undertaken to describe the marine environment of the study area and is presented in Section 16.6 - Baseline Conditions.

Field surveys

16.4.9 Field surveys undertaken to inform this chapter are the intertidal walkover surveys, wintering and breeding bird surveys (waterbirds and waders assessed in this chapter).

16.4.10 Intertidal walkover surveys were undertaken in March and July 2025 by suitably qualified marine ecologists from Mott MacDonald, using the following best practice guidance:

- a) Joint Nature Conservation Committee (JNCC) Marine Monitoring Handbook²⁹; and
- b) The JNCC Handbook for Phase 1 Habitat Survey, a Technique for Environmental Audit³⁰.

16.4.11 Marine habitat codes adopted from the Marine Habitat Classification for Britain and Ireland³¹ are used to describe the biotopes observed during the survey, and the SACFOR³² abundance scale utilised to record the cover/density of

²⁸ ABPmer. UK Renewables Atlas. Available at: [Explore the ABPmer UK Renewables Atlas](#)

²⁹ Davies et al., 2001. Marine Monitoring Handbook. Available at: [data.jncc.gov.uk/data/ed51e7cc-3ef2-4d4f-bd3c-3d82ba87ad95/mmh-PG4-5.pdf](#)

³⁰ JNCC, 2010. Handbook for Phase 1 habitat survey – a technique for environmental audit. Available at: [Handbook for Phase 1 habitat survey](#)

³¹ JNCC, 2010. Marine Habitat Classification for Britain and Ireland. Available at: [JNCC Marine Habitat Classification](#)

³² Super-abundant, Abundant, Common, Frequent, Occasional, Rare, Present

species identified³³. The survey commenced two hours before the low tide with the lower littoral zone surveyed at the low tide (see Table 16-3 for tide times).

Table 16-3 Tide times and heights (source: Source: WillyWeather³⁴)

Date	Location	Low water	Height above chart datum (m)
13/03/2025	A494 River Dee Bridge	9.18am	0m
25/03/2025	Greenfield site, Flint	3.21pm	2.72m

16.4.12 Full methodologies and details are provided in the intertidal survey report (Appendix 16A, Volume 3; Document Reference: 395318-RML-00-XX-RP-L-0014) and breeding and wintering bird survey reports (Appendix 8B, Volume 3), appended to the ES.

16.4.13 The normal validity period for ecology surveys is 1 - 2 years dependent upon the species or habitat being surveyed³⁵. Surveys completed during this study may require further updating or revalidation as the Scheme progresses. A summary of surveys undertaken for the Scheme is provided in Table 16-4

Table 16-4 Summary of surveys 2018 – 2025

Survey type	Date survey completed	Survey details	Summary of findings
NVC	2021 and July 2022	Surveys to inform	The intertidal area of
Saltmarsh and	updated 27th June	potential mitigation areas	the Scheme site was
intertidal	2024 for proposed	Wepre and Greenfield	characterised by mud and sandy
walkover	mitigation areas only.	and baseline of the	mud habitats consistent with an
surveys	March 2025 –	Scheme area.	upper estuarine environment.
	intertidal walkover		The Wepre saltmarsh site shows
	surveys		signs of succession along the
	7th July 2025 – NVC		seaward bund with an increase
	surveys, full Scheme		in scrub, tall ruderal and grass
	area.		

³³ JNCC, 1990. SACFOR abundance scale used for both littoral and sublittoral taxa from 1990 onwards. Available at: [sacfor.pdf](#)

³⁴ River Dee - Queensferry New Bridge Tide Times, Flintshire - WillyWeather

³⁵ CIEEM (April 2019) Advice Note on the Lifespan of Ecological Reports and Surveys. Available at <https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf> [Accessed 21/01/25]

Survey type	Date survey completed	Survey details	Summary of findings
			species not specific to saltmarsh communities. The Greenfield saltmarsh site presents as a miniature salt-marsh tidal creek ecosystem. Saltmarsh reports are provided separately in Appendix 16B.
Wintering bird surveys	Nov 2018 and Feb 2019 (inclusive). Nov 2020 – Feb 2021 November 2022 to January 2023 Nov 2023 – Feb 2024 September 2024 to March 2025	Low tide counts and wintering bird surveys conducted once a month.	Notable bird species recorded including Schedule 1, birds of Principle Importance in Wales and Red List Birds of Conservation Concern. The Dee Estuary Ramsar/SPA sites supports internationally important populations of several species. Surveys conducted to date have identified wintering SPA species utilising the fields and the riverbanks within the site extent.
Breeding Bird Surveys	1 April to 31 July 2021 April – July 2023 April – July 2025	The survey methodology applied for the breeding bird surveys broadly followed that used for the Breeding Bird Survey (BBS). Six survey visits of three days each.	Notable bird species recorded including Schedule 1, birds of Principle Importance in Wales and Red List Birds of Conservation Concern.

Significance criteria and biodiversity resource importance

16.4.14 Criteria for determining importance of ecological features have been undertaken with reference to the CIEEM Guidelines for Ecological Impact Assessment (EcIA)²³. The assessment of importance of sites, habitats and species for biodiversity considers:

- Designation of the site;
- Naturalness, rarity, commonness of habitat;
- Habitat diversity;

- d. Habitat connectivity;
- e. Rarity or commonness of species, either internationally, nationally or more locally, including those that may be seasonally transient;
- f. Presence of endemic species, locally distinct sub-populations of a species, threatened species or Red Data List species;
- g. Plant communities typical of valued natural / semi-natural vegetation types;
- h. Presence of rich assemblages of plants and animals; and
- i. Presence of large populations of species or concentrations of species considered uncommon or threatened in a wider context.

16.4.15 Habitats and species present within the ZOI that are listed under Section 7 of the Environment (Wales) Act 2016 are also highlighted.

16.4.16 The sensitivity value of ecological receptors has been determined by its level of protection (statutory or non-statutory), its vulnerability or rarity, views of consultees, specialist expertise and professional judgement as appropriate for that receptor, with reference to the descriptions summarised in Table 16-5.

16.4.1 Baseline studies have established the relative importance of the Marine Environment resources, using the guidance in Table 3.9. of LA 108, as summarised in Table 16-5.

Table 16-5 Receptor Sensitivity/Value³⁶

Value (sensitivity)	Typical descriptors
International or European importance (Very High)	Very high importance and rarity, international scale and very limited potential for substitution. Although not an exhaustive list, examples of this include: Internationally designated sites including Ramsar Site, Special Areas of Conservation (SAC), Special Protection Areas (SPA) etc). Sites proposed for international designation candidate Special Areas of Conservation (cSAC) or potential Special Protection Areas (pSPA)).

³⁶ Adapted from: <https://www.standardsforhighways.co.uk/tse/attachments/af0517ba-14d2-4a52-aa6d-1b21ba05b465>

Value (sensitivity)	Typical descriptors
	Resident or regularly occurring populations of species which can be considered at an international level where: • The loss of these populations would adversely affect the conservation status or distribution of the species at an international scale. • The population forms a critical part of a wider population at this scale. • The species is at a critical phase of its life cycle at an international scale
UK or National (High)	A nationally designated site (SSSI, ASSI, NNR, Marine Conservation Zones and Marine Protected Areas) A viable area of a priority habitat identified in Section 7 of the Environment (Wales) Act 2016, or of smaller areas of such habitat which are essential to maintain the viability of a larger whole. Any regularly occurring population of a nationally important species which is threatened or rare in the region or county. A regularly occurring significant population / number of any nationally important species, including Schedule 8 plant species on the amber list of birds of conservation concern.
Regional (Medium)	High or medium importance and rarity, regional scale, limited potential for substitution. Although not an exhaustive list, examples of this include: • Regionally important non-statutory designated sites (including heritage coasts). • Areas of habitats identified (including for restoration) in regional plans or strategies. • Resident or regularly occurring populations of species which can be considered at an international, UK or national level where: - o The loss of these populations would adversely affect the conservation status or distribution of the species at a regional scale.

Value (sensitivity)	Typical descriptors
	- o The population forms a critical part of a wider population at this scale. - o The species is at a critical phase of its life cycle at a regional scale. - o Species identified in regional plans or strategies.
County (Low)	Low or medium importance and rarity, county or other unitary authority (borough or district) scale. Although not an exhaustive list, examples of this include: • Statutory and non-statutory wildlife or nature conservation sites designated at a county (or equivalent) level (including Local Wildlife Sites (LWSs), Local Nature Conservation Sites (LNCSSs), Local Nature Reserves (LNRs), Sites of Importance for Nature Conservation (SINCs), Sites of Nature Conservation Importance (SNCIs) and County Wildlife Sites (CWSs)). • Areas of habitats identified in county or equivalent authority plans or strategies (such as local BAPs). • Resident or regularly occurring populations of species which can be considered at an international, UK or national level where: • The loss of these populations would adversely affect the conservation status or distribution of the species at a county (or equivalent) scale. • The population forms a critical part of a wider population at this scale. • The species is at a critical phase of its life cycle at a county (or equivalent) scale.
Local (Negligible)	Low importance and rarity, local scale. Although not an exhaustive list, examples of this include: • Local level designated sites (including all of those listed above for county level).

Value (sensitivity)	Typical descriptors
	• Areas of habitat considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange. • Populations / communities of species considered to appreciably enrich the habitat resource within the local context including features of importance for migration, dispersal or genetic exchange.
None	Scoped out from further assessment due to limited in extent or not affected.

(adapted from Table 3.9 LA 108)

16.4.2 The assessment of the significant effects of the Scheme focuses on those ecological features identified through the baseline studies as being important. The value of an ecological feature has been determined based on professional judgement and the role of the ecological feature within the landscape, as well as considering its importance within a defined geographical context and overall resilience.

Level of Impact

16.4.3 The level of impacts on marine environment resources have been assessed in accordance with the criteria provided in Table 3.11 of LA108 as summarised in Table 16-6

16.4.4 Level of impact shall be determined by the assessment of the following characteristics:

- positive or negative (e.g. adverse/beneficial);
- duration (e.g. permanent/temporary);
- reversibility (e.g. irreversible/reversible);
- extent/magnitude; and,
- frequency and timing.

Table 16-6 Level of impact and typical descriptions

Level of impact (Change)		Typical description
Major	Beneficial	1. Permanent addition of, improvement to, or restoration of a marine habitat or species. 2. The extent, magnitude, frequency and/or timing of an impact positively affects the integrity of key characteristics of the resource and the change is likely to restore a marine ecological receptor to favourable conservation status, or to create a feature of recognisable value within an international or national context – major beneficial effect.
	Adverse	1. Permanent/irreversible damage to a biodiversity resource. 2. The extent, magnitude, frequency and/or timing of an impact negatively affects the integrity of key characteristics of the resource – major adverse effect.
Moderate	Beneficial	1. Temporary addition of, improvement to, or restoration of a biodiversity resource. 2. The extent, magnitude, frequency and/or timing of an impact positively affects the integrity of key characteristics of the resource and the change is likely to restore a marine ecological receptor to favourable conservation status, or to create a feature of recognisable value within a regional or county context – moderate beneficial effect.
	Adverse	1. Temporary/reversible damage to a biodiversity resource. 2. The extent, magnitude, frequency and/or timing of an impact adversely affects the valued ecological receptor, but there will probably be no permanent effect on its integrity with appropriate mitigation and is reversible – moderate adverse effect.
Minor	Beneficial	1. Permanent addition of, improvement to or restoration of a biodiversity resource.

Level of impact (Change)		Typical description
		2. The extent, magnitude, frequency and/or timing of an impact positively affects the integrity of key characteristics of the resource and the change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value within a local context - minor beneficial effect.
	Adverse	1. Temporary/reversible damage to a biodiversity resource. 2. The extent, magnitude, frequency and/or timing of an impact does not affect the integrity or key characteristics of the resource. The change affects the valued ecological receptor in the short term but there will be no permanent effect (reversible) – minor adverse effect.
Negligible	Beneficial	1. Temporary addition of, improvement to, or restoration of a biodiversity resource. 2. The change is likely to restore or retain the status of an ecological receptor – negligible or slight beneficial effect.
	Adverse	1. Temporary/reversible damage to a biodiversity resource. 2. The extent, magnitude, frequency and/or timing of an impact does not affect the integrity or key characteristics of the resource – negligible or slight adverse effect.
No change		No observable impact, either positive or negative.

(adapted from Table 3.11 LA 108)

16.4.5 The importance of the resource/receptor (Table 16-5) and level of impact (Table 16-6) would be used to determine the significance of effect based on Table 3.13 of LA108 - significance matrix as detailed in Table 16-7

Significance Matrix

16.4.6 Significance of effects on marine ecological receptors have been assessed by referring to the matrix detailed in Table 16-7. Significance of effects have been assigned as either Major, Moderate, Minor, or Negligible and can be either adverse or beneficial. Effects that are categorised as Major or Moderate are considered as “significant”.

Table 16-7 Significance Matrix

Level of impact						
	Designation level (Sensitivity)	No change	Negligible	Minor	Moderate	Major
Resource Importance	International or European (Very High)	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	UK or national (High)	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Regional (Medium)	Neutral	Neutral or slight	Slight	Moderate	Moderate or Large
	County (Low)	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or Moderate
	Local (Negligible)	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

(Source Table 3.13 DMRB LA108)

16.4.7 Any significant impacts remaining after applying the mitigation hierarchy, known as the ‘residual impacts’, together with an assessment of the likelihood of success of the mitigation, are the factors which would be considered against legislation, policy and development management in determining the Scheme.

16.4.8 Where individual environmental effects identified have been considered non-significant when assessed in isolation, the combined or cumulative impact of

these effects may result in a significant overall effect. This is particularly relevant where:

- a. effects occur simultaneously or sequentially in the same geographic location;
- b. receptors (e.g., habitats, species, communities) are sensitive to multiple stressors; or,
- c. there is temporal overlap in the occurrence of effects, leading to prolonged exposure.

Further detail on this can be found in Chapter 17 (Cumulative Effects).

The Magnitude of ecological impact

16.4.9 The magnitude of impact on each ecological feature determined as ‘important’ is assessed by the predicted change from the baseline conditions and the scale of the effect. In line with CIEEM guidance²⁶, this considers positive or negative, extent, magnitude, duration, frequency and timing, and reversibility of ecological impacts. A distinction is also recognised between:

- a) Habitats – where effects on extent, structure and functions of habitat, as well as distribution and its typical species composition need to be considered.
- b) Species – where effects on abundance and distribution of that species, as well as timing of particular activities (such as breeding, nursery, overwintering, etc.) need to be considered.

16.4.10 For marine and estuarine environments, the assessment of impacts needs to consider the level of ecological connectivity as these environments are often dynamic and highly changeable, and marine and estuarine species and habitats can be vulnerable to these changes. Where there is uncertainty in effects on the marine environment, the precautionary principle has been applied.

16.5 Assumptions and limitations

16.5.1 Limitations of the survey work are included within individual habitat and species reports, as referenced above in Section 16.4. Where survey work was constrained by factors such as access and weather, this has been addressed

during the survey windows and / or has been taken into consideration during the interpretation of the results. The main limitations are summarised below:

- a) Ecological surveys (such as those undertaken to inform the 2022 PEA) are limited to factors which affect the presence of species, such as time of year, migration patterns and behaviour, while the extent of surveyed area could be limited by the safety concern of surveyor.
- b) It is possible that certain species may have been overlooked or under-recorded during the surveys; specifically, the intertidal survey was not conducted at an optimal time of the year. As such, further surveys were completed on the 7th July 2025, provided in Appendix 16B, Volume 3.
- c) Benthic fauna within the subtidal and intertidal zones have not been surveyed or assessed, therefore the assessment of species presence is based on a desk-based study, therefore the level of knowledge and assessment of impact on benthic fauna is limited.
- d) Records for the European smelt have been collected for the months of May, September, and October in 2014. Given that the data is now over ten years old, this is outdated information.
- e) No site-specific surveys were undertaken for migratory fish and therefore the baseline is informed by desk study only. In addition, the results of fish catches at Chester Weir for sea and river lamprey (*Petromyzon marinus* and *Lampetra fluviatilis*, respectively), and monthly run estimates for adult Atlantic salmon (*Salmo salar*) and brown/sea trout (*Salmo trutta*), were provided by NRW.
- f) The distance at which underwater and airborne noise and vibration may propagate is unknown, as well as the frequency (Hertz) or volume (decibels) of the noise at source. Though the impact of underwater noise produced during pile driving operations has not been modelled, an underwater noise assessment has been undertaken based on existing literature and professional judgement (Appendix 16C, Volume 3), which includes the assessment of effects on receptors such as migratory fish species.

16.5.2 The distance or area of suspended sediments caused by in-river construction activity and the level and duration of the turbidity changes caused is unknown. Furthermore, the distance or area of resuspended contaminated sediments from in-river construction activity is also unknown, as well as the presence or levels of contaminants or duration of persistence. In the absence of detailed information to inform the assessment of significant effect, a precautionary approach will assume a worst-case scenario that effects from underwater and airborne noise, suspended sediments and resuspension of potentially contaminated sediments could be both likely and significant. However, by adopting best practice methods and including provisions for pollution control measures in accordance with Guidance for Pollution Prevention (GPP), these risks can be managed to acceptable levels. These mitigation measures would be

set out in the CEMP that would be prepared by the Contractor and submitted to NRW for approval at least eight weeks prior to site mobilisation.

- 16.5.3 These limitations and assumptions have been considered in the assessment of relevant effects, and a precautionary approach is applied as needed to confirm the assessment is robust.

16.6 Baseline Conditions

- 16.6.1 The baseline information within the ZOI of the Scheme has been compiled using intertidal survey data, along with desk-based studies of the wider area, as well as the EIA Scoping Report (provided in Volume 3, Appendix 4A).
- 16.6.2 Baseline details in relation to water quality, including background for turbidity, are discussed in Chapter 7 (Water Environment).

Designated sites

- 16.6.3 Designations with marine or intertidal features have been summarised in the following sections, locations of these are provided in Figure 16.1, Volume 2.
- 16.6.4 Chapter 8 (Terrestrial Biodiversity) provides a full list of designated sites and Figures 8.1 and 8.2 in Volume 2 outlines the locations of these.

Statutory designations

The Dee Estuary Ramsar Site

16.6.5 The Dee Estuary Ramsar is located 1km north-west of the Scheme. This wetland is designated as it qualifies under Criterion 1 because it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographical region. The following Annex 1 features are also supported:

- a) H1130 Estuaries;
- b) H1140 Mudflats and Sandflats not covered by seawater at low tide;
- c) H1210 Annual vegetation of drift lines;
- d) H1230 Vegetated sea cliffs of the Atlantic and Baltic coasts;
- e) H1310 Salicornia and other annuals colonising mud and sand H1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);
- f) H2110 Embryonic shifting dunes;
- g) H2120 Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”);
- h) H2130 Fixed dunes with herbaceous vegetation (“grey dunes”); and,
- a) H2190 Humid dune slacks.

16.6.6 The site qualifies under Criterion 2 as it supports a breeding colony of the vulnerable Natterjack toad (*Bufo calamita*). The site also regularly supports 20,000 or more waterbirds, qualifying under Criterion 5.

16.6.7 The site qualifies under Criterion 6 because it regularly supports 1% of the individuals in the populations of waterbirds in any season, as listed above for the SPA assemblage qualification.

The Dee Estuary Special Protection Area (SPA)³⁷

16.6.8 The Dee Estuary SPA is located 1km north-west of the Scheme and qualifies under Article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or

³⁷ Natural England, 2014. European Site Conservation Objectives for Dee Estuary SPA (UK9013011). Available at: [European Site Conservation Objectives for Dee Estuary SPA - UK9013011](#)

more of the Great Britain populations of the following species listed in Annex I in any season:

- a) Bar-tailed godwit (*Limosa lapponica*) (wintering);
- b) Common tern (*Sterna hirundo*) (breeding);
- c) Little tern (*Sterna albifrons*) (breeding); and
- d) Sandwich tern (*Sterna sandvicensis*) (autumn passage).

16.6.9 Qualifying under Article 4.2 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the biogeographical populations of the following regularly occurring migratory species (other than those listed in Annex I) in any season:

- a) Redshank (*Tringa totanus*) (passage and wintering);
- b) Shelduck (*Tadorna tadorna*) (wintering);
- c) Teal (*Anas crecca*) (wintering);
- d) Pintail (*Anas acuta*) (wintering);
- e) Oystercatcher (*Haematopus ostralegus*) (wintering);
- f) Grey plover (*Pluvialis squatarola*) (wintering);
- g) Knot (*Calidris Canutus islandica*) (wintering);
- h) Dunlin (*Calidris alpina*) (wintering);
- i) Black-tailed godwit (*Limosa limosa islandica*) (wintering); and
- j) Curlew (*Numenius arquata*) (wintering).

16.6.10 The site also qualifies under Article 4.2 of the Directive, as it is a site of major importance to birds, used regularly by over 20,000 waterbirds, supporting Great Crested Grebe (*Podiceps cristatus*), Cormorant (*Phalacrocorax carbo*), Shelduck, Wigeon (*Anas penelope*), Teal, Pintail, Oystercatcher, Grey plover, Lapwing (*Vanellus Vanellus*), Knot (*C. canutus*), Sanderling (*Calidris alba*), Dunlin, Black-tailed godwit, Bar-tailed godwit (*L. lapponica*), Curlew and Redshank.

River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid SAC³⁸

16.6.11 The Scheme is located within the River Dee and Bala Lake SAC, designated for the following species:

- a) Bullhead (*Cottus gobio*);
- b) River lamprey (*Lampetra fluviatilis*);
- c) Brook lamprey (*Lampetra planeri*);
- d) Floating water-plantain (*Luronium natans*);
- e) Otter (*Lutra lutra*);
- f) Sea lamprey (*Petromyzon marinus*); and
- g) Atlantic salmon (*Salmo salar*).

16.6.12 The habitat Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation is also designated under the SAC.

Dee Estuary / Aber Dyfrdwy SAC

16.6.13 The SAC is located 1km north-west of the Scheme, designated for the following Annex I habitats that are a primary reason for site selection:

- a) Mudflats and sandflats not covered by seawater at low tide;
- b) Salicornia and other annuals colonising mud and sand;
- c) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);

~~16.6.13~~ 16.6.14 Annex I habitats present as a qualifying feature, though not a primary reason for site selection comprise:

- ~~e)~~ a) Estuaries;
- ~~f)~~ b) Annual vegetation of drift lines;
- ~~g)~~ c) Vegetated sea cliffs of the Atlantic and Baltic Coasts;
- ~~h)~~ d) Embryonic shifting dunes;
- ~~i)~~ e) "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")";

³⁸ <https://sac.jncc.gov.uk/site/UK0030252>

f) "Fixed coastal dunes with herbaceous vegetation ("grey dunes"); and

g) Humid dune slacks.

~~16.6.13~~ **16.6.15** Annex II species present as a qualifying feature comprise:

a) Sea lamprey (*P. marinus*);

b) River lamprey (*L. fluviatilis*); and

c) Petalwort (*Petalophyllum ralfsii*).

Dee Estuary / Aber Afon Dyfrdwy SSSI³⁹

~~16.6.14~~ **16.6.16** Located 1km north-west of the Scheme and designated for its total populations of internationally important wintering waterfowl and individual waterfowl and tern species. Also designated for its intertidal mud and sandflats, saltmarsh and transitional habitats; the hard rocky sandstone cliffs of Hilbre Island and Middle Eye with their cliff vegetation and maritime heathland and grassland; its assemblage of nationally scarce plants; and its populations of Sandhill Rustic Moth (*Luperina nickerlii gueneei*). European smelt (*Osmerus eperlanus*) is also noted for its presence.

Afon Dyfrdwy (River Dee) SSSI⁴⁰

~~16.6.15~~ **16.6.17** The Scheme is located within the SSSI, which is of special interest for its fluvial geomorphology, Carboniferous geology and range of river habitat types and species. These include saltmarsh transition habitats, populations of floating water plantain (*L. natans*), slender hare's-ear (*Bupleurum tenuissimum*), sea barley (*Hordeum marinum*), hard-grass (*Parapholis strigose*), Atlantic salmon (*S. salar*), Bullhead (*C. gobio*), Brook lamprey (*L. planeri*), River lamprey (*L. fluviatilis*), Sea lamprey (*P. marinus*), European smelt (*O. eperlanus*) and aquatic invertebrates.

River Dee (England) SSSI⁴¹

~~16.6.16~~ **16.6.18** Though within the same river, the River Dee two separate designations, one for Wales and England. The River Dee SSSI is located 7km

³⁹ CYNGOR CEFN GWLAD CYMRU

⁴⁰ CYNGOR CEFN GWLAD CYMRU

⁴¹ Site name:

upstream of the Scheme and is notified for its nationally important transition through a range of river types from mesotrophic to eutrophic. It is also notified for Atlantic salmon (*S. salar*), otter (*L. lutra*), European smelt (*O. eperlanus*) club-tailed dragonfly (*Gomphus vulgatissimus*) and fluvial geomorphology.

Dee Estuary (England) SSSI⁴²

~~16.6.17~~16.6.19 Located 7km north-west of the Scheme and forming the northern half of the Dee Estuary, the SSSI is of interest for its populations of internationally important waterfowl, whose numbers reach national and in some cases, internationally important levels; comprising oystercatcher (*H. ostralegus*), knot (*C. canutus*), curlew (*N. arquata*), redshank (*T. totanus*), bar-tailed godwit (*L. lapponica*) black-tailed godwit (*L. limosa*), grey plover (*P. squatarola*) and dunlin (*C. alpina*). It is also of importance for its intertidal mud and sandflats, saltmarsh and transitional habitats; the hard rocky sandstone cliffs of Hilbre Island and Middle Eye with their cliff vegetation and maritime heathland and grassland.

Designated Shellfish Waters

~~16.6.18~~16.6.20 The proposed Scheme is located 9km upstream of the Dee (West) and Dee (East) Shellfish Water sites, designated under the Water Framework Directive (WFD). The Scheme is also located 10km upstream of a classified bivalve mollusc harvesting area, specifically for blue mussel (*Mytilus edulis*) and common cockle (*Cerastoderma edule*).

~~16.6.19~~16.6.21 The Dee supports important fish stocks; and the outer estuary acts as a nursery ground for several fish species (see Section 16.6.38). Both salmon and sea trout are commercially important in the estuary and the Dee supports a salmon net fishery controlled by a Net Limitation Order. There is also a fishery for brown shrimp (*Crangon crangon*) between May and July^{43, 44}. Whitebait and sand eels (*Ammodytes* spp.) within the estuary create a food resource for the estuaries' breeding tern colonies (NCC, 1978).

⁴² SSSI detail - Designated Sites View

⁴³ Natural England (2010). The Dee Estuary European Marine Site. 259pp..

⁴⁴ North Western IFCA (2025). Status of the brown shrimp (*Crangon crangon*) fishery: 31 pp.

Non-Statutory designations

~~16.6.20~~16.6.22 Details on Local Wildlife Sites (LWS) are outlined in Table 8-12 within Chapter 8 (Terrestrial Biodiversity). One LWS with marine features was identified and has been summarised below.

~~16.6.21~~16.6.23 The River Dee LWS comprises a coastal and floodplain grazing marsh, coastal saltmarsh, mudflats, and is of ornithological interest. The site is located 420m north-west of the Scheme.

Marine Habitats

~~16.6.22~~16.6.24 Habitats have been summarised from the intertidal survey report (Appendix 16A, Volume 3; Document Reference: 395318-RML-00-XX-RP-L-0014) and a summary is provided in the following paragraphs. Though recorded as saltmarsh, the survey was not conducted at an optimal time of the year. As such, further surveys took place on the 7th July 2025 and integrated below. The survey report is provided in Appendix 16B, Volume 3 (Doc Ref: 395318-RML-00-XX-RP-L-0012).

~~16.6.23~~16.6.25 The intertidal habitats within the study area on the south side of the tidal river Dee (west abutment) comprises steep banks with saltmarsh and scrub on the upper littoral (saltmarsh LS.LMp.Sm); however, directly under the existing bridge structure, the upper littoral comprises littoral mud (LS.LMu), the absence saltmarsh likely due to the shading effect of the existing bridge.

~~16.6.24~~16.6.26 The subtidal habitat includes substrate from the mid to lower littoral comprised fine sandy mud with scattered rocks and debris, forming the biotope type Polychaete/oligochaete-dominated upper estuarine mud shores (LS.LMu.UEst). Directly under the existing bridge structure, the lower littoral featuring muds with gravels and cobbles forming littoral mixed sediment (LS.LMx).

~~16.6.25~~16.6.27 The northern bank of the River Dee is also backed by saltmarsh, dominated by sea purslane (*Sesuvium portulacastrum*), followed by common saltmarsh-grass (*Puccinellia maritima*), which is interspersed with Babington's

orache (*Atriplex glabriuscula*) and sea plantain (*Plantago maritima*). This is bordered from above by common couch (*Elytrigia repens*) or sea couch (*E. atherica*) (or a combination of the two) interspersed with sea aster (*Tripsolium pannonicum*) and sea beet (*Beta vulgaris subsp. Maritima*). Mown semi-improved neutral grassland borders this upper saltmarsh.

~~16.6.26~~16.6.28 On the south bank, these consist predominantly of a *P. maritima* dominated community which can be attributed to the SM13 *P. maritima* salt-marsh community (*Puccinellia maritima*) National Vegetation Classification (NVC) community. The north bank was characterised by two distinct stands of plant assemblages representing different saltmarsh habitat zonations. The upper saltmarsh habitat has a closed-sward dominated by *E. repens* with frequent *Atriplex littoralis* and *B. maritima*. This then transitions into the lower saltmarsh where *S. portulacastrum* is dominant.

~~16.6.27~~16.6.29 The upper- to mid-littoral comprises a mosaic of sandy mud (littoral sandy mud LS.LMu). Consistent with the south side of the river, saltmarsh is absent beneath the existing bridge structure on the north side.

~~16.6.28~~16.6.30 The existing bridge structure is concrete and features tubular green seaweeds, brown algae and barnacles on the existing bridge piers below the Mean High Water Spring (MHWS) mark.

~~16.6.29~~16.6.31 At the location of the proposed new bridge, the northern bank of the River Dee is dominated by tall common couch or sea couch (or a hybrid of the two), with abundant sea purslane dominating towards the lower saltmarsh zone with intertidal mud below that. The southern bank of the River Dee and the Queensferry Drain outflow are dominated by scrub and intertidal mud, with scattered saltmarsh species in between.

Fish spawning and nursery grounds

~~16.6.30~~16.6.32 The subtidal zone of the Dee Estuary is an important breeding, sheltering and nursery area for coastal fish species⁴⁵, however, this is in the outer areas where there is coarse sand and gravel substrate.

~~16.6.31~~16.6.33 The outer Dee Estuary, which is 10-15km away from location of the Scheme, is a spawning area for sprat (May – August)⁴⁶. The estuary is also a low intensity spawning area for cod (*Gadus morhua*), whiting (*Merlangius merlangus*), mackerel (*Scomber scombrus*), plaice (*Pleuronectes platessa*) and sole (*Solea solea*)⁴⁷.

~~16.6.32~~16.6.34 The Dee Estuary is also a nursery area for herring, whiting, plaice (*P. platessa*) (low intensity) and sole (*S. solea*) (high intensity)⁴⁶. The estuary is also a low intensity nursing ground for tope shark (*Galeorhinus galeus*), thornback ray (*Raja clavata*), spotted ray (*Raja montagui*), angler/monk fish (*Lophius piscatorius*) and sand eel. A high intensity nursing ground for herring, cod and whiting⁴⁷.

~~16.6.33~~16.6.35 The Dee Estuary SSSI is also notable for its presence of smelt (*O. eperlanus*), the estuary (≥1km away from proposed works) provides crucial spawning and nursery grounds for this species³⁹.

~~16.6.34~~16.6.36 Habitats further upstream in the River Dee and Bala Lake SAC, particularly in the proposed works area, comprise of subtidal mud. It is important to note that this is not a suitable substrate for fish spawning grounds. Species such as herring, European smelt, and elasmobranch species, such as tope shark and thornback rays, typically use gravel, gravelly sand or sand substrate in the outer Estuary as their suitable spawning ground habitat⁴⁶.

⁴⁵ JNCC, 2013. Ramsar Information Sheet: UK11082 [online] Available at: https://rsis.ramsar.org/RISapp/files/30642347/documents/GB298_lit161209.pdf

⁴⁶ Coull, K., Johnstone, R. and Rogers, S. (1998) Fisheries sensitivity maps in British Waters. UKOOA Ltd, Aberdeen, pp. 63

⁴⁷ Ellis, J., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012) Spawning and nursery grounds of selected fish species in UK waters. Science Series Technical Report, Cefas Lowestoft, pp. 147:56.

Priority Habitats

~~16.6.35~~16.6.37 Table 16-8 lists the marine habitats found within or adjacent to the scheme and whether these habitats are listed as Priority Habitats in Section 7 of the Environment (Wales) Act 2016. A value for their ecological significance has also been assigned.

Table 16-8 Summary of habitats and value of resource importance

Habitat Ref	Habitat description	Priority Habitat	Value/justification
G2	Running water	Yes	International the Tidal River Dee is a priority habitat as well as being designated as a SAC/SSSI. Local/ the Queensferry Drain provides biodiversity within an urban context as well as meeting other planning biodiversity objectives.
H1.1	Intertidal mud / sand	Yes	National although limited in its extent at the location of the Scheme, intertidal mud / sand is a feature of the River Dee SSSI. It is a priority habitat and an Annex I habitat of the Dee Estuary SAC 1km downstream (mudflats and sand flats not covered by sea water at low tide).
H2.6	Saltmarsh	Yes	National although limited in its extent at the location of the Scheme, saltmarsh is a feature of the River Dee SSSI. It is a priority habitat and an Annex I habitat of the Dee Estuary SAC 1km downstream (saltmarsh is covered within Atlantic salt meadows).

Protected and Notable Species

Fish

~~16.6.36~~16.6.38 For the purposes of this chapter, species have been grouped into the following categories:

- a) Migratory fish species protected under the Wildlife and Countryside Act (1981): **High** sensitivity
- b) Other fish species: **Low to Negligible** sensitivity

~~16.6.37~~16.6.39 The desk study identified four records within a 2.0km search radius within the last ten years. These comprised brown trout / sea trout (*Salmo trutta*), bullhead (*C. gobio*) and European eel (*Anguilla Anguilla*), all within Wepre

Brook, located approximately 1.75km from the Scheme location and Allis shad (*Alosa alosa*) have been recorded in the River Dee.

~~16.6.38~~16.6.40 The Dee Estuary also supports several migratory fish species including river lamprey (*L. fluviatilis*); sea lamprey (*P. marinus*); Atlantic salmon (*S. salar*); sea trout (*S. trutta*); twaite shad (*Alosa fallax*); European smelt (*Osmerus eperlanus*) and European eels (*A. anguilla*).

~~16.6.39~~16.6.41 Bullhead are a feature of interest of the River Dee and Bala Lake SAC; however, this species is a freshwater fish confined to the river above the tidal limit at Chester Weir (located 11km upstream of the Scheme) and will not be affected by the proposed Scheme.

~~16.6.40~~16.6.42 Brown / sea trout is listed as a species of least concern on the International Union for Conservation of Nature (IUCN) Red List⁴⁸ Allis Shad is listed as Critically Endangered⁴⁹ both are Section 7 species. European eel is listed as critically endangered on the IUCN Red list⁵⁰ and is a Section 7 species.

~~16.6.41~~16.6.43 European eel will likely feed and be resident in the channelised section of the tidal River Dee. In addition, River Lamprey primarily reside in estuaries feeding on estuarine fish, such as Herring (*Clupea harengus*) and flatfish (Pleuronectidae) (Maitland 2003)⁵¹ and are expected to be present migratory fish within the Dee Estuary.

~~16.6.42~~16.6.44 European smelt are a feature of both the River Dee and Dee Estuary SSSI. NRW provided records of European smelt and their locations where

⁴⁸ Freyhof, J. 2011. *Salmo trutta*. *The IUCN Red List of Threatened Species* 2011: e.T19861A9050312. <http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19861A9050312.en>. [Accessed 06/03/25]

⁴⁹ Ford, M. 2024. *Alosa alosa* (Europe assessment). *The IUCN Red List of Threatened Species* 2024: e.T903A221184262. <https://dx.doi.org/10.2305/IUCN.UK.2024-2.RLTS.T903A221184262.en>. [Accessed 06/05/25]

⁵⁰ Pike, C., Crook, V. & Gollock, M. 2023. *Anguilla anguilla* (Europe assessment). *The IUCN Red List of Threatened Species* 2023: e.T60344A216177498. [Accessed 06/05/25]

⁵¹ Maitland, P.S., 2003. Ecology of the river, brook and sea lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. Peterborough (English Nature).

netted/trawled, the locations are provided on Figure 16.2, Volume 2 of the ES. Smelt is listed on the (IUCN) Red List as Least Concern.

~~16.6.43~~16.6.45 Fish species that migrate through the River Dee and under the location of the existing and proposed bridges include those which are features of interest of the designated sites. These are Atlantic salmon, sea lamprey (*P. marinus*), river lamprey and European smelt. Information regarding sea lamprey, brook lamprey, Atlantic salmon, sea trout and European smelt has been obtained from NRW. Full results are provided in Appendix 16D.

~~16.6.44~~16.6.46 Artificial light at night from illuminated bridges can reach aquatic habitats, such as rivers, which in turn can threaten the river's natural heterogeneity and alter the behavioural responses of migratory fish⁵². An Environmental Lighting Impact Assessment (ELIA) for the Scheme was completed in August 2025 (Doc ref: 395318-MMD-00-XX-RP-E-0009), with three receptor locations adjacent to the River Dee (E03, E04 and H02).

Anadromous and Marine Fish Species

Lamprey species

~~16.6.45~~16.6.47 Based on the Chester Weir fish trap data (Appendix 16D, Volume 3), peak migration for sea lamprey is between May and July, with river lamprey migration occurring from February to April, with peak numbers observed in February. Brook lamprey has not been considered in this assessment as they do not descend into the tidal zone and are therefore deemed not to be affected by the Scheme.

~~16.6.46~~16.6.48 Lamprey are considered to be of international significance as they are a feature of the Dee Estuary SAC.

European smelt

⁵² Pérez Vega, C., Jechow, A., Campbell, J., Zielinska-Dabkowska, K., & Hölker, F. 2024. Light pollution from illuminated bridges as a potential barrier for migrating fish—Linking measurements with a proposal for a conceptual model. *Basic and Applied Ecology* **74**: 12pp.

~~16.6.47~~16.6.49 Records for the European smelt have been collected for the months of May, September, and October in 2014. The locations of where European smelt have been caught is provided on Figure 16.2, Volume 2 of the ES. The largest total count at any one time was of 179 individuals on the 10th October 2016 at the Grindes – Seine Net located upstream of the River Dee Crossing.

~~16.6.48~~16.6.50 European smelt are of national significance due to their importance as an indicator species of water quality, meaning their presence or absence can reveal the health of the ecosystem. Furthermore, they also serve as a crucial food source for fish-eating birds and other fish, such as sea trout and sea bass⁵³.

Salmon and sea trout

~~16.6.49~~16.6.51 Results of fish catches for salmon and sea trout (2009 – 2025) provided by NRW, indicate both species generally have their peak migration periods from June to August. Outside of this period, autumn was notable for the passage of smolts, though these were limited in numbers, with the exception of salmon from 2009 – 2012 where numbers were comparable to the previous months. The peak migration period for smolts is in April and May.

~~16.6.50~~16.6.52 Atlantic salmon and sea trout are of international importance, as they are features due to their ecological role as indicators of freshwater and marine health, and their significant economic and social value through fisheries and tourism. They are protected under international conventions like the UN Convention for the Conservation of Salmon and OSPAR convention, reflecting their global significance⁵⁴.

~~16.6.51~~16.6.53 Generally, the River Dee has continued to see Atlantic salmon and sea trout stocks decline, to the extent that stocks are now approaching unsustainable population levels. Salmon stocks in all 23 principal salmon rivers

⁵³ <https://canalrivertrust.org.uk/things-to-do/fishing/caring-for-our-fish/freshwater-fish-species/rare-and-protected-fish/smelt>

⁵⁴ [Natural Resources Wales / Vulnerable salmon and sea trout continue to decline despite conservation efforts from anglers and nets](#)

in Wales, including the River Dee are now classed as “At Risk”, highlighting the continued decline in numbers⁵⁴.

Summary

~~16.6.53~~16.6.54 Taking the peak migration times for both salmonids and lamprey, the most sensitive period for these species is February for river lamprey and from May –September inclusive for sea lamprey and salmonids.

~~16.6.54~~16.6.55 Recognising that the Atlantic salmon, sea and river lamprey are features of interest of the SACs and occur within the Dee at the location of the Scheme, these species are considered to be of international significance.

European eel

~~16.6.55~~16.6.56 The Dee Estuary and River Dee also support European eel (*A. anguilla*). They may also inhabit Queensferry drain, though none were observed during terrestrial ecology surveys for water voles and otters, presence should be assumed.

Marine benthic invertebrates

~~16.6.56~~16.6.57 The Dee Estuary supports a diverse array of marine invertebrates, particularly within its extensive intertidal mudflat and sandflat habitats, containing benthic species such as ragworm (*Hediste diversicolor*), with small areas of barnacles (*Semibalanus balanoides* and/or *Balanus crenatus*) and the common periwinkle (*Littorina littorea*) on cobbles at low water. The mud includes a wide band of light airy impoverished sand which contains low numbers of the amphipod shrimps *Corophium* sp. and *Bathyporeia* sp.

~~16.6.57~~16.6.58 The scheme area is generally sheltered but subject to moderately strong tidal streams and reduced salinity (description taken from CCW intertidal survey standard report in 2002⁵⁵). During the baseline survey, polychaete

⁵⁵ CCW, 2002. 11.52.3 Queensferry Bridge to Connahs Quay Bridge Phase 1 Intertidal Report: Countryside Council for Wales.

worms (most likely *H. diversicolor*) were found under rubble in the intertidal zone, south-west of the existing A494 Bridge.

Birds – waterbirds and waders

Wintering waterbirds and waders

~~16.6.58~~16.6.59 The Dee Estuary is a large funnel-shaped, sheltered estuary and is one of the top ten estuaries in the UK for wintering and passage waterfowl populations. The estuary supports internationally important numbers of waterfowl and waders⁵⁶.

~~16.6.59~~16.6.60 Four seasons of overwintering bird surveys have been completed (2018/19, 2020/21, 2022/23 and 2024/25) and results of these have been summarised below, for full results refer to the Non-Breeding Bird Technical Reports (Appendix 9B, Volume 3).

~~16.6.60~~16.6.61 Three species designated under the Dee Estuary SPA were identified during the 2024-25 surveys comprising Redshank, Teal and Oystercatcher. Other birds recorded that were listed under waterbird assemblage qualification were also noted, these include: lapwing, cormorant, ringed plover, little egret, gadwall and widgeon. None were recorded at significant numbers (>1% of the national population).

~~16.6.61~~16.6.62 Three species, Shelduck, Black-tailed Godwit and Dunlin, though not noted in the 2022/23 or 2024/25 surveys, were identified from previous surveys completed in 2018/19 and 2020/21. No other qualifying species were recorded in the survey area in any of the other completed survey seasons.

~~16.6.62~~16.6.63 Suitable habitats for wintering birds comprise the river itself, mudflats, saltmarsh, grassland and arable fields within the study area.

~~16.6.63~~16.6.64 Surveys conducted in the winters of 2018/2019 to 2024/2025 highlight how the areas affected by the Scheme are utilised by overwintering bird

⁵⁶ <https://rsis.ramsar.org/ris/298>

assemblages which are a feature of interest of the SPA/Ramsar sites, as well as other notable species.

Breeding waterbirds and waders

~~16.6.64~~16.6.65 Breeding bird surveys were completed in 2021 and 2023, with additional surveys conducted in 2024 but limited to the formerly proposed Airbus Load Out Facility (ALOF) site only (Document Reference: 395318-MMD-00-XX-RP-Z-0011).

~~16.6.65~~16.6.66 In 2025, breeding bird surveys were also undertaken for the full scheme area and the survey report will be included as an addendum to the ES and HRA at a later date.

~~16.6.66~~16.6.67 The Dee Estuary Ramsar/SPA are designated for the following species during the breeding season (March-August):

- a) Common tern (*S. Hirundo*); and
- b) Little tern (*S. albifrons*).

~~16.6.67~~16.6.68 The Dee Estuary Ramsar/SPA sites support several internationally important breeding bird species and assemblages. The Scheme is located 1km from these sites; however, birds are mobile and so will utilise other areas along the River Dee. These areas include the intertidal habitats (for loafing, roosting, foraging, and refuge) and adjacent fields and sand bars (for high tide refuge, depending on food availability and the state of the tide).

~~16.6.68~~16.6.69 Designated species that were recorded and are supported by the Dee Estuary Ramsar/SPA (little egret, redshank, teal, and oystercatcher) within the survey area did not reach or exceed significant thresholds of 1% or more of the designated site population.

~~16.6.69~~16.6.70 It is reasonable to assume that given the combination of a comprehensive desk study (including a BTO-commissioned Data Report) and detailed survey data generated via fieldwork undertaken by experienced professional ornithologists over several years, the desk and field data are relatively robust and broadly capture the non-breeding season avifaunal

assemblage across the Scheme footprint and/or its two associated 10km National Grid squares.

~~16.6.70~~16.6.71 Valuable habitats and features for birds in the breeding season include the tree lines, hedgerows and scrub, grassland and arable land particularly during high tide. The River Dee which intersects the Scheme survey area and footprint appears to support a moderate number of species (>21) including common sandpiper, cormorant, oystercatcher, redshank, goosander, lapwing, grey heron, little egret, turnstone, moorhen, mallard, gadwall (*Mareca strepera*), shoveler (*Spatula clypeata*), teal (*A. crecca*), tufted duck (*Aythya fuligula*), wigeon (*A. penelope*), great crested grebe (*P. cristatus*), little grebe (*Tachybaptus ruficollis*), greylag goose (*Anser anser*) pink-footed goose (*Anser brachyrhynchus*), Canada goose (*Branta canadensis*), common gull (*Larus canus*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), lesser black-backed gull (*Larus fuscus*).

~~16.6.71~~16.6.72 Small rocky embankments which are exposed during low tide only are considered to be of importance to roosting lapwing, redshank, cormorant, oystercatcher, mallard, and gull species, including herring, black-headed, lesser and greater black-backed gull.

~~16.6.72~~16.6.73 Survey results gathered between 2018 and 2025 estimated the value of a maximum of importance at the county level for conservation.

~~16.6.73~~16.6.74 The study area supports several bird species of conservation concern; however, many species appeared to be in relatively low numbers within the Scheme footprint compared to the surrounding areas and beyond the Zol extents. This is likely attributable to current levels of anthropogenic disturbance from roads, footpaths, cycle paths, a shooting range, and industrial activity within the Scheme footprint.

~~16.6.74~~16.6.75 The desk study and field data also indicated the significance of the habitats within the Zol, which could be important for the populations of several species. These habitats would be protected by appropriate mitigation and enhancement measures. The following habitats and features within the Zol have been identified as valuable to breeding birds:

- The river and riverbank habitat, particularly during low tide provide an important commuting, foraging and roosting area for various waterbirds, such as lapwing, common sandpiper, redshank, kingfisher, cormorant, mallard, oystercatcher, Canada goose, coot, grey wagtail, and gull species. The majority of these species were recorded in relatively low numbers; however, a greater number of birds, particularly goose, duck and smaller waders, could be observed at a distance outside of the survey area towards the western extent (i.e. towards the coastline). This area had more suitable breeding habitat, such as the Dee Estuary and Tata Steelworks, which are known to support breeding colonies of common terns and black-headed gulls. No common or little terns were observed or recorded within the survey area. Up to 60 black-headed gulls were recorded roosting and foraging on the banks throughout the surveys. In 2023, there was an avian flu outbreak at Tata Steelworks and black-headed gull reproductive output was reported to be extremely low. More recently, Welsh Government state that all of Wales is an Avian Influenza Prevention Zone (28/01/25).
- The industrial and commercial properties along the river offer suitable nesting habitat for herring gulls (2025 peak count 91) and lesser black-backed gulls (2025 peak count 58). Multiple pairs were observed building nests and attending to young throughout the surveys. The actual number of nest sites could not be confirmed due to surveyors' visual obstruction. The birds appeared to favour the Scottish Power building located on Factory Road. During the 2025 breeding bird surveys, little ringed plover (*Charadrius dubius*) was observed on two occasions in a possible family group (3 individuals) utilising areas of stockpiled gravel in commercial yards along the south bank, the species is considered to be a probable breeding species within the Scheme survey area.
- Ringed Plover (*Charadrius hiaticula*) were also observed foraging along the intertidal area/riverbanks.

Designated birds

~~16.6.75~~16.6.76 Three SPA designated species, namely redshank (*T. totanus*), oystercatcher (*H. ostralegus*), and cormorant (*P. carbo*), were recorded within

the ZOI. These species were not recorded in numbers considered significant (i.e. less than 1% of the population found within the SPA). No species associated with the SPA designated for their breeding abundance (common tern or little tern) were recorded in all survey years.

~~16.6.76~~16.6.77 The open water and intertidal habitats support functional species assemblages such as black-headed gull (*Chroicocephalus ridibundus*), common sandpiper, coot, cormorant, herring gull (*L. argentatus*), mallard, moorhen, oystercatcher and redshank which typically thrive in wetland, estuarine and coastal habitats.

Marine mammals

~~16.6.77~~16.6.78 There are several species of marine mammals found in the Dee Estuary, including the harbour porpoise (*Phocoena phocoena*), grey seal (*Halichoerus grypus*) and the harbour seal (*Phoca vitulina*), though these were predominantly confined to the mouth of the Dee Estuary where they travel up and down the Irish Sea foraging⁵⁷.

~~16.6.78~~16.6.79 Strandings data⁵⁸ for 2018 – 2021 in Flintshire show that the below marine mammals are in the Dee estuary area at Talacre:

- a) Fin whale (*Balaenoptera physalus*) (sandbank on the River Dee), one record in 2020;
- b) Harbour porpoise (*P. phocoena*); and
- c) Grey seal (*H. grypus*).

~~16.6.79~~16.6.80 The Scheme area is deemed unsuitable for many marine mammal species, due to its shallow nature and distance from the open sea, however, grey seal have previously been sighted up the river during high tide at Flint Castle⁵⁹ and in 2006, a seal was spotted as far upstream as Old Dee Bridge⁶⁰.

⁵⁷ <https://ourdeestuary.co.uk/wildlife-2/>

⁵⁸ Marine Environmental Monitoring. Annual Reports for Marine Mammal and Turtle strandings. Available at: Annual Reports – Strandings Wales

⁵⁹ WATCH: Seal caught splashing about in the Dee Estuary | The Leader

⁶⁰ [Seal Dee-light - Cheshire Live](#)

These are rare occurrences and the seal populations in this region are mainly found at the mouth of the Dee Estuary.

Invasive Non-Native Species (INNS)

~~16.6.80~~16.6.81 No INNS were identified during the March 2025 intertidal walkover surveys (Appendix 16A, Volume 3).

~~16.6.81~~16.6.82 Chinese mitten crab (*Eriocheir sinensis*) was recorded 1,735m from the Scheme in Wepre Brook. The first record of the Chinese mitten crab in North Wales was made in the River Dee in 2006. In their report, NRW state that a substantial population is thought to be present on the River Dee, however this is based on anecdotal evidence.

~~16.6.82~~16.6.83 The Chester Weir fish trap has captured a total of 234 Chinese mitten crabs since 2007, 94% of which were caught in the months of September and October⁶¹. The NRW report suggests that the canalised section of the River Dee between Connah's Quay and Saltney (which includes the areas subject to this assessment) does not appear to be favourable habitat due to a lack of vegetation below MHWS; however, evidence suggests that the River Dee population size and geographical range is gradually increasing^{62,61}.

Summary evaluation of ecological baseline

~~16.6.83~~16.6.84 It is impractical for an assessment of the ecological effects of the Scheme to consider every species and habitat that would be affected; instead, it focuses on 'Valued Ecological Receptors' (VERs) based on their legal protection, designation, rarity etc and whether they are significantly affected by the Scheme.

~~16.6.84~~16.6.85 Species and habitats which are considered to be widespread, not threatened and resilient to the Scheme effects, and which will remain viable and sustainable, have been scoped out of the assessment. The habitats listed in

⁶¹ Natural Resources Wales (2022) Dee Stock Assessment Programme. Angler Report 2022: 16pp.

⁶² Natural Resources Wales (2016) Monitoring of Chinese Mitten Crabs (*Eriocheir sinensis*) on the River Dee. Report No. 154. 90pp.

Table 16-9 which are not Priority habitats, but are of local importance, are not considered to be VERs. They are considered important in terms of their biodiversity value and therefore mitigation measures are required. General mitigation measures are recommended in **Section 16.7**.

~~16.6.85~~16.6.86 Table 16-9 provides a summary of the VERs, their assigned sensitivity value, and justification for inclusion.

Table 16-9 Summary of Valuable Ecological Receptors (VERs)

VER	Value (sensitivity)	Justification
Statutory Designated Sites		
Dee Estuary SPA	International	Designated due to its assemblages of waterfowl and wetland birds and habitats. Only three qualifying bird species of the SPA (teal, redshank and oystercatcher) were recorded in the survey area, and none were recorded in significant numbers (>1% of the SPA population). No direct or indirect damage to habitats or species is considered likely to occur. In addition, it is considered that the associated effects from construction noise would not significantly disturb the aggregations of roosting, loafing or feeding waterfowl. However, there may be indirect effects to associated habitats which are used, affecting their foraging habitat. Noise from construction may temporarily displace birds.
Dee Estuary Ramsar	International	Due to its assemblages of waterfowl and wetland birds and habitats. Other waterbirds for which the Ramsar are designated for were recorded but, again none were recorded at significant numbers (>1% of the national population). No direct or indirect damage to habitats or species is considered likely to occur. In addition, it is considered that the associated effects from construction noise would not significantly disturb the aggregations of roosting, loafing or feeding waterfowl. However, there may be indirect effects to associated habitats which are used, affecting their foraging habitat. Noise from construction may temporarily displace birds.

VER	Value (sensitivity)	Justification
Liverpool Bay SPA	International	Due to supporting large aggregations of wintering red-throated diver and common scoter, as well as important marine foraging areas of little terns breeding within The Dee Estuary SPA. This designated site will not be directly affected by the Scheme works during construction and operation; however, the Vessel Mobilisation Outline Method Statement confirms that the proposed vessel transport route to deliver construction materials from Liverpool Dry will pass through Liverpool Bay SPA. It is anticipated that there will be only two journeys, one passing through at the beginning and one at the end, therefore bird disturbance should be kept to a minimum.
Dee Estuary SAC/SSSI	International	Due to the presence of Atlantic salt meadows which includes the sub feature saltmarsh, estuaries, mud flats and sandflats not covered by seawater at low tide which includes the sub feature intertidal communities. The presence of migratory fish species Atlantic salmon and sea and river lamprey and European Smelt.
River Dee and Bala Lake / SAC	International	No significant effects on the features of the Annex I habitats that are a primary reason for selection of this site are envisaged, as the habitat type supporting these communities does not occur at the location of the proposed Scheme. However, the SAC is considered to be of international / very high value due to the presence of migratory fish species Atlantic salmon and sea and river lamprey, and otter.
Habitats		
Running water	International	The River Dee is a priority habitat as well as being designated an SAC/SSSI.
Intertidal mudflats and sandflats	National	Although limited in its extent at the location of the Scheme, mudflats are a feature of the River Dee SSSI as well as being a priority habitat.
Saltmarsh	National	Although limited in its extent at the location of the Scheme, saltmarsh is a feature of the River Dee SSSI as well as being a priority habitat.

VER	Value (sensitivity)	Justification
Fish Spawning and Nursery Grounds	International	The Dee Estuary is a spawning area for sprat (May – August). The Estuary is also a low intensity spawning area for cod (<i>G. morhua</i>), whiting (<i>M. merlangus</i>), mackerel (<i>S. scombrus</i>), plaice (<i>P. platessa</i>) and sole (<i>S. solea</i>). A high intensity spawning ground for sand eel (<i>Ammodytidae</i> spp), It is also a nursery area for herring (<i>C. harengus</i>), whiting, plaice (low intensity) and sole (<i>S. solea</i>) (high intensity). The estuary is also a low intensity nursing ground for tope shark (<i>G. galeus</i>), thornback ray (<i>R. clavata</i>), spotted ray (<i>R. montagui</i>), monkfish (<i>L. piscatorius</i>), and sand eel, and a high intensity nursing ground for herring, cod and whiting. It is important to note that further upstream at the location of the proposed scheme and within the River Dee and Bala Lake SAC, the substrate comprises subtidal mud, which is unsuitable for spawning and nursery grounds of the fish species mentioned above.
Marine Species (Fauna)		
Marine Mammals	International	Marine mammals stranding records found at the mouth of the Dee estuary at Talacre included a fin whale (<i>B. physalus</i>) (sand bank on the River Dee), harbour porpoise (<i>P. Phocoena</i>) and grey seal (<i>H. grypus</i>). These records are very rare and have not been found in close proximity to the proposed Scheme.
Fish species protected under the Wildlife and Countryside Act (1981)	International	The Atlantic salmon, sea and river lamprey are features of interest of the SACs and regularly occur within the Dee at the location of the proposed Scheme. Fish numbers appear to be declining based on counts provided by NRW and conservation objectives, and so the value of this species group is of international importance.
Waterfowl and Waders	International	Overwintering birds: redshank, teal and oystercatcher, designated under the Dee Estuary SPA, were identified during the 2024-25 non-breeding bird surveys, it is important to note that the numbers of within the survey area did not reach or exceed significant thresholds of 1% or more of the population total of the designation. Lapwing and cormorant, listed under the assemblage qualification were also noted. Shelduck, black-tailed godwit and Dunlin,

VER	Value (sensitivity)	Justification
		though not noted in the 2022/23 or 2024/25 surveys, were identified from the previous surveys completed in 2018/19 and 2020/21. Breeding birds: The Scheme area supports several bird species of conservation concern. However, many species appeared to be in relatively lower abundance within the Scheme footprint when compared to the surrounding areas within, and beyond, the zone of influence extents. This is likely due to the availability of suitable foraging and breeding habitat
Other fish species	National	European smelt (<i>Osmerus eperlanus</i>) are a feature of both the River Dee and Dee Estuary SSSI. European smelt are of national significance due to their importance as an indicator species of water quality, meaning their presence or absence can reveal the health of the ecosystem. Furthermore, they also serve as a crucial food source for fish-eating birds and other fish, such as sea trout and sea bass.
Marine invertebrates	Local	The Dee Estuary supports a diverse array of marine invertebrates, particularly within its extensive intertidal mudflat and sandflat habitats. Mudflat and sandflat areas contain ragworm (<i>H. diversicolor</i>), with small areas of barnacles (<i>S. balanoides</i> and/or <i>B. crenatus</i>) and the common periwinkle (<i>L. littorea</i>) on cobbles at low water. The mud includes a wide band of light airy impoverished sand which contains low numbers of the amphipod shrimps <i>Corophium</i> sp. and <i>Bathyporeia</i> sp. The site is sheltered but subject to moderately strong tidal streams and reduced salinity. Polychaete worms (likely ragworm) were found under rubble south-west of the A494 bridge whilst surveying.
INNS	N/A	No INNS were identified during the 2025 intertidal walkover surveys. Chinese Mitten Crab (<i>E. sinensis</i>) was recorded within 1735 m from the Scheme in Wepre Brook.

16.7 Mitigation Measures Forming Part of the Scheme Design

16.7.1 Several mitigation measures (primary, secondary, and tertiary) have been considered as part of the Scheme design to reduce any potential environmental effects. These measures are considered to be standard industry practice⁶³ for this type of development and further details of these are detailed in Chapter 2 (The Project) of this report and mitigation measures specific to the Marine Environment chapter are below.

Avoid

16.7.2 Primary mitigation measures to avoid adverse effects have been adopted as an intrinsic part of the design. Reasonable avoidance measures would be used to protect breeding and wintering waterbirds, migratory fish, and marine invertebrates.

16.7.3 Where protected species or their habitats would likely be affected, the works will be carried out in accordance with the methods detailed in the Outline Construction Environmental Management Plan (CEMP) (Appendix 18A), or as agreed with a qualified marine ecologist, subject to consents, licences (e.g. Marine Licence, HRA, WFD) and conditions within those licences. Reasonable avoidance measures would include:

- a) Maintain protection of intertidal and marine habitats which are being retained.
- b) Where possible, avoid in-river works during salmonid fish migration seasons (April-May).
- c) Where possible, avoid in-river works during lamprey fish migration seasons (May-July).
- d) Where possible, avoid piling works during breeding bird season (March-August).
- e) Where possible, avoid any temporary in-river structures during construction and operation & maintenance phase, which may impact fish migrations.

⁶³ [jema-mitigation-in-eia-guidance-final.pdf](#)

16.7.4 The following mitigation measures have been agreed and will be adopted within method statements:

- a) The installation of pile casings will be undertaken between 0800 – 1700hrs, with no work undertaken in 3hr period leading up to high tide at Chester weir (as previously agreed with Marine Area Advice and Management Team to reduce risk of disturbance to migrating fish).
- b) Boring within the pile casings minimises noise and removes risk of material loss as silt into the River Dee.
- c) Concrete works will be carried out with containment to prevent loss of concrete to the River Dee.
- d) Lighting for works will be switched off outside working hours, and security lighting minimised to avoid deterring fish movement and the passage of otters. Note – there is an existing and significant floodlight source at Scottish Power Energy Networks (SPEN) on the south-west bank of the that currently illuminates the river at night all year round.

16.7.5 If the above mitigation measures are not achievable, then in-river working would be restricted to between early March and November, to avoid overwintering bird season which is obviously a major constraint on construction operations that could potentially lead to significant risk of delays to the construction programme and that should be avoided.

Minimise/Mitigate

16.7.6 Secondary mitigation measures are defined as actions taken after the initial design stage to prevent, reduce, or offset residual environmental impacts that could not be avoided through primary mitigation²³. These measures are often imposed through planning conditions or within the Environmental Statement, and require further activity to achieve their intended outcome, such as engineering controls or specific operational practices and are integral to the Scheme:

- a) Site supervision during de-watering works within the Queensferry Drain Statutory Main River;
- b) Piling activities will be undertaken only in daylight hours to provide suitable windows of opportunity for migratory fish species (i.e. Atlantic salmon, sea trout, river and sea lamprey) to pass through the River Dee undisturbed on their migratory routes, as agreed by NRW during consultation.

- c) Soft-start procedure to be implemented prior to commencement of piling activities to allow suitable time for fish, marine mammals, waterbirds, and other mobile species to move away and avoid areas of increased noise levels, thereby largely reducing the risk of injury and/or stress to these species.
- 16.7.7 In previous consultations with NRW, it was mutually agreed that the ‘in river’ working using a jack-up barge or pontoons could be carried out at any time of the year subject to the following restrictions:
- a) Working hours restricted to daylight hours, which would typically be Monday – Friday 07:00 to 19:00 in the summer months, and 07:00 to 17:00 in the winter.
 - b) In-river piling activity working hours would be limited to between 08:00 to 17:00, and no piling work to take place in the 3 hours leading up to high tide at Chester weir.
- 16.7.8 Tertiary mitigation measures include producing and adhering to an INNS Management Plan. This will detail how the risk of potential introduction and spread of INNS will be minimised and outline measures to ensure vessels comply with the International Maritime Organization (IMO) ballast water management guidelines⁶⁴. It will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as measures to be adopted in the event that a high alert species is recorded.
- 16.7.9 Furthermore, biosecurity measures designed to manage and control the spread of INNS would be a contractual requirement for construction and an outline is presented within the outline CEMP (Appendix 18A). In Summary, the following measures will be implemented, where possible:
- a) Access and egress to the water body will be limited to a single point(s) in order to undertake ‘in river’; and,
 - b) Anything that comes in contact with the water, including boots and equipment, will be carefully cleaned.

Compensate

- 16.7.10 Permanent loss of saltmarsh habitat from the narrow ribbon of riverbank at the location of the bridge will occur as a result of the construction and operation of

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<https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/Biofouling%20pages/Compilation%20of%20relevant%20Guidelines%20and%20guidance%20documents%20-%202025-05.pdf>

the new bridge. Removal of the existing bridge will remove the shading effects on the habitat directly below the existing bridge, providing replacement habitat with post-monitoring and management conditions (for further details, please refer to Section 16.13 of this chapter), as well as the restoration and enhancement at the Greenfield Marsh site downstream from the Scheme.

16.7.11 The Greenfield Marsh site was identified following consultation with NRW and Flintshire County Council (FCC) to establish possible priority locations for saltmarsh restoration. The proposals are to preserve and monitor the area for the saltmarsh to colonise naturally by removing the rock rubble of the old embankment, and if required to enhance the area species through some manual enrichment should the existing conditions change, while also preserving the area of greenspace as existing and without any detriment on the existing rights for the public to use the land for outdoor recreation. Furthermore, the Greenfield site is approximately four hectares in size, therefore it will mitigate any losses from the proposed Scheme plus create additional habitat (for further details, please refer to Section 16.13 of this chapter).

16.7.12 The study team have considered the feasibility of creating new saltmarsh adjacent to the new crossing (also highlighted by NRW in previous consultation on 26th May 2022) but concluded that the Greenfield Marsh site, downstream of the Scheme, offers better potential for improving the condition and extent of existing saltmarsh as mitigation for saltmarsh loss.

16.7.13 The site was identified following consultation with NRW and Flintshire County Council (FCC) to establish possible priority locations for saltmarsh creation. The proposals are to preserve and monitor the area for the saltmarsh to colonise naturally and if required to enhance the area species through some manual enrichment should the existing conditions change. Whilst also preserving the area of greenspace as existing and without any detriment on the existing rights for the public to use the land for outdoor recreation.

16.7.14 The area under the existing River Dee Bridge which is currently unvegetated, littoral mud, will be subject to a separate monitoring and management plan with

the objective of eventually achieving floristic assemblages matching as like-for-like as possible to the existing saltmarsh habitat adjacent on both banks.

16.7.15 The habitat restoration goals of the currently shaded site within the Scheme area and the Greenfield Marsh site should be to facilitate the natural colonisation of saltmarsh species, as both the hydrological and sediment conditions conducive to saltmarsh development should be established during this period.

16.7.16 Management actions within the first year to facilitate these restoration objectives should include the removal of any debris to facilitate natural re-vegetation, the grading and stabilising of banks if needed to match the adjacent marsh elevation and the installation of sediment traps or coir rolls if erosion risk is deemed high, with a monitoring plan in place for five years post-construction, which will be detailed in an Environmental Monitoring and Management Plan (EMMP) at pre-construction stage (refer to Section 16.11 for further details).

16.8 Assessment of Land Take Effects

16.8.1 In this section, the potential effects of land take of the Scheme are identified as areas below mean high water spring (MHWS) and assessed, with and without mitigation measures, in order to determine the significance of residual effects.

16.8.2 With regards to the area of land take associated with the replacement bridge, removal of existing River Dee bridge and associated riverbank area, an area of intertidal habitat classified as saltmarsh on the northeastern bank of the River Dee will be affected by the construction of the replacement bridge. The overshadowing effect caused by the new bridge would have an adverse effect on the strip of existing saltmarsh habitat which will be directly beneath it.

16.8.3 The northeastern bank of the river beneath the existing bridge is a concrete revetment devoid of any vegetation. The existing bridge will be removed and the existing substrate will be adapted to encourage a natural recolonisation of saltmarsh habitat from the adjacent riverbanks. Additional post-monitoring and management will be required to ensure it re-establishes sufficiently (refer to Section 16.13 (Environmental Monitoring) of this chapter for further details).

- 16.8.4 The intertidal and subtidal habitats in this location are considered of national importance, the impact and effect are considered as **moderate adverse** and is therefore **significant**. With the inclusion of the compensation measures and bank design mitigation, the impact and effects are reduced to **negligible** and is therefore **not significant**.

Statutory designated sites, associated habitats and species

- 16.8.5 There will be **no significant effects** upon the marine qualifying features of the Dee Estuary Ramsar, SPA, and SAC. The boundaries of these sites are located approximately 1km downstream from the proposed Scheme footprint; therefore, no habitats of these designations will be directly affected by land take and consequently, there will be no change to these sites as a result of land take, which means the effects are **negligible** and **not significant**.
- 16.8.6 The designated sites which are crossed by the Scheme are the River Dee and Bala Lake SAC and River Dee SSSI. No significant effects on the Annex I habitats that are a primary reason for selection of the SAC, namely Water courses of plain to montane levels with the *R. fluitantis* and *Callitricho-Batrachion* vegetation, are envisaged, as the habitat type supporting these communities does not occur at the location of the Scheme. The SSSI includes intertidal mud and sandflats and saltmarsh which are habitats which would be directly affected by land take.
- 16.8.7 The land take during construction of the replacement bridge, removal of the existing bridge, and associated infrastructure, including access, the new shared use path and drainage outfall, would result in a loss of and disturbance to intertidal and saltmarsh habitat. The former occurs on the south bank where the saltmarsh consists predominantly of mud and on the north bank where more characteristic species of saltmarsh have been identified.
- 16.8.8 The Scheme also requires the construction of piers within the River Dee. A small area (approximately 42.4m²) of subtidal mud and sand would therefore be replaced by concrete bridge foundations. For the removal of the existing bridge,

the existing bridge abutments, decking and crossheads would be removed and landscaped.

16.8.9 As tidal rivers are a dynamic system, the effects of land take in terms of riverbed habitat, are hard to estimate. A Hydrodynamic and Sediment Transport Modelling report has been produced and is provided as an Appendix to Chapter 7 (Water Environment) (Appendix 7E, Volume 2; Document Reference 395318 MMD-00-XX-RP-Z-0000). The effects from construction processes are assessed in Section 16.9 and further information on the project is provided in Chapter 2 (The Project).

16.8.10 The River Dee and Bala Lake SAC is crossed by the Scheme; however, **no significant effects** on the Annex I habitats that are a primary reason for selection of the SAC are anticipated, as the habitat type (*Water courses of plain to montane levels with the R. fluitantis and Callitriche-Batrachion vegetation*) does not occur at the location of the Scheme.

16.8.11 In the absence of mitigation, land take impacts upon the River Dee SSSI (a receptor of National significance) and associated habitats are considered to be a **moderate adverse effect**.

16.8.12 There would be no significant land take effects upon features of interest of the Dee Estuary Ramsar/SPA. None of the key areas identified within these sites which are used by the wetland birds would be lost. The boundary of these sites are located 1.0km downstream from the Scheme footprint so no habitats of these sites would be directly affected by land take.

16.8.13 The River Dee SSSI is also crossed by the Scheme. Primary features of the designation are intertidal mud, sandflat and saltmarsh of national importance therefore are of **moderate** magnitude and impact. These habitat types would be directly affected by land take, resulting in a direct permanent loss of habitat, which would be considered a **moderate adverse effect**; however, with the inclusion of the compensation measures and bank design mitigation, the impact and effects are reduced to **negligible** and is therefore **not significant**.

16.8.14 The proposed land take during construction of the replacement bridge, demolition works associated with the existing bridge and associated infrastructure, including access and drainage outfall, would result in a loss of and disturbance to intertidal and saltmarsh habitat; therefore, an **adverse effect** is anticipated. This occurs on both the south bank and north bank where coastal saltmarsh vegetative communities are found.

16.8.15 Furthermore, the shading effects of the new replacement bridge will extend beyond the construction footprint, therefore an **adverse effect** is anticipated; however, this would be mitigated in the long term by the removal of the existing bridge which will no longer be shaded, and saltmarsh will likely establish with the presence of sunlight with source populations of saltmarsh species deriving from the adjacent saltmarsh habitat either side of both abutments. This can take a considerable amount of time, as colonisation of pioneer saltmarsh species and succession to a mature saltmarsh vegetation at this location is unknown, ranging from two to three years for initial colonisation to decades for an area of established saltmarsh⁶⁵. This area of habitat will be included in an environmental monitoring and management plan (EMMP) following construction which should detail objectives and steps to be taken should the vegetative community not develop favourably (i.e. not achieve the characteristics or floristic assemblage notable of an Annex I saltmarsh habitat, namely Atlantic saltmarsh H1330). This may include active restoration measures—such as plug planting of saltmarsh species or the use of pre-established vegetation matting. This will contribute positively to net benefits for biodiversity (NBB).

16.8.16 The feature is national importance and the impact of land take on the Annex I saltmarsh habitat would result in a **moderate** impact and the overall effect is **moderate adverse** which is **significant**. Taking account of the measures set out in Section 16.7, the impact and effect is reduced to **negligible**, and the overall effect on which is **not significant**.

⁶⁵ JNCC (2003), Saltmarsh Review: An overview of coastal saltmarshes, their dynamic and sensitivity characteristics for conservation and management: *Report No. 334*; 58-60,

16.8.17 The primary mitigation included in the Scheme for the loss of saltmarsh and intertidal habitats is that replacement habitat would be developed. If successful, it is considered that this will mitigate in some way for the areas lost as a result of land take and so the residual effects in 5+ years are considered to be a ***moderate beneficial effect***.

Fish

16.8.18 The Atlantic salmon, sea lamprey and river lamprey are features of interest of the SACs and European smelt are a feature of the SSSI. These species all migrate annually within the River Dee at the location of the Scheme.

16.8.19 The Scheme requires the construction of piers within the River Dee. A small area of subtidal mud and sand, amounting to approximately of 42.4m², would be replaced by concrete bridge foundations. The sensitivity of the migratory fish species is high, however, due to the very small amount of land take (42.2m²) relative to the total area of the riverbed, the magnitude is low, therefore the overall effect is ***minor adverse*** and therefore ***not significant***. The effects upon fish during construction and operation are assessed in Section 16.9 and Section 16.10, respectively.

Marine Benthic Invertebrates

16.8.20 The placement of new bridge piers within the River Dee will permanently remove the subtidal sand and mud habitat substrates which is the characteristic habitat for benthic species.

16.8.21 Subtidal mud habitat is found throughout the intertidal and subtidal zones of the Scheme area and not the qualifying feature of the SAC designation. The placement of the new bridge piles and the retention of the existing bridge piles result in an overall net loss of sub-tidal mud habitat; however, this will result in a ***minor adverse effect***, as the area of this habitat represents 0.006%⁶⁶ of the

⁶⁶ Land take of 0.0042Ha of subtidal and intertidal habitat for bridge piers. Total River Dee and Bala Lake SAC area = 1271.32Ha (6% of the SAC is Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (4%) and Salt marshes, Salt pastures, Salt steppes (2%) = 76.279 ha)
(0.0042/76.279)*100 = 0.006%.

total area of the River Dee and Bala Lakes SAC intertidal and subtidal habitat area.

16.8.22 Furthermore, the habitat lost is also not within the boundary of the Dee Estuary SAC, which is located 1km from the proposed works; additionally, key benthic species rapidly recruit following disturbance, allowing for rapid colonisation. The impact of intertidal sand and mud habitat loss due to the new bridge piles is assessed as a **minor adverse effect** and therefore **not significant**.

16.8.23 In the absence of mitigation, effects from land take and therefore a loss of available habitat for marine benthic invertebrates (a receptor of **local importance**) and is considered to be a **minor adverse effect**. With the secondary and tertiary mitigation in place, detailed in Section 16.7, the effect of land take on benthic invertebrates has been assessed and is considered to be **negligible** and **not significant**.

16.8.24 The residual effects upon marine invertebrate species and their associated habitats during operation are considered to be **negligible** and **not significant**

Breeding Waterbirds and Waders

16.8.25 Breeding birds would be affected by land take in the form of loss of suitable intertidal habitat including saltmarsh, mudflat and sand. As the proposed development will potentially require the removal or impact of banks, saltmarsh and intertidal mud and sand, there will likely be a small reduction of nesting and foraging habitats for breeding birds, in the short-term as a result of land take.

16.8.26 In the absence of mitigation, land take effects upon breeding birds are considered to be **negligible**. The sensitivity of the feature is high, however due to the small amount of land take, the magnitude on breeding birds is negligible, therefore the overall effect with mitigation in place is a **slight adverse effect** and **not significant**. Works would be timed to avoid the removal of vegetation within the nesting bird season (March to September, inclusive) or checks by an ornithologist will be made prior to clearance. The Scheme would incorporate landscaping to provide suitable habitat for nesting and foraging. Furthermore, the removal of the existing bridge will enable the gradual growth of saltmarsh in

the once shaded areas, and the compensation measure at the Greenfield site will create more saltmarsh habitat further downstream. The residual effect of land take on breeding birds is considered to be **neutral** and **not significant**.

Wintering Waterbirds and Waders

16.8.27 The majority of roosting species located within the site were primarily identified as using the small, rocky bays which were located >150m away from the proposed bridge works, on either side (see Appendix 8B, Volume 3; Document Reference: 395318-RML-00-XX-RP-Y-8012). In addition, species identified were never noted as utilising the areas beneath the bridge specifically for roosting or feeding.

16.8.28 There were 40 priority listed overwintering species recorded during the non-breeding bird surveys however, none of which represent a significant proportion of the national populations (<1% of total wintering population). These species are not heavily reliant on the habitats offered within the Scheme area. Although the coastal bird assemblages within the site extent were frequently encountered, there was a much greater presence of bird species >1.50km east and west of the central area (existing A494 River Dee Bridge).

16.8.29 Overall, the Scheme is not anticipated to have a substantial impact on overwintering birds in terms of land take, given that the proposed areas subject to removal, both permanent and temporary, are already exposed to considerable disturbances due to their proximity to existing roads, public spaces, and cycle networks. Additionally, existing more suitable habitats are accessible in close proximity to the Scheme and would be left undisturbed.

16.8.30 In the absence of mitigation, land take effects upon wintering birds (**a receptor of district importance**) are considered to be a **minor adverse impact** and **not significant**. With primary, secondary and tertiary mitigation in place, the effect of land take on wintering birds is considered to be **negligible adverse impact** and **not significant**.

16.8.31 The residual effect to wintering birds in terms of land take is considered to be **neutral**.

16.9 Assessment of Construction Effects

16.9.1 In this section, the potential effects of construction of the Scheme are identified and assessed, with and without mitigation measures, in order to determine the significance of residual effects.

16.9.2 The main construction activities associated with the Scheme include:

- a) Utility diversions;
- b) Removal of existing bridge deck and cross heads and site clearance;
- c) Associated earthworks required for the designed highway alignment as well as for drainage, structures and landscaping works;
- d) Construction of and diversion of drainage systems;
- e) Construction of new structures including a new pumping station;
- f) Construction of the new and improved sections of the carriageway;
- g) Construction of new access roads;
- h) Construction of new shared use pathways; and,
- i) Temporary lighting requirements.

16.9.3 In summary, construction activities which may cause noise and vibration disturbance within the river include the following:

- a) Construction of pontoon – intermittent and infrequent noise (up to 8 weeks)
- b) Positioning and re-positioning and use of jack-up barge
- c) Installation of steel tube pile casings into the riverbed (expected to take up to 2 days per pile)
- d) Boring within the pile casings (1.5 days per pile)
- e) Forming piles with reinforcement and concrete (expected to take up to 0.5 days per pile)
- f) Pile cap construction (the formwork method is expected to take up to 8 weeks for each (worse-case scenario), the Caisson method is expected to take up to 2 weeks)

16.9.4 The outline construction activities are provided in Chapter 2 (The Project) and have been described in more detail in the Constructability Report (Doc Ref:

395318-MMD-00-XX-RP-Z-0034). The anticipated effects of construction of the Scheme are based on a 'worst case scenario'.

- 16.9.5 The construction programme is dependent on several key constraints such as the diversion of utilities and any seasonal limits for works in the River Dee that may be imposed by NRW. Advance works to establish construction compounds, access points and to divert utilities are likely to begin several months before commencement of the main works. The construction activities and programme could be subject to modification during both the detailed design and the construction phases. Detailed information on construction and programme is provided in Chapter 2 (The Project).
- 16.9.6 The likely impacts arising from construction include temporary effect on fish health due to increased siltation in the river and estuary causing clogging of gills, the accidental release of pollutants (e.g. fuel and/or coolant from construction machinery, runoff from the riverbank due to earthworks/clearance) into the water, and increased noise and vibration underwater causing disorientation of migratory fish species. Furthermore, temporary loss of benthic invertebrate habitat due to disturbance of the riverbed. It is important to note that the primary, secondary and tertiary mitigation measures detailed in Section 16.7 are a vital component of the Scheme.
- 16.9.7 Control of pollution during construction will be set out in a detailed CEMP. This will include best practice measures to prevent accidental spillage of chemicals during construction activities. An outline CEMP can be found in Appendix 18A, a detailed CEMP will be completed by the appointed principal contractor during pre-construction phase and will align with the measures set out within the outline CEMP included as part of this application.

Statutory designated sites, associated habitats and species

- 16.9.8 There would be no direct construction-stage effects upon features of interest of the Dee Estuary Ramsar, SPA and SAC. The boundary of these sites is located 1.0km downstream from the Scheme.

- 16.9.9 There may be indirect effects in the absence of mitigation, in particular on saltmarsh and intertidal habitats and features of interest including birds, river and sea lamprey and European smelt as a result of works within the River Dee to construct the bridge, and to remove the existing bridge. Indirect impacts may include smothering due to sedimentation from piling activities and potentially resuspension and release of dissolved contaminants that may be trapped in the sediments, increased water turbidity, noise and air pollution and also the potential introduction and spread of marine invasive non-native species.
- 16.9.10 A HRA Screening and Appropriate Assessment would be carried out to assess the effects of the Scheme on the SAC, SPA, and Ramsar sites (in progress). As the River Dee is tidally influenced, all in-river operations and construction would be subject to the application of a Marine Licence to NRW, ensuring that operations are conducted in an environmentally responsible and legally compliant manner.

Fish

- 16.9.11 To construct the proposed bridge, a piling rig mounted on a temporary platform or on a 'jack-up' barge would be used to drive thin, steel tubes into the riverbed. When the tubes reach the required depth, bored piles will be constructed by positioning an auger inside the steel tube. This way the disturbance of the silt and vibration at the riverbed will be kept to a minimum and restricted only to the steel tube-driving operations, thus reducing the quantity of suspended particulates and noise within the water course which may indirectly affect fish. This construction methodology is classified as a primary mitigation measure of the Scheme.
- 16.9.12 Temporary construction impacts on migratory fish may occur from accidental spillages of chemicals and substances, increased sediment mobilisation, increased vibration / noise during in-channel works conducted in the migration season and temporary lighting.
- 16.9.13 These activities can lead to behavioural effects such as avoidance of the noise source and interruption of migratory routes. The impact of underwater noise

produced during pile driving operations has not been modelled, the assessment of the effects on migratory fish species is based on existing literature and professional judgement.

16.9.14 It is anticipated that the in-river piling works could take up to 12 months, depending on the contractor's detailed construction methodology and programme (see Appendix 18A). Noise and silt disturbance would arise from inserting the steel casing tubes into the riverbed to a depth sufficient to achieve stability and a seal to minimise water ingress and contain disturbed silts. The tubes would be oscillated or driven in with vibration. A rotary bore within the steel tubes would remove riverbed silt and underlying glacial till deposits to the full pile depth required. Other associated noise or silt disturbance may arise from the installation of the temporary sheet piles in the riverbank, which are to maintain flood bank level of integrity during construction.

16.9.15 A modelling study has been conducted to assess the impact of underwater noise produced during piling within the river on migratory fish. This is reported within Chapter 16, Marine Environment.

16.9.16 Behavioural impacts in fish following their exposure to underwater noise relate to the way in which they hear and how they may subsequently respond to the sound. Variation in the anatomy and physiology of the ears and associated structures in fish is extensive, indicating that different species detect sound in different ways⁶⁷.

16.9.17 Excessive fine sediment, in suspension or deposited, can have damaging impacts on all life stages of fish, particularly salmonids. The effect on ecosystems will, however, depend on several key factors, including the concentration of fine sediment in suspension, the duration of exposure to fine sediment and the sediment chemical composition and particle size⁶⁸.

⁶⁷ Popper, Arthur N., and Richard R. Fay. "Sound detection and processing by fish: Critical review and major research questions (part 2 of 2)." *Brain, behaviour and evolution* 41.1 (1993): 26-38.

⁶⁸ Bilotta, Gary S., and Richard E. Brazier. "Understanding the influence of suspended solids on water quality and aquatic biota." *Water research* 42.12 (2008): 2849-2861.

- 16.9.18 Pollution could have a detrimental effect on salmonids migrating to spawning grounds further upstream. Turbidity of water, particularly if the turbidity is caused in part by organic compounds, can increase the oxygen deficit and this can play a part in making the river unsuitable for migrating fish.
- 16.9.19 Sea and River Lamprey are adversely affected by pollution in the lower reaches of rivers and cannot migrate through heavily polluted water. Populations can be eliminated from rivers with high-quality habitat in the upper stretches due to pollution incidents further downstream⁶⁹.
- 16.9.20 The noise and vibration associated with piling to form the foundations for the replacement bridge has a **moderate** impact and will have a **moderate adverse effect** on salmonid and lamprey species (high sensitivity), which is **significant**. With secondary and tertiary mitigation measures implemented in the Scheme and agreed with NRW, the in-river piling works would be restricted to daylight hours only (8am to 5pm) with a soft-start approach to minimise the risk of disturbance to migrating fish, the effect of noise and vibration disturbance on migratory fish (very high sensitivity) is **minor adverse impact**, and therefore **not significant**.
- 16.9.21 Temporary lighting during the construction period, may also disturb migratory fish. Artificial lighting may disorientate migrating fish or deter them for fear of predation, indirectly affecting migration.
- 16.9.22 In the absence of mitigation, temporary lighting effects upon migratory fish within the River Dee (a receptor of **international importance and therefore very high sensitivity**) the impact and effect are considered to be **moderate adverse**, which is **significant**. With the secondary and tertiary mitigation in place, the effect of temporary lighting disturbance on migratory fish is considered to be a **minor impact** and **not significant**.
- 16.9.23 The effect of construction activities on European smelt (a receptor of **national importance**) is considered to be **moderate adverse and significant**. With the

⁶⁹ Maitland, P. S. "Ecology of the River, Brook and Sea Lamprey—Conserving Natura 2000 Rivers." Ecology series 5 (2003).

secondary and tertiary mitigation in place, the effect of temporary lighting disturbance on migratory fish is considered to be a **minor impact** and **not significant**.

Marine Benthic Invertebrates

16.9.24 In the absence of mitigation, construction effects, such as sediment disturbance and risk of pollution from construction machinery (e.g. fuel, lubricants and coolants) entering the water and sediment, on marine benthic invertebrates (a receptor of **local importance**) are considered to be a **minor adverse effect**. With the secondary and tertiary mitigation in place, the effect of disturbance from construction on benthic invertebrates has been assessed and is considered to be **negligible adverse impact** and **not significant**.

16.9.25 Although not significant, the application of standard industry practices means the magnitude of impact would be reduced and the residual effect is reduced to **negligible** which remains **not significant**.

Breeding waterbirds and waders

16.9.26 Designated breeding bird species supported by the Dee Estuary Ramsar/SPA (little egret, redshank, teal, and oystercatcher) did not exceed significant thresholds of 1% or more of the designated site population within the survey area. Though the Scheme survey area and footprint appears to support a moderate number of species (>21) during the breeding season. Saltmarsh and mudflats during low tide provide valuable foraging habitats, and saltmarsh habitat during high tide provides a vital high tide roost area for breeding birds.

16.9.27 Of the species identified using the surveyed areas in the breeding season, redshank and shelduck are the most sensitive to noise disturbance, though these species were recorded in low numbers (shelduck peak count in the breeding season was 2, redshank peak count in the breeding season was 3) and were not confirmed as breeding within the Scheme survey area.

16.9.28 In the absence of mitigation, effects of construction activities upon breeding waterbirds, which are of international importance and high sensitivity, are

considered to be a **minor adverse effect** due to their low numbers, and **not significant**.

16.9.29 To reduce disturbance and displacement during the construction and demolition phase, mitigation measures include quieter operating plant and machinery are used. In addition, it is also advised that acoustic and visual bunds are placed to alleviate visual and noise disturbance to the foraging and (or) commuting species.

16.9.30 With the adoption of Reasonable Avoidance Measures as set out within the bird survey reports and Chapter 8 of this report (Terrestrial Biodiversity) and the potential to restore some of the habitat lost, the residual impact upon local bird assemblages is considered to be **negligible** and **not significant**.

16.9.31 The potential construction impacts of the Scheme on breeding birds may include temporary loss and fragmentation of foraging habitat; and increased levels of disturbance resulting from noise and light if not mitigated for appropriately. This or could result in a reduction in species richness and/or abundance; displacement of birds from foraging sites. This would result in a minor adverse effect and therefore not significant.

16.9.32 Providing the mitigation recommended is followed, the residual effect to wintering waterbirds and waders in terms of construction effects is considered to result in a **minor adverse effect** which is **not significant**.

Wintering waterbirds and waders

16.9.33 The wintering qualifying bird species for the designated site; redshank, shelduck, oystercatcher and curlew, appeared to use the areas surveyed, however these were recorded in relatively small numbers and did not represent a significant proportion of the Dee Estuary SPA or Ramsar populations (<1% of total wintering population). The abovementioned species are not heavily reliant on the habitats offered within the Scheme area.

16.9.34 Although the coastal bird assemblages within the site extent were frequently encountered, there was a much greater presence of bird species >1.50km east

and west of the central area (A494 river Dee crossing). This could be due to the current high disturbance within the site extent including heavy traffic on the existing bridge crossing above the river, pedestrians and regular agricultural practices within the fields surrounding the site (observe from a pre-determined transect route).

16.9.35 Further to this, there were several occasions where local dog walkers did pass through the site, which caused some disturbance, however this was only temporary. The birds returned back to their original roosting and/or feeding location; the medium, rocky bays exposed only during low to mid tide located >200m from the centre of the proposed works.

16.9.36 Based on the tide toolbox⁷⁰ generic waterbird responses to disturbance from a range of activities including construction work have been collated and summarised over time. Table 16-10 provides the type and level of disturbance. When reviewing this, one needs to consider the existing background noise at the site as well as its use by and proximity to public rights of way (PRoW) and other roads/cycle routes.

Table 16-10 General waterbird disturbance levels stimuli

Activity	Value (sensitivity)	Site context
Personnel on mudflat	High	During construction and demolition, activity within and on the intertidal mudflats would increase.
Intermittent plant and personnel on crest	High to moderate	During construction and demolition, activity within and on the intertidal mudflats would increase
Irregular piling noise (above 70db)	High to moderate	Sheet piling needed to stabilise banks during demolition. Noise associated with pile driving.
Regular piling noise (above 70db)	Moderate	As above

⁷⁰ Available at [TIDE toolbox - TIDE tools](#) [Accessed 09/06/2025]

Activity	Value (sensitivity)	Site context
Irregular noise (50-70db)	Moderate	Increased and irregular noise levels during demolition and construction.
Regular noise	Moderate to low	For example, existing road traffic which would continue
Occasional movement of crane	Moderate to low	Required to install the bridge from the jack-up barge, may also be temporary visual effects
Noise below 50db	Low	What are the existing noise levels, get from baseline noise report
Activity in land	Low	Construction activities in land, i.e. demolition of existing properties and construction of new road section, footpaths etc.

(Source: TIDE toolbox)

16.9.37 Of the over wintering qualifying species for the designated site identified using the surveyed areas, redshank and shelduck are the most sensitive to noise disturbance.

16.9.38 In the absence of mitigation, effects upon wintering waterbirds are considered to be a ***slight adverse effect***.

16.9.39 To reduce disturbance and displacement during the construction and demolition phase, it is advised that quieter operating plant and machinery are used. Where unavoidable, anticipated noisier construction activities should not be completed during three hours leading up to high tide, in order for bird species to utilise the banks during low tide undisturbed, in order to both commute and/or forage. In addition, it is also advised that acoustic and visual bunds are placed to alleviate visual and noise disturbance to the foraging and (or) commuting species.

16.9.40 With the adoption of Reasonable Avoidance Measures as set out within the bird survey reports and the Terrestrial Biodiversity Chapter and the potential to restore some of the habitat lost, the residual impact upon local bird assemblages is considered to be ***neutral***.

16.9.41 The potential construction impacts of the Scheme on non-breeding birds may include loss and fragmentation of foraging habitat; and increased levels of disturbance resulting from noise and light if not mitigated for appropriately. This would result in a reduction in species richness and/or abundance; displacement of birds from foraging sites; and a reduction in overwinter survival. This would result in a **minor adverse effect**.

16.9.42 To reduce disturbance and displacement during the constructional phase, it is advised that quieter operating plant and machinery are used during works to the bridge area. Where unavoidable, anticipated noisier construction activities should be completed during three hours either side of high tide in order for species to utilise the banks during low tide in order to both commute and/or forage. In addition, it is also advised that acoustic and visual bunds are placed to alleviate visual and noise disturbance to the foraging and/or commuting species listed above.

16.9.43 To mitigate disturbances and the displacement of overwintering species during the construction phase, it is recommended to implement acoustic and visual barriers. These measures would help minimize both noise and visual disturbances, ensuring a more favourable environment for the aforementioned bird species.

16.9.44 Providing the mitigation recommended is followed, the residual effect to wintering waterbirds and waders in terms of construction effects is considered to result in a **temporary minor adverse effect** which is **not significant**.

16.10 Assessment of Operational Effects

16.10.1 In this section the potential effects of operation of the Scheme, once open to traffic, are identified and assessed, with and without mitigation, in order to determine the significance of residual effects.

16.10.2 Effects from the operation of the road include potential increase in public access and vehicles, permanent highway lighting, and hydromorphological changes including changes to flow, velocity or sediment dynamics within the

River Dee. It is important to note that the mitigation measures detailed in Section 16.7 are a vital component of the Scheme.

Statutory designated sites, associated habitats and species

16.10.3 There will be no direct operational effects upon features of interest of the Dee Estuary Ramsar, SPA and SAC. None of the key areas identified within these sites will be subject to any further effects during the operation of the road as the boundary of these sites is located 1.0km downstream from the Scheme footprint. As the number of lanes on the new Bridge are staying the same as the existing (two lanes), no increase of contaminants in surface water runoff from the road due to higher volume of traffic is anticipated. An analysis of the long-term impacts of surface water run-off into the River Dee has been provided in Chapter 7 (Water Environment), this concluded a slight (beneficial) permanent effect given the provision of a new swale channel and vegetation lined open channel diversion of the Queensferry Drain and increase in swale capacity.

16.10.4 It has been concluded that the realignment of the A494 River Dee Bridge would not change the overall air quality impact on designated habitats (Chapter 11: Air Quality). The A494 River Dee Bridge is not expected to change the quantity of road traffic emissions or their impact on intertidal ecological receptors but rather relocate these impacts approximately 40m south-east where habitat critical loads are similar; therefore, it has been concluded that the magnitude of emissions are expected to be the same and therefore no significant effects on air quality are anticipated.

16.10.5 The designated sites which are crossed by the Scheme are the River Dee and Bala Lake SAC and River Dee SSSI. No significant effects on the Annex I habitats are anticipated, due to not being present in the vicinity of the Scheme footprint, so no pathway and therefore no effect. The SSSI includes intertidal mud, sandflats and saltmarsh which are habitats that could be affected by the shading effects of the replacement bridge, in particular to the north bank which contain abundant sea purslane, a typical species of Atlantic salt meadow. The shading effects of the replacement bridge will be mitigated by the removal of

the existing bridge and the habitat compensation at the Greenfield site downstream of the Scheme.

- 16.10.6 The hydrodynamic and sediment transport modelling study (Appendix 7E, Volume 2) concludes that the construction of the replacement bridge will not significantly alter water levels but may lead to localised changes in current speeds and flow patterns, which in turn, may cause localised increases in water turbidity and new areas of erosion or sediment deposition. As the channel is already tidal, heavily modified and turbid, the predicted changes in water turbidity are not expected to be significant. The original bridge piles are being left in-situ, as such the presence of additional bridge piles from construction of the new bridge increases eddy formation and slightly modifies current speeds, though these changes are small-scale and do not result in large-scale hydrodynamic impacts.
- 16.10.7 The hydrodynamic and sediment transport modelling study concluded that although localised areas of erosion and deposition occur, particularly near the bridge piles, this would not significantly disrupt overall sediment dynamics. Overall, while the new bridge influences localised flow conditions, its broader impact on tidal regime and sediment transport remains limited within this naturally variable tidal channel and so no significant operational effects are predicted.
- 16.10.8 In the absence of mitigation, the impact level is considered to be **minor adverse**. Given the sensitivity of designated sites is very high, resulting operational effects upon the designated sites and associated habitats (a receptor of international importance) are of a **moderate adverse effect (significant)**.
- 16.10.9 Given the primary mitigation included in the Scheme for the loss of saltmarsh and intertidal habitats outlined in Section 16.7, operational effects upon saltmarsh and intertidal habitats are considered to be **negligible** and **not significant**. The shading effects of the replacement bridge will be mitigated for in the long-term (1-5 years) by the removal of the existing bridge and habitat compensation at the Greenfield site downstream from the Scheme.

16.10.10 The residual effects upon the designated sites and associated habitats during operation are **neutral** and **not significant**.

Fish

16.10.11 The potential effect of loss and/or disturbance of fish habitats, including spawning and nursery habitats, has been considered in relation to the permanent loss of benthic intertidal and subtidal habitat due to the installation of new bridge piers and keeping the old bridge piers in place. The most sensitive species are likely to be demersal species (e.g. flounder, sole, and plaice) and elasmobranchs (e.g. tope shark and rays); however, such species are not expected so far upstream within the Scheme area and would more likely be found in the mouth of the Dee Estuary therefore are not considered to be at risk. Similarly, whilst of very high conservation value and sensitivity, migratory fish species are unlikely to be sensitive to this impact due to being highly mobile, their ability to avoid the impacted area and their unlikely requirement to rely on the small habitat loss that will be removed by the Scheme for foraging; therefore the sensitivity to this impact is assessed as **negligible**, with a **minor adverse effect** and therefore **not significant**.

16.10.12 The permanent loss or disturbance of benthic habitat within the River Dee could lead to a localised decrease in infaunal and epibenthic marine invertebrates which in turn reduces food availability for fish, which could have consequences for the local abundance of fish species following the impact; however, the footprint is very small and localised, with a large area of suitable surrounding habitat, therefore the sensitivity to this impact is assessed as **negligible**, with a **minor adverse effect** and therefore **not significant**.

16.10.13 The subtidal mud habitat which will be lost at the proposed bridge footprint location is not suitable fish spawning substrate, therefore the sensitivity to this impact is assessed as **negligible**, with a **minor adverse effect** and therefore **not significant**.

16.10.14 The impact of additional light on fish migratory routes is considered within the Environmental Lighting Impact Assessment (ELIA) for the Scheme (Doc ref:

395318-MMD-00-XX-RP-E-0009). This considered two receptor locations within the immediate vicinity of the existing bridge and adjacent to the River Dee (E03 and E04), with another receptor location, H02, further downstream by the existing Queensferry Bridge (also known as Jubilee Lift Bridge), which is approximately 150m northwest of the existing A494 bridge.

16.10.15 Receptor location E03 is situated along a proposed active travel route on the southwestern bank of the river and receptor location E04 is situated along the existing national cycle route 568 on the northeastern bank of the river, which is to be reprofiled and retained as part of the Scheme. Receptor location H02 is a metal bridge with a two-way single lane carriageway which is illuminated by several floodlights mounted on the structure at high tilt angles producing a white coloured light, emitting a bright white light, with noticeable spill onto the river surface.

16.10.16 The proposed operational illumination levels for receptor location E03 with no de-rating maintenance factor applied, indicates a predicted level of change assessed as **major adverse** on biodiversity (e.g. migratory fish), while for receptor location E04, indicates a predicted level of change assessed as **minor adverse** and for H02, the predicted level of change assessed as **negligible/not significant**.

16.10.17 Mitigation measures have been recommended for this location (E03) which will be part of the Scheme's commitments, such as lighting on the central area of the road (with forward facing integral light shields), rather than on the outer areas of the bridge to reduce light spillage, also lower colour temperatures and rear light shields on the proposed lighting for the active travel routes under the bridge; however, in summary, the ELIA concluded that location E03 is currently a dark, unlit area that will be lit in the future.

16.10.18 Taking the findings of the ELIA into account when assessing the impact of light disturbance of the Scheme on migratory fish species (very high sensitivity); even though the light from the Scheme during operation will be higher than the current baseline conditions, with mitigation measures in place to keep light spillage onto the river to a minimum, and considering that the much higher light

spillage from Queensferry Bridge (H02) downstream of the Scheme has not created a barrier for migratory fish, potentially due to the high turbidity of the water which is known to restrict light penetration⁷¹, the significance of effect is considered as **minor adverse** and **not significant**.

Marine Benthic Invertebrates

16.10.19 The placement of new bridge piers within the River Dee will permanently remove a small area of intertidal and subtidal sand and mud habitat, which is the characteristic habitat for marine benthic species.

16.10.20 Benthic species are known to rapidly recruit following disturbance, allowing for rapid colonisation. Furthermore, the area of sub-tidal mud habitat of the River Dee and Dee Estuary is very large, with sufficient space for quick re-establishment of benthic species.

16.10.21 The residual effects upon marine benthic invertebrate species which are of local importance and negligible sensitivity during operation are considered to be **minor adverse** and **not significant**.

Breeding waterbirds and waders

16.10.22 The lighting plan indicates lighting along the active travel route on the south-western side of the new bridge. The proposed luminaires will support the Active Travel Route connection to Station Road and are required for health and safety/personal security. These are directional LED luminaires mounted on 6-metre-high columns, with low kilolumen (klm) output and a correlated colour temperature of 3000K. The lighting changes at viewpoints E03 and E04 are expected to have a minor adverse level of change during the construction phase, with all other receptor locations seeing no/negligible change. As such it is anticipated there will be a **minor adverse effect** on breeding bird nesting

⁷¹ R.J. Davies-Colley, D.G. Smith (2001). Turbidity, suspended sediment, and water clarity: a review. *The Journal of the American Water Resources Association* **37**(5): pp. 1085-1101. Available at: https://www.researchgate.net/publication/229559740_Turbidity_Suspended_Sediment_and_Water_Clarity_A_Review

areas during breeding bird season, where light spills onto the suitable breeding habitat from receptor sites E03 and E04.

Wintering waterbirds and waders

- 16.10.23 The potential operational impacts of the Scheme on non-breeding birds may include increased levels of disturbance resulting from noise and light if not mitigated for appropriately. This would result in a reduction in species richness and/or abundance; displacement of birds from foraging sites; and a reduction in overwinter survival.
- 16.10.24 The lighting plan indicates lighting along the active travel route on the south-western side of the new bridge. The proposed luminaires are described in 16.10.22. The existing bridge and areas under the existing bridge are currently unlit so there is a potential for a **moderate adverse effect** on bird roosting areas where light spills onto the River Dee and the nearby intertidal areas/riverside banks close to receptor sites E03 and E04. Further afield, the proposed lighting scheme is expected to have **negligible effect** to wintering waterbirds and waders as predicted levels of lighting change are considered to be **negligible** and therefore **not significant**.
- 16.10.25 To reduce disturbance, displacement, and to reduce road mortality during the operational phase, the planting of treelines and/or hedgerows has been added to the design, to act as natural visual and sound barriers surrounding the widening of the A494 road, particularly alongside the westbound carriageway as the current tree and shrub line is likely to be lost. In addition to this, these natural barriers will also compensate and/or create new habitats for wintering waterbirds and waders, and elevate bird flight paths which will aid the reduction of road mortality (EMPs; Chapter 2, Vol. 2; Figures 2.1 to 2.4).
- 16.10.26 Providing the mitigation recommended is followed, the residual effect to wintering waterbirds and waders in terms of operation effects is considered to result in a **temporary minor adverse effect** and **not significant**.

16.11 Environmental Monitoring

16.11.1 The purpose of monitoring is to:

- a) ensure measures are delivered which are envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment;
- b) build data on the effectiveness of design and mitigation measures thereby driving improvement in environmental performance for future projects;
- c) satisfy licence / permit /draft order requirements (where applicable); and
- d) identify remedial action as a consequence of underperformance or failure of mitigation.

16.11.2 Monitoring would be undertaken both during the construction and the operation of the Scheme to confirm the effectiveness of mitigation measures and, if necessary, to inform the need for any changes.

Environmental Monitoring during construction

16.11.3 The Contractor would be required to monitor the site during construction to ensure that all construction-phase mitigation is in place.

16.11.4 Monitoring of watercourses at risk from pollution would be carried out at pre-construction and during the construction phase. This would comprise visual assessments for oil and silt, supplemented by turbidity monitoring using portable field indicator equipment, where necessary by sampling at locations up- and downstream of the works (and tested as appropriate for suspended solids, pH changes and hydrocarbons). Monitoring requirements would be discussed and agreed with NRW. Further information is provided in Chapter 7 (Water Quality) and Chapter 19 (Conclusions).

Environmental Monitoring during operation (0 to 5 years, post-construction)

16.11.5 On completion of the construction phase, there would be a five-year aftercare period at a minimum to ensure the establishment of the landscape and ecological elements of the Scheme. The environmental requirements for this period would be implemented through an Environmental, Landscape and

Ecology Aftercare Plan as set out in Chapter 18 (Environmental Management) of this ES.

16.11.6 The foreshore area of Greenfield Marsh, near Walwen, contains areas of saltmarsh habitat of variable condition including patches of rubble left as vestiges from an old landfill. The proposals are to remove debris, preserve and monitor the area for the saltmarsh to colonise naturally and if required, to enhance the area species through some manual enrichment, should the existing conditions change. This will increase the extent of the saltmarsh habitat, and removing debris will enhance its current condition. This is considered proportionate to that lost as a result of the Scheme. Welsh Government would collaborate with Flintshire County Council (FCC) and Natural Resources Wales (NRW) to progress with these proposals should the Scheme be consented. Post-monitoring of the saltmarsh would be carried out for the first 5 years, as specified by NRW and FCC, with a specific post-debris removal management and monitoring plan implemented.

16.11.7 The overall aim should be to increase the extent of the saltmarsh across the area of mudflat post-debris removal. The monitoring objective of the monitoring and management plan in years 1-5 should be to assess the progress of the area of mudflat in naturally re-colonising towards that of an SM13a NVC community which is currently present on site according to the baseline survey. This community should be considered as the target end habitat as it closely resembles Annex I Atlantic salt meadows habitat and thus reflects a high biodiversity value. This community is already present on-site though its extent is likely hindered by the piles of rubble.

16.11.8 A target total percentage vegetative cover of the mudflat and percentage SM13a cover should be agreed upon ($\geq 70\%$ cover by year 5; $\geq 80\%$ SM13a by year 5 for example). The cover of vegetation is recommended to be monitored quarterly for years 1-5 post-rubble removal, through fixed quadrats and aerial imagery surveys. Species composition should also be monitored annually by means of further NVC surveys. Should low natural colonisation occur (e.g. $< 30\%$ by year 2) then assisted planting using plug plants, matting or seed should be considered. Other parameters to be monitored should include the

elevation change and hydrology. The elevation change should be monitored annually and is recommended to aim to be within ± 5 cm of the adjacent SM13a community. The hydrology should include regular tidal inundation logs which should aim to be regular enough to support an SM13a community.

16.11.9 The areas situated under the current bridge which are currently unvegetated, littoral mud should be subject to a separate monitoring and management plan with the objective of eventually achieving floristic assemblages matching as like-for-like as possible to the saltmarsh habitat adjacent on both banks (assuming the National Vegetation Classification (NVC) survey undertaken by Mott MacDonald ecologists in July 2025 is representative of the adjacent saltmarsh). In the short-term (0-5 year post-bridge removal), the restoration goals of the site should be to facilitate the natural colonisation of saltmarsh species. Through this, at least 50–70% cover of target saltmarsh species should be achieved (those recorded during the NVC survey). Both the hydrological and sediment conditions conducive to saltmarsh development should be established during this period. Management actions for years 0-1 to facilitate these objectives should include the removal of any debris to facilitate natural re-vegetation, the grading and stabilising of banks if needed to match the adjacent marsh elevation and the installation of sediment traps or coir rolls if erosion risk is deemed high. In the long term (5+ years post-bridge removal) the objective should be to achieve and maintain habitats with a floristic composition parity with adjacent saltmarsh, representing a stable saltmarsh community which can withstand tidal and climatic variations. These habitats should be maintained with minimal invasive species present. Management actions during years 1-5 are recommended to include passive restoration where natural colonisation takes place. Monitoring may include quarterly vegetation surveys as well as soil salinity and elevation checks. If colonisation is <30% by year 2, assisted planting using plug plants, matting or seed from adjacent marsh should be considered. If invasive species appear, manual removal or targeted control should be initiated.

16.11.10 Further details of ecological post-monitoring plans will be documented in an Environmental Monitoring and Management Plan (EMMP) at pre-construction

stage and approved prior to commencement of works by the Design & Build contractor (appointed contractor, to be confirmed).

Post-Construction Environmental Monitoring Documentation

16.11.11 The results of monitoring shall be reported through updates in the EMMP during construction and handover phases.

16.11.12 The results and evaluation of monitoring shall be reported to the Overseeing Organisation and/or competent authority. Any proposals for remedial action shall be discussed and agreed with the Overseeing Organisation and/or competent authority on a case-by-case basis.

16.11.13 Any development licences and/or consents would be subject to their own licence reporting processes and licence return forms.

16.12 Assessment of Cumulative Effects

16.12.1 The cumulative effect of the Scheme has been considered with other plans or projects within a pre-defined geographical area as part of a cumulative effects assessment (CEA). Existing nearby developments that are built and operational at the time of assessment have been considered as part of the baseline.

16.12.2 The cumulative effects of the Scheme with other projects in the surrounding area are addressed in Chapter 17 (Cumulative Effects and Inter-relationships). It was concluded that the potential for any of the identified projects to generate cumulative effects with the Scheme would not be significant within the Zone of Influence. Other developments are sufficiently distant to or do not occur at the same time as the Scheme, or are of a sufficiently minor scale, and so do not represent any significant cumulative effects as a result of this Scheme in combination with other plans and projects.

16.12.3 Cumulative effects on sites within the UK National Sites Network are addressed in the HRA Screening and Appropriate Assessment which has been completed in parallel to the ES.

Inter-relationships

16.12.4 In identifying and assessing the likely impacts of the Scheme on the marine environment, the inter-relationships with the environmental impacts identified in other ES chapters have been considered. These are:

- Chapter 6: Geology and Soils – Discharge of contaminated or sediment laden groundwater to the River Dee following dewatering of excavations or foundations works. Contamination of soils (including intertidal habitats), groundwater and surface water from accidental spills and leaks relating to construction plant and fuels / oils. Several measures have been highlighted within this chapter as being suitable for mitigating the potential effects. These include the protection of soil structure and quality, the protection of controlled water from both general site works, and foundation works, and to manage contamination risks.
- Chapter 7: Road Drainage and Water Environment – This chapter focused on the construction and operational effects of the proposed Scheme on the water quality on the River Dee and associated habitats and species, including those listed as features of interest of the designated sites. A WFD assessment has been carried out to support the Marine Environment chapter. The WFD concluded that the proposed Scheme would be unlikely to have an impact on the WFD status of the River Dee, assuming that there were no long-term impacts on sedimentation and river flow in line with the conclusions of the Hydrodynamic and sediment transport modelling study (Appendix 7E, Volume 2).
- Chapter 8: Terrestrial Biodiversity - This chapter relates to the terrestrial ecological features and provides an assessment of likely significant effects on receptors identified as being at risk of the construction, operation and maintenance of the Scheme. There are close inter-relationships between this and the Marine Environment chapter, in particular for terrestrial and intertidal habitats, and coastal and terrestrial ornithology.
- Chapter 9: Landscape & Visual – The Environmental Masterplans (EMPs) and proposed landscape works (Chapter 2, Vol. 2; Figures 2.1 to 2.4) have been informed by the potential ecological effects of the Scheme on the Valued Ecological

Receptors. Net gains and losses in intertidal habitat have been assessed, and sensitive landscaping proposed to create / maintain connectivity and enhance existing ecology habitat with biodiversity value.

- Chapter 12: Noise and Vibration – The noise and vibration effects upon ecological receptors has been informed by assessments carried out in this Chapter. This includes the assessment of construction vibration, including piling within the River Dee. The vibration levels indicate that human receptors located approximately 30m or less from vibratory piling operations may experience an adverse effect due to piling activities. The approach for controlling construction noise will be to reduce source levels where possible and sensitive timing of in-river works. In some circumstances it may be preferable to use plant which generates a higher level of noise if this significantly reduces the construction time.
- Chapter 13: Materials and Waste - During the construction and operational phase, materials and waste would be present close to the road drainage system linked to the River Dee, with potential for run off which could have ecological impacts on species and habitats and on water quality. Working methods to manage and limit these risks are set out in Chapter 19 Environmental Management.
- Chapter 15: Climate – An increase in winter precipitation and frequency of extreme rainfall events as a result of climate change, may increase risk of contaminants entering the marine environment, which could in turn have ecological impacts on species and habitats and on water quality. To mitigate this, the Scheme includes a comprehensive flood risk and drainage design, which is in line with DMRB guidance and has been modelled and designed with consideration of climate change allowances and use of a Sustainable Drainage System (SuDS).

16.13 Residual Effects

- 16.13.1 The Scheme includes works within and adjacent to sites which form part of the National Site Network and other-designated sites and would affect subtidal and intertidal habitats which support protected and notable species including marine invertebrates, waterbirds and waders, and several fish species.

- 16.13.2 This Chapter has assessed the effects of the Scheme on VERs, taking into consideration primary and tertiary mitigation measures, which are a vital component of the Scheme and secondary additional mitigation, which would be incorporated into the Scheme during construction and/or operation.
- 16.13.3 The mitigation includes standard pollution and noise and vibration control measures during construction, as well as sensitive lighting, to be implemented through an outline CEMP. Conditions of the Draft Order and/or licences and consents will ensure the mitigation measures are implemented on site by the Contractor (see Residual Effects Assessment and Classification (REAC) table in Appendix 18.B.).
- 16.13.4 The outline CEMP would identify those responsible for implementing the various management plans and mitigation measures. These management plans are live documents and will require regular updates and revisions. The outline CEMP has been prepared and are provided as an appendix to the ES (Appendix 18.A.).
- 16.13.5 An Environmental Coordinator would be responsible for the interface between the environmental specialists and engineers. The Ecological Clerk of Works (ECoW) would support the Environmental Coordinator during construction and post-monitoring.
- 16.13.6 This assessment has identified that the construction, operation and maintenance of the Scheme would result in a ***minor adverse residual effect on certain aspects of the marine environment***. This results from a small loss of subtidal mud and intertidal saltmarsh habitats, and potential effects on migratory fish species.
- 16.13.7 The loss of saltmarsh habitat will be mitigated by enhancing the currently shaded area of the existing A494 Bridge, as well as the Greenfield Marsh site, downstream from the Scheme, which will also require post-construction monitoring for five years post-construction, documented in an EMMP (completed at pre-construction stage by the appointed contractor). With regards to the migratory fish species during construction, this will be mitigated and is

detailed in the outline CEMP (Appendix 18.A) and detailed in a full CEMP at pre-construction stage by the appointed contractor.

16.13.8 Tables 16-11 to 16-13 provide a summary of the VERs identified through desk study and site visits and surveys, their assigned value, and justification for inclusion for land take, construction and operational effects.

Table 16-11 Summary of land take effects on Valuable Ecological Receptors (VERs) in the marine environment

VER	Value	Description of effect	Effect without mitigation	Mitigation	Significance of residual effect
Dee Estuary Ramsar/SPA/SAC/SSSI	International	No significant land take effects. The boundary of these sites is located 1 km downstream from the scheme footprint; therefore, no intertidal or subtidal habitats of these sites will be directly affected by land take.	Negligible	N/A	Not Significant
River Dee and Bala Lake SAC	International	Small loss of intertidal and subtidal (in-river) habitat which are features of interest.	Moderate adverse effect	The potential for enhancing approximately 4 Ha of intertidal habitat at the downstream Greenfield site, to mitigate for the loss of a much smaller area of intertidal habitat at the location of the proposed works. Furthermore, removal of existing bridge will allow saltmarsh species to colonise and establish. Loss of 42.4m² of subtidal mud habitat (footprint of the piles)⁷² is considered extremely small compared to the SAC designation. This habitat type is extensive throughout the subtidal zones of the River Dee and Dee Estuary and not the Annex I habitat/primary reason for the SAC designation; therefore the removal of this habitat will not cause the extent of the habitat to significantly change, as the proposed area of removal of this habitat represents 0.006% of the total area of the River Dee and Bala Lakes SAC intertidal and subtidal habitat area.	Not significant
The River Dee SSSI	National	Loss of intertidal habitat which are features of interest.	Moderate adverse effect	The potential for enhancing approximately 4 Ha of intertidal habitat at the downstream Greenfield Marsh site, to mitigate for the loss of a much smaller area of intertidal habitat at the location of the proposed works. Furthermore, removal of existing bridge will allow saltmarsh species to colonise and establish.	Not significant
Migratory fish	International	Loss of subtidal and intertidal habitat which may cause reduction in benthic invertebrates,	Minor adverse effect	Due to the adverse effect of removing the existing bridge piers, which would cause sediment disturbance and additional underwater noise and vibration, the piers are remaining in	Not Significant

⁷² Two piers (12 No. piles per pier) at 1.5m diameter. Total area per pile is 1.77m² with a total area of 42.4m².
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VER	Value	Description of effect	Effect without mitigation	Mitigation	Significance of residual effect
		which is a key food source to fish species in the river.		place; however, this means there is a relatively small subtidal mud habitat deficit of 42.4m ² of the total subtidal area, resulting in a 0.006% loss of the total subtidal area of River Dee and Bala Lakes SAC. This will be covered in the HRA Statement to inform Appropriate Assessment.	
Marine benthic Invertebrates	Local	Loss of and disturbance to benthic habitat and sediment.	Minor adverse effect	The potential for enhancing approximately 4Ha of intertidal habitat at the downstream Greenfield site, to mitigate for the loss of a much smaller area of intertidal habitat at the location of the proposed works. Due to the adverse effect of removing the existing bridge piers, which would cause sediment disturbance and additional underwater noise and vibration, they will remain in place, however this means there is a small subtidal habitat deficit and will likely require habitat compensation or enhancement elsewhere.	Not significant
Breeding waterbirds and waders	International	Loss of and/or disturbance to nesting and/or foraging habitat	Slight adverse effect	Works will be timed to avoid removal of vegetation within the nesting bird season or checks by a competent ecologist will be made prior to clearance. The Scheme will incorporate landscaping which will provide new suitable habitat for nesting. Furthermore, removal of existing bridge will allow saltmarsh species to colonise and establish to create suitable foraging and nesting habitat.	Not significant
Wintering waterbirds and waders	International	Loss of and/or disturbance to small areas of land used for foraging	Minor adverse effect	Habitat would be reinstated, and large expanses of intertidal habitats left untouched. The Scheme will incorporate landscaping which will provide new suitable habitat for foraging. Furthermore, removal of existing bridge will allow saltmarsh species to colonise and establish to create suitable foraging habitat.	Not significant

Table 16-12 Summary of construction effects on Valuable Ecological Receptors (VERs) in the marine environment

VER	Value	Description of Effect	Effect without mitigation	Mitigation	Significance of residual effect
Dee Estuary Ramsar/SPA /SAC/SSSI	International	Indirect pollution incidents leading to changes in water quality and increased siltation. Loss of, and disturbance to habitats which are a feature of the designated sites. Increased noise and vibration. Temporary lighting.	Moderate adverse effect	Tertiary mitigation measures such as pollution, silt mobilisation and noise control which are integral to the Scheme as described in the outline CEMP. Construction and demolition (bridge removal) methods including soft-start piling methods to reduce the disturbance of silt and noise for in-river works and associated habitats. Pollution, silt mobilisation and noise control measures which are integral to the Scheme, as described in the outline CEMP. Construction works are restricted to daytime working only, however, sensitive lighting will be used, if still required.	Not Significant
River Dee and Bala Lake SAC	International	Indirect pollution incidents leading to changes in water quality and increased siltation. Loss of, and disturbance to intertidal and subtidal habitats which are a feature of the SAC. Increased noise and vibration. Temporary lighting.	Moderate adverse effect	Tertiary mitigation measures such as pollution, silt mobilisation and noise control which are integral to the Scheme as described in the outline CEMP. Construction and demolition (bridge removal) methods including soft-start piling methods to reduce the disturbance of silt and noise for in-river works and associated habitats. Pollution, silt mobilisation and noise control measures which are integral to the Scheme, as described in the outline CEMP. Construction works are restricted to daytime working only, however, sensitive lighting will be used, if still required.	Not Significant
The River Dee SSSI	National	Indirect pollution incidents leading to changes in water quality and increased siltation. Loss of, and disturbance to habitats which are a feature of the SSSI. Increased noise and vibration. Temporary lighting.	Moderate adverse effect	Tertiary mitigation measures such as pollution, silt mobilisation and noise control which are integral to the Scheme as described in the outline CEMP. Construction and demolition (bridge removal) methods including soft-start piling methods to reduce the disturbance of silt and noise for in-river works and associated habitats. Pollution, silt mobilisation and noise control measures which are integral to the Scheme, as described in the outline CEMP. Construction works are restricted to daytime working only, however, sensitive lighting will be used, if still required.	Not Significant

VER	Value	Description of Effect	Effect without mitigation	Mitigation	Significance of residual effect
Fish	National	Accidental chemical spillages from construction machinery (e.g. fuel, lubricants and coolants) entering the water. Increased sediment mobilisation and excessive fine sediment. Increased noise and vibration during in-channel works conducted in the migration season. Temporary lighting.	Moderate adverse effect	Tertiary mitigation measures such as pollution, silt mobilisation and noise control which are integral to the Scheme as described in the outline CEMP. Construction and demolition (bridge removal) methods including piling methods to reduce the disturbance of silt and noise for in-river works and associated habitats. When the tubes reach the required depth, bored piles will be constructed by positioning an auger inside the steel tube. This way the disturbance of the silt and vibration at the riverbed will be kept to a minimum and restricted only to the steel tube-driving operations thus reducing the quantity of suspended particulates and noise within the water course which may indirectly affect fish. This construction method would be classified as an embedded mitigation measure and a mandatory requirement. Construction works will be restricted to daytime working only; however, if lighting is required, sensitive lighting will be used. In-river piling activity working hours would be limited to between 08:00 to 17:00, and no piling work to take place in the 3 hours leading up to high tide at Chester weir.	Not Significant
Marine benthic Invertebrates	Local	Increased sediment mobilisation and excessive fine sediment. Accidental chemical spillages from construction machinery (e.g. fuel, lubricants and coolants) entering the water and sediment.	Minor adverse effect	Tertiary mitigation measures such as pollution, silt mobilisation and noise control which are integral to the Scheme as described in the outline CEMP. Construction and demolition methods including piling methods to reduce the disturbance of silt and noise for in-river works and associated habitats. When the tubes reach the required depth, bored piles will be constructed by positioning an auger inside the steel tube. This way the disturbance of the silt and vibration at the riverbed will be kept to a minimum and restricted only to the steel tube-driving operations thus reducing the quantity of suspended particulates and noise within the water course which may indirectly affect fish. This construction method would be classified as an embedded mitigation measure and a mandatory requirement.	Not Significant
Breeding waterbirds and waders	International	Displacement and disturbance from vibration, noise, increased lighting and an increase in human activity. Increased sediment and dust indirectly impacting foraging habitat.	Minor adverse effect	Construction and demolition (bridge removal) methods including piling methods to reduce the disturbance of silt and noise for in-river works and intertidal areas. Pollution and noise control measures which are integral to the Scheme as described in the outline CEMP.	Not Significant

VER	Value	Description of Effect	Effect without mitigation	Mitigation	Significance of residual effect
		Abandonment of nests. Damage and/or destroy active nests. Important to note that Low numbers of breeding waterbirds and waders within scheme area.		Construction works will be restricted to daytime working only; however, if lighting is required, sensitive lighting will be used. Temporary screening if required, provided around the immediate Scheme footprint to lessen visual impacts and dampen acoustic disturbance during the breeding season (March to September). Preconstruction nesting bird checks will be completed by a suitably experienced ornithologist prior to the works taking place.	
Wintering waterbirds and waders	International	Displacement from noise, increased sediment impacting foraging habitat. Visual intrusion.	Minor adverse effect	Construction and demolition methods including piling methods to reduce the disturbance of silt and noise for in-river works and intertidal areas. Pollution and noise control measures which are integral to the Scheme as described in the outline CEMP. Where unavoidable, anticipated noisier construction activities should be completed for three hours either side of high tide in order for species to utilise the banks during low tide in order to both commute and/or forage. Construction works will be restricted to daytime working only; however, if lighting is required, sensitive lighting will be used.	Not Significant

Table 16-13 Summary of operational effects on Valuable Ecological Receptors (VERs) in the marine environment

VER	Value	Description of Effect	Effect without mitigation	Mitigation	Significance of Residual Effect
Dee Estuary Ramsar/S PA/SAC/SSI	International	Indirect effects from increased toxicity levels from road runoff.	Moderate adverse effect	Increased road runoff not anticipated as number of lanes on the new bridge will remain the same as the existing bridge. Highway drainage and run off from adjacent land would be collected by piped highway drainage systems. These would continue to discharge into the Queensferry Drain at locations near the railway and outfall into the River Dee. Protection from accidental spillages would be provided by isolation systems allowing pollutants to be contained for safe disposal.	Not significant
River Dee and Bala Lake SAC	International	Indirect effects from increased toxicity levels from road runoff	Moderate adverse effect	As above.	Not significant
The River Dee SSSI	National	Indirect effects from increased toxicity levels from road runoff. Air pollution. Loss of habitat from shading effects.	Moderate adverse effect	Increased road runoff not anticipated as number of lanes on the new bridge will remain the same as the existing bridge. Highway drainage and run off from adjacent land would be collected by piped highway drainage systems. These would continue to discharge into the Queensferry Drain at locations near the railway and outfall into the River Dee. Protection from accidental spillages would be provided by isolation systems allowing pollutants to be contained for safe disposal. The mitigation included in the Scheme for the loss of saltmarsh and intertidal habitats arising from land take and from operational shading is in discussion with NRW. This includes the potential for the creation and/or enhancement of habitats in order to compensate for the loss of a small area of saltmarsh. The shading effects of the new replacement bridge will be mitigated for in the long-term by the removal of the existing bridge.	Not significant
Benthic marine Invertebrates	Local	Increased toxicity levels from road runoff entering drains.	Minor adverse effect	Highway drainage and run off from adjacent land would be collected by piped highway drainage systems. These would continue to discharge into the Queensferry Drain at locations near the railway and outfall into the River Dee. Protection from accidental spillages would be provided by isolation systems allowing pollutants to be contained for safe disposal.	Not significant
Fish	International	Increased toxicity levels from road runoff entering drains. Increased lighting.	Minor adverse effect	Highway drainage and run off from adjacent land would be collected by piped highway drainage systems. These would continue to discharge into the Queensferry Drain at locations near the railway and outfall into the River Dee. Protection from accidental spillages would be provided by isolation systems allowing pollutants to be contained for safe disposal. Sensitive lighting designs to keep light spillage onto the river to a minimum.	Not significant

VER	Value	Description of Effect	Effect without mitigation	Mitigation	Significance of Residual Effect
Breeding waterbirds and waders	International	Disturbance and displacement from increased lighting.	Minor adverse effect	Sensitive lighting designs to keep light spillage onto the river to a minimum.	Not significant
Wintering waterbirds and waders	International	Disturbance and displacement from increased lighting.	Moderate adverse effect	Instigation of sensitive, reduced or an avoidance of additional lighting, in particular where this affects watercourse and associated banks, to keep light spillage onto the river to a minimum.	Not significant

16.14 Summary of Residual Effects

16.14.1 The Scheme was assessed with respect to impacts on VERs for the marine environment. Potential impacts associated with land take is loss of subtidal and intertidal habitats for marine species. During construction, potential impacts were identified from increases in suspended sediments, contaminant release, underwater noise emissions and temporary lighting. During operation the presence of proposed infrastructure, accidental spill events and proposed permanent lighting on the highway and cycleways were identified as key potential impacts.

16.14.2 The construction activities within the River Dee, including the SAC/SSSI sites, are expected to cause moderate adverse effects due to indirect pollution, changes in water quality, sediment disturbance, noise and habitat disturbance. However, mitigation measures such as specific construction methods, pollution control, and noise reduction would mitigate these impacts.

16.14.3 The residual operational effects on the River Dee, and associated habitats due to potential increased pollution levels from road run-off are expected to be moderate adverse; however, mitigation measures, including improved highway drainage systems and isolation systems for accidental spillages, aim to neutralise and improve these residual effects during the operation of the road to beneficial (for further information, refer to Chapter 7: Drainage and Water Environment). In addition to this, the removal of the existing bridge means that higher pollution levels than what is already present are not anticipated.

16.14.4 The residual effects of land take on the sensitive receptors with mitigation in place are assessed as being either **neutral** or **beneficial**. There would be habitat loss within the intertidal mud, sand, and saltmarsh habitats, which are features of the River Dee SSSI, which is crossed by the Scheme, mitigated by habitat creation, which may in time lead to a **large beneficial effect**.

16.14.5 Following assessment of the sensitivities on a range of receptors including benthic habitats, fish, marine benthic invertebrates and waterbirds on each

identified impact the assessment found that all impacts were of either negligible or minor significance.