

Shannon Technology and Energy Park (STEP) Power Plant

Environmental Impact Assessment Report – Volume 2
Chapter 07B Terrestrial Ecology

Shannon LNG Limited

April 2024

Prepared for:
Shannon LNG Limited

Prepared by:
DixonBrosnan Environmental Consultants

Table of Contents

7.B	Terrestrial Biodiversity	7-5
7B.1	Introduction	7-5
7B.2	Competent Expert	7-5
7B.3	Methodology.....	7-6
7B.3.1	Overview.....	7-6
7B.3.2	Relevant Legislation	7-6
7B.3.3	Sources of Information	7-7
7B.3.4	Guidance	7-7
7B.3.5	Field Surveys.....	7-8
7B.3.6	Consultation.....	7-11
7B.3.7	Limitations and Assumptions	7-11
7B.4	Baseline Environment	7-12
7B.4.1	Description of Existing Site.....	7-12
7B.4.2	Habitats.....	7-21
7B.4.3	Mammals	7-27
7B.4.4	Amphibians and reptiles	7-38
7B.4.5	Birds.....	7-38
7B.4.6	Fish	7-44
7B.4.7	Aquatic (Freshwater) Invertebrates	7-45
7B.4.8	Invasive Species.....	7-48
7B.4.9	Other species	7-48
7B.5	Assessment of Impact and Effect	7-48
7B.5.1	Likely Significant Effects.....	7-48
7B.5.2	Impact Assessment	7-49
7B.5.3	Construction Phase	7-53
7B.5.4	Operational Phase.....	7-63
7B.5.5	Decommissioning Phase.....	7-71
7B.6	Mitigation and Monitoring Measures	7-72
7B.6.1	Construction	7-72
7B.6.2	Operations	7-81
7B.7	Cumulative Impacts.....	7-82
7B.7.1	Summary of Schemes Considered in Cumulative Impact Assessment	7-82
7B.8	Do Nothing Scenario	7-84
7B.9	Residual Impacts.....	7-84
7B.9.1	Habitats.....	7-84
7B.9.2	Badgers	7-85
7B.9.3	Bats.....	7-85
7B.9.4	Otter.....	7-85
7B.9.5	Other Terrestrial Mammals	7-86
7B.9.6	Amphibians	7-86
7B.9.7	Birds.....	7-86
7B.9.8	Fish	7-87
7B.9.9	Aquatic Invertebrates.....	7-87
7B.9.10	Other Species	7-87
7B.9.11	Spread of Invasive Species	7-87
7B.9.12	Air Quality	7-87
7B.10	Summary	7-93
7B.11	References.....	7-108

Figures

Figure 7.1: Special Areas of Conservation (SAC) and within zone of influence of the Proposed Development	7-15
Figure 7.2: Special Protection Areas (SPAs) within zone of influence of the Proposed Development	7-16
Figure 7.3: Development site and overlapping Natura 2000 sites	7-17
Figure 7.4: Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) in vicinity of Proposed Development	7-19
Figure 7.5: Ballylongford Bay pNHA relative to the Proposed Development	7-20
Figure 7.6: Terrestrial and Freshwater Habitats within the Site boundary	7-22
Figure 7.7: Badger Latrine with Recorded Pellets (2019) and sett Locations (2019 and confirmed 2023 / 2024).....	7-30
Figure 7.8: Bat roost survey locations	7-33
Figure 7.9: Otter Survey Results	7-35
Figure 7.10: Other Species recorded within the Proposed Development	7-37
Figure 7.11: Estuarine Bird Survey Locations	7-42
Figure 7.12: Aquatic Sampling Locations	7-47

Tables

Table 7.1: Survey Types and Survey Dates for 2022-2024*	7-9
Table 7.2: Natura 2000 Sites within Zone of Influence of the Site.....	7-12
Table 7.3: Terrestrial and Freshwater Habitats recorded within the Site boundary	7-23
Table 7.4: Bait Marking Survey Conclusions	7-28
Table 7.5: Birds of Conservation Concern Recorded during Proposed Development site Surveys	7-40
Table 7.6: EPA Impact Classification	7-49
Table 7.7: Equating the Definitions of Significance of Effects Using a Geographic vs. Qualitative Scale of Reference	7-50
Table 7.8: Summary Valuation of Significant Terrestrial Ecological Features and Identification of Features at Risk of Significant Effects	7-51
Table 7.9: Impact on Habitats within Site Boundary	7-54
Table 7.10: Residual Impacts on Habitats within Site Boundary Following Mitigation	7-84
Table 7.11. Summary of Potential impacts from the Proposed Development for Designated Sites, Habitats and Flora.....	7-88
Table 7.12 Table Summary	7-95

7.B Terrestrial Biodiversity

7B.1 Introduction

DixonBrosnan Environmental Consultants were commissioned to assess the likely significant effects of the Proposed Development on terrestrial and freshwater aquatic ecology.

This chapter of the Environmental Impact Assessment Report (EIAR) describes and evaluates the habitats within the Proposed Development along with their representative flora and fauna in order to describe and assess the impacts that will result from the Proposed Development. The chapter follows the structure and protocols detailed in the Environmental Protection Agency's (EPA) *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).

The Proposed Development is located in the townlands of Kilcolgan Lower and Ralappane, between Tarbert and Ballylongford, Co. Kerry. The Site boundary ('red line') encloses an area of approximately 41 hectares (ha) and is entirely owned by the Applicant.

Full details on the background, planning history and the Proposed Development is provided in **Chapter 02** (Description of the Proposed Development) and also the Planning Statement submitted with this planning application. Construction activities are described in detail in **Appendix A2.3** Construction Environmental Management Plan (CEMP) and **Appendix A2.6** Construction Equipment Onsite, Volume 4.

Chapter 05 (Land, Soils and Geology) and **Chapter 06** (Water) address the changes in hydrology and hydrogeology which can have an impact on ecology.

Chapter 07A (Marine Ecology) addresses the potential impacts on the marine and estuarine ecology. Noise impacts are addressed in **Chapter 08** (Airborne Noise and Groundborne Vibration). Details of underwater noise (by Vysus Group) (VG)) are presented in **Appendix A7A.3**, Volume 4.

7B.2 Competent Expert

Carl Dixon MSc (Ecology) is a senior ecologist who has 25 years' experience in ecological and water quality assessments. He also has experience in mammal surveys, bat surveys, invasive species surveys and ecological supervision of large-scale projects. Projects in recent years include the Waste to Energy Facility Ringaskiddy, Shannon LNG Project, supervision of the Fermoy Flood Relief Scheme, Skibbereen Flood Relief Scheme, Upgrade of Mallow WWTP Scheme, Douglas Flood Relief Scheme, Great Island Gas Pipeline and Arklow Bank Wind Park Phase 2.

Sorcha Sheehy PhD (Ecology/ornithology) is an ecologist and ornithologist who has worked for 15 years in environmental consultancy. She has worked on Screening/NISs for a range of small and large-scale projects with expertise in assessing impacts on birds. Sorcha's PhD research focused on bird behaviour at airports, where she studied bird avoidance behaviour and collision risk to aircraft. During her consultancy work Sorcha carried out field-based surveys and environmental reports including NIS, AA screening and EIARs. Notable projects include the Arklow Bank Wind Park, Indaver Ireland Waste Management Facility, Fermoy Weir and Fish Bypass Channel and Greenlink Interconnector.

7B.3 Methodology

7B.3.1 Overview

This assessment is based on surveys of the Proposed Development (refer to **Figure F2.1** of Volume 3). The Proposed Development includes a Combined Cycle Gas Turbine (CCGT) gas-powered Power Plant capable of up to 600 MW of electricity generation, 120 MWh (1-hr) battery energy storage system (BESS), Above Ground Installation (AGI), and associated plant, equipment and infrastructure including a substation. A review of desktop data was also carried out to identify potential ecological issues (**Sections 7B.3.3 and 7B.3.5**). Dates of ecological surveys carried out by DixonBrosnan during 2022, 2023 and 2024 are included in **Table 7.1**. It is noted that extensive ecology surveys were also carried out within the Proposed Development in 2006 / 2007, 2011 / 2012 and 2019 / 2020 / 2021. These surveys have also been used to inform this EIAR where relevant.

7B.3.2 Relevant Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Act 1976, as amended, and the European Communities (Birds and Natural Habitats) Regulations 2011. They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive 2009/147/EC.

Under this legislation, sites of nature conservation importance are designated in order to legally protect faunal and floral species and important/vulnerable habitats. The relevant categories of designation are as follows:

- Special Areas of Conservation (SACs) are designated under the European Communities (Birds and Natural Habitats) Regulations 2011 to comply with the EU Habitats Directive (92/43/EEC).
- Special Protection Areas (SPAs) are designated under the EU Birds Directive (79/409/EEC) amended in 2009 as Directive 2009/147/EC.
- Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs) are listed under the Wildlife (Amendment) Act, 2000, as amended. A NHA is designated for its wildlife value and receives statutory protection. A list of pNHAs was published on a non-statutory basis in 1995, but these have not since been statutorily designated. Consultation with the NPWS is still required if any development is likely to impact on a pNHA.

Relevant European Legislation

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive).
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (The Birds Directive).
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (The Water Framework Directive).
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (The Fish Directive (consolidated)).

Relevant Irish Legislation

- Wildlife Act 1976 as amended by Wildlife Act 1976 (Protection of Wild Animals) Regulations 1980, Wildlife (Amendment) Act 2000, Wildlife (Amendment) Act 2010, Wildlife (Amendment) Act 2012, European Communities (Wildlife Act, 1976) (Amendment) Regulations 2017 (The Wildlife Act).
- European Communities (Conservation of Wild Birds) Regulations 1985 (S.I. No. 291/1985) as amended by S.I. No. 31/1995 (The Wild Birds Regulations).
- European Communities (Natural Habitats) Regulations 1997 (S.I. No. 94/1997 as amended by S.I. No. 233/1998 and S.I. No 378/2005) (The Habitats Regulations).
- Fisheries (Consolidation) Act, 1959 (as amended) (The Fisheries Act).
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) (The Habitats Regulations).
- Flora (Protection) Order, 2022 (S.I. No. 235/2022).

7B.3.3 Sources of Information

A desktop study was carried out to collate the available information on the local ecological environment. The purpose of the desktop study was to identify features of ecological value occurring within the Proposed Development and those occurring in proximity to it. A desktop review also allows the key ecological issues to be identified early in the assessment process and facilitates the planning of surveys. Sources of information utilised for this report include the following:

- National Parks and Wildlife Service (NPWS) - www.npws.ie.
- Environmental Protection Agency (EPA) – www.epa.ie.
- National Biodiversity Data Centre (NDBC) – www.biodiversityireland.ie.
- Bat Conservation Ireland - www.batconservationireland.org.
- Birdwatch Ireland - www.birdwatchireland.ie.
- British Trust for Ornithology (BTO) - www.BTO.org.
- National Biodiversity Action Plan 2017-2021 (NPWS 2017).
- Kerry County Council (2019) *Council Climate Change Adaptation Strategy 2019-2024*.
- Kerry County Council (2021) *Biodiversity Action Plans 2022-2028*.
- *Kerry County Council Draft Local Authority Climate Action Plan 2024-2029 (2023)*.
- Kerry County Council (2022) *County Development Plan 2022-2028*.

7B.3.4 Guidance

This chapter of the EIAR follows *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)* (European Union (EU), 2017) and the EPA's *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA 2022). It also takes account of the *Draft Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Environment, Community and Local Government, August 2018), *Guidelines on Ecological Impact Assessment in the UK and Ireland*, 2nd edition (Chartered Institute of Ecology and Environmental

Management CIEEM 2016) and *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*, Version 1.2 (CIEEM, 2022).

Reference was also made to the following documents where relevant:

- *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC*. EC Environment Directorate-General (2018).
- *Guidance on integrating climate changes and biodiversity into environmental impact assessment* EU Commission (2013).
- *Assessment of plans & projects in relation to N2K sites – Methodological Guidance*. EC (2021).
- *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*. Inland Fisheries Ireland (2016).
- *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive*. EC (2021).
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes*. National Roads Authority (NRA) (2009).
- *Best Practice Guidance for Habitat Survey and Mapping*. Heritage Council (2011).
- *A Guide to Habitats in Ireland*. Fossitt (2000).
- *Guidelines for the treatment of Badgers prior to the construction of National Road Schemes*. National Roads Authority, Dublin. NRA (2005a).
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. NRA (2005b).
- *Guidelines for the treatment of bats during the construction of national road schemes*. NRA (2005c).
- *Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes*. NRA (2006).
- *Guidelines for the treatment of Otters prior to the construction of National Road Schemes*. NRA (2008).
- *Bird Census Techniques*. Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. (2000).
- *Bird Monitoring Methods - a Manual of Techniques for Key UK Species*. (Gilbert, G., Gibbons, D.W. & Evans, J. (1998)).
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (4th edn). Collins (2023).
- *Bat Mitigation Guidelines for Ireland Volume 2*. F. Marnell, C. Kelleher and E. Mullen NPWS (2022).

7B.3.5 Field Surveys

This assessment is based on surveys at the Proposed Development, refer to **Figure F2.1** of Volume 3.

Ecological surveys were carried out between 2022 and 2024 to inform this EIAR. Estuarine bird surveys were carried out monthly between May 2021 and August 2023 and the survey dates over this 2-year+ monitoring period are also included below.

Ecological survey work was previously carried out at the Proposed Development in 2006 / 2007, 2011 / 2012 and 2019 / 2020 / 2021. Therefore, a large volume of background information about the Proposed Development is available. These surveys informed the Environmental Impact Assessments (EIA) for the previous planning applications as detailed in **Chapter 01** (Introduction) (**Table 1.3**).

Surveys were carried out following best practice and at appropriate times of year in line with CIEEM (2016) and CIEEM (2022).

7B.3.5.1 Habitat Surveys

Habitats were mapped according to the classification scheme outlined in the Heritage Council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and following the guidelines contained in *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). Habitats were cross referenced with Habitats Directive Annex I habitats. Dates of the main habitat surveys are included in **Table 7.1**. During these surveys the site was also surveyed for invasive species and rare floral species (Wyse *et al.*, 2016; Stace 2019). It is noted that a considerable number of site visits were carried during the overall assessment process which included estuarine bird surveys, breeding bird surveys, aquatic surveys, bat surveys and Badger and Otter surveys, refer **Table 7.1**. Observations in relation to habitats as well as other mammals, amphibians and reptiles made during these site visits are included in this chapter where relevant.

Table 7.1: Survey Types and Survey Dates for 2022-2024*

Survey Type	Survey Dates
Habitat Survey	11 th May 2023, 21 st May 2023, 6 th September 2023, 15 th March 2024
Badger Survey	21 st May 2023, 19 th February 2024
Bat Survey	11 th May 2023, 12 th May 2023, 4 th September 2023, 5 th September 2023, 6 th September 2023, 8 th September 2023, 19 th February 2024
Otter Survey	27 th June 2022, 21 st May 2023, 19 th February 2024
Breeding Bird Survey	27 th March 2023, 30 th April 2023, 12 th May 2023, 29 th June 2023
Estuarine Bird Survey (2021-2023)	28 th May 2021, 30 th June 2021, 19 th July 2021, 20 th July 2021, 21 st September 2021, 22 nd September 2021, 26 th October 2021, 27 th October 2021, 4 th November 2021, 17 th November 2021, 16 th December 2021, 17 th December 2021, 12 th January 2022, 13 th January 2022, 22 nd February 2022, 23 rd February 2022, 18 th March 2022, 19 th March 2022, 21 st April 2022, 22 nd April 2022, 9 th May 2022, 27 th June 2022, 26 th July 2022, 1 st August 2022, 2 nd September 2022, 18 th September 2022, 15 th October 2022, 30 th October 2022, 30 th November 2022, 29 th December 2022, 25 th January 2023, 27 th February 2023, 27 th March 2023, 30 th April 2023, 1 st May 2023, 29 th June 2023, 25 th July 2023, 15 th August 2023.
Aquatic Survey	20 th September 2022, 22 nd September 2022

*Estuarine bird surveys May 2021-August 2023

7B.3.5.2 Badger

Badger *Meles meles* surveys were carried out at the Proposed Development in May 2023 and February 2024, refer to **Table 7.1**. Potential habitat such as grassland and scrub to a minimum of 150 m from the Site boundary were systematically checked for signs of Badger activity or habitation following SNH (2018) guidelines. These signs include the presence of main, annex, subsidiary, and outlier setts, foraging evidence (e.g. snuffle holes), latrines, access runs and trails, hairs caught on wires and bushes, tracks, and prints. Further details on Badger survey methods are included in **Appendix A7B.1** of Volume 4.

7B.3.5.3 Bats

Bat activity and emergence surveys were conducted within the Proposed Development under suitable weather conditions on several dates as outlined in **Table 7.1**. Dusk activity surveys commenced at 15 minutes before sunset and ended a minimum of two hours after sunset (Collins 2023). The primary purpose of bat emergence surveys was to assess usage of structures and habitats, located within or in close proximity, to the Site boundary. Activity surveys were also carried out to identify foraging and/or commuting routes across the Proposed Development (*i.e.* hedgerows / treelines, coastal habitats, Ralappane Stream etc) within the Site boundary. All buildings located within the Site boundary were surveyed during daytime, as well as two other buildings to the west of the Proposed Development to identify signs of or potential for roosting bats. Further details on bat survey methods are included in **Appendix A7B.1** of Volume 4.

7B.3.5.4 Otter

Watercourses, drainage channels and coastal habitats were assessed in June 2023 and February 2024 for signs of Otter *Lutra lutra*, refer to **Table 7.1** for dates. Observations relating to Otter that were made during other surveys, such as estuarine and breeding bird surveys, were also recorded where relevant. Otter survey methodology followed guidance outlined in NRA (2008) and included searches for breeding or resting sites within 150m of the Site boundary. Evidence of Otter, including spraints, footprints, or feeding remains, was also recorded where present. Further details on Otter survey methods are included in **Appendix A7B.1** of Volume 4.

7B.3.5.5 Breeding Birds

The breeding bird surveys were based on the BTO Common Bird Census (CBC) methodology and Breeding Bird Survey (BBS) (Gilbert *et al.*, 1998 and Bibby *et al.* 2000) which aim to capture a snapshot of breeding bird activity within the survey area. The survey area focused on terrestrial habitats within the planning boundary. Breeding bird surveys were carried out over the dates outlined in **Table 7.1**.

The Proposed Development was walked so that all habitats within 50 m of all potential nesting features were surveyed. The ornithological surveyor slowly walked through the site, stopping at regular intervals to scan with binoculars and to listen for bird calls or song. Birds were identified by sight and song. All species seen or heard in the survey area and immediate environs were recorded including those in flight. Visits were made during favourable weather conditions.

All species encountered during the survey were mapped and coded using standard BTO species codes and activity recorded using the BTO codes for breeding evidence. In an effort to minimise potential disturbance, no attempts were made to locate nests as observed behaviours are generally sufficient to determine probable or confirmed breeding. The conservation status of birds was also recorded. Bird species listed in

Annex I of the Birds Directive are considered a conservation priority. Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (BOCCI). These are bird species suffering declines in population size. BirdWatch Ireland and the Royal Society for the Protection of Birds have identified and classified these species by the rate of decline into Red and Amber lists (Gilbert *et al.* 2021). Red List bird species are of high conservation concern and the Amber List species are of medium conservation concern. Green listed species are regularly occurring bird species whose conservation status is currently considered favourable.

Further details on breeding bird survey methods are included in **Appendix A7B.2** of Volume 4.

7B.3.5.6 Estuarine Birds

Estuarine (winter and summer) bird surveys were carried out from several vantage points overlooking the Shannon Estuary to the west and east of the Proposed Development from 2021 to 2023. The vantage point locations for the winter bird counts are shown in **Figure 7.11**.

The survey methodology was based on that used by the British Trust for Ornithology (BTO), Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert *et al.* (1998) and the low tide waterbird surveys (Lewis and Tierney 2014). The winter bird survey was undertaken using 8.5x45 binoculars and a Swarovski ATX30-70x95 spotting scope. Counts were undertaken at each survey location at either high tide, mid tide and low tide.

Dates of winter bird surveys are included in **Table 7.1** and further details on survey methods are included in **Appendix A7B.3** of Volume 4.

7B.3.5.7 Aquatic (Freshwater) Surveys

Ross Macklin BSc of Triturus Environmental Ltd carried out aquatic surveys of the Ralappane Stream on Tuesday 20th to Thursday 22nd September 2022. Survey effort focused on both instream and riparian habitats. The survey included a fisheries assessment (electro-fishing and or fisheries habitat appraisal), white-clawed crayfish (*Austropotamobius pallipes*) survey, macrophyte and aquatic bryophyte survey and biological water quality sampling (Q-sampling). This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed project and ensured that any habitats and species of high conservation value would be detected. Further details of the aquatic surveys are included in **Appendix A7B.4** of Volume 4.

7B.3.6 Consultation

Consultations were carried out with statutory and non-statutory bodies. Those relevant to the current Chapter included consultation with the National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI) and the Irish Whale and Dolphin Group (IWDG). Full details of consultation are included in **Chapter 01** (Introduction) Section 1.6.

7B.3.7 Limitations and Assumptions

Extensive survey work was carried out over several years at the Proposed Development using a range of standard methodologies. However, there are difficulties in mapping areas of Badger territory and other species (including bats) in third party lands outside the control of the Applicant. It can be difficult to determine territory size in Badger populations and roost buffer zones in bats particularly where they may include

multiple landholdings. Therefore, in this case a conservative approach was adopted in determining impacts on Badger social groups and other wildlife.

7B.4 Baseline Environment

7B.4.1 Description of Existing Site

The Proposed Development will be located on the Shannon Estuary, 4.5 km from Tarbert and 3.5 km Ballylongford in Co. Kerry. The Proposed Development is 41 ha within the Tarbert-Ballylongford Landbank which has a total area of 243 ha (603 acres).

The Proposed Development consists primarily of improved agricultural grassland, which runs along the southern shore of the Shannon estuary. The Site boundary is shown in **Figure F2.3**, Volume 3. The shoreline in this general area is relatively sheltered and composed of shingle or low earthen cliffs. The land within the site is primarily used for grazing or hay/silage. The type of grassland varies considerably with topography and includes areas of wet grassland particularly in the northwest section of the Proposed Development. A small section of the Ralappane Stream is located within the Proposed Development. To the west of the Site boundary, this stream forms a tidal creek and dense reed beds adjoin parts of its lower reaches near its discharge to into the Shannon Estuary. Lands in the eastern part of the Proposed Development include large, well-drained fields and here the land is more intensively farmed.

7B.4.1.1 European Sites

Special Areas of Conservation (SACs) and candidate SACs (cSACs) are protected under the Habitats Directive and the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Special Protection Areas (SPAs) are protected under the Birds Directive 2009/147/EC and European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Collectively, these sites are referred to as Natura 2000 or European sites.

Table 7.2: Natura 2000 Sites within Zone of Influence of the Site

Site	Code	Distance from Site Boundary (at closest point)
Special Area of Conservation (SAC) / candidate Special Area of Conservation (cSAC)		
Lower River Shannon SAC	002165	0 km
Moanveanlough Bog SAC	002351	12.4 km south
Tullaheer Lough and Bog SAC	002343	14.0 km north-west
Special Protection Area (SPA)		
River Shannon and River Fergus Estuaries SPA	004077	0 km
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	004161	10.0 km south
Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs)		
Ballylongford Bay pNHA	001332	c.80 m west
Tarbert Bay pNHA	001386	2.1 km south-east
Bunnaruddee Bog NHA	001352	5.9 km south

The Site boundary partially overlaps the Lower River Shannon Special Area of Conservation (SAC) (Site code 002165) (NPWS 2012a) and the River Shannon and River Fergus Estuaries Special Protection Area (SPA) (Site code 004077) (NPWS 2012b). Marine habitats which overlap with the Lower River Shannon SAC are discussed in **Chapter 7A** (Marine Ecology) and in the AA screening/NIS.

Three other Natura 2000 sites are located within a zone of influence of the Proposed Development *i.e.*, Moanveanlough Bog SAC (002351) (12.4 km south) and Tullaheer Lough and Bog SAC (Site code: 002343) (14.0km northwest) and the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (Site code: 004161) (10.0 km south). The zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site (OPR 2021). This was established using the Source- Pathway-Receptor framework. The location of SACs and SPAs within the zone of influence are listed in **Table 7.2** and illustrated in **Figure 7.1** and **Figure 7.2**.

The Lower River Shannon SAC (Site code: 002165) overlaps with the Site (**Figure 7.3**). This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head / Kerry Head, a distance of approximately 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. The site is designated for a wide range of Annex I marine, coastal, freshwater aquatic and terrestrial habitats, while Annex II species for which the site is designated include marine mammals, diadromous fish species and freshwater aquatic species.

Moanveanlough Bog SAC (Site code: 002351), located 12.4 km south of the Proposed Development is situated in Co. Kerry approximately 6 km east of Listowel, mainly within the townlands of Carhoeara and Bunagarha. The site comprises a raised bog that includes both areas of high bog and cutover bog. The site is a designated for Annex I habitats [7110] Raised Bog (Active)*, Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150].

Tullaheer Lough and Bog SAC (Site code: 002343), which is located 14.0 km north-west of the Site, is a diverse site comprising of raised bog (including areas of high bog and cutover bog), wet grassland, improved grassland, scrub woodland, alkaline fen and lake. It is bounded to the east by the Doonbeg to Moyasta road, to the west by a local road, to the north by bog tracks and to the south by a conifer plantation. The site is a designated for Annex I habitats [7110] Raised Bog (Active)*, Degraded raised bogs still capable of natural regeneration [7120], Transition mires and quaking bogs [7140] and Depressions on peat substrates of the Rhynchosporion [7150].

River Shannon and River Fergus Estuaries SPA (Site code: 004077), which overlaps with part of the Proposed Development (**Figure 7.3**) includes the estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. The site has vast expanses of intertidal flats which contain a diverse macroinvertebrate community which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches. The site is designated for the following species: Cormorant *Phalacrocorax carbo*, Whooper Swan

Cygnus cygnus, Light bellied Brent Goose *Branta bernicla hrota*, Shelduck *Tadorna tadorna*, Wigeon *Anas Teal Anas crecca*, Pintail *Anas acuta*, Shoveler *Anas clypeata*, Scaup *Anas marila*, Ringed Plover *Charadrius hiaticula*, Golden Plover *Pluvialis apricaria*, Grey Plover *Pluvialis squatarola*, Lapwing *Vanellus vanellus*, Knot *Calidrus canutus*, Dunlin *Calidris alpina*, Black-tailed Godwit *Limosa limosa*, Bar-tailed Godwit *Limosa laponica*, Curlew *Numenius arquata*, Redshank *Tringa 7-14etanus*, Greenshank *Tringa nebularia* and Black-headed Gull *Larus ridibundus*. The site is also designated for wetlands.

Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (Proposed Development (code: 004161), which is located 10 km south of the Proposed Development is a very large site centred on the borders between the counties of Cork, Kerry and Limerick. The site is skirted by the towns of Newcastle West, Ballydesmond, Castleisland, Tralee and Abbeyfeale. The SPA is designated for Hen Harrier *Circus cyaneus*.

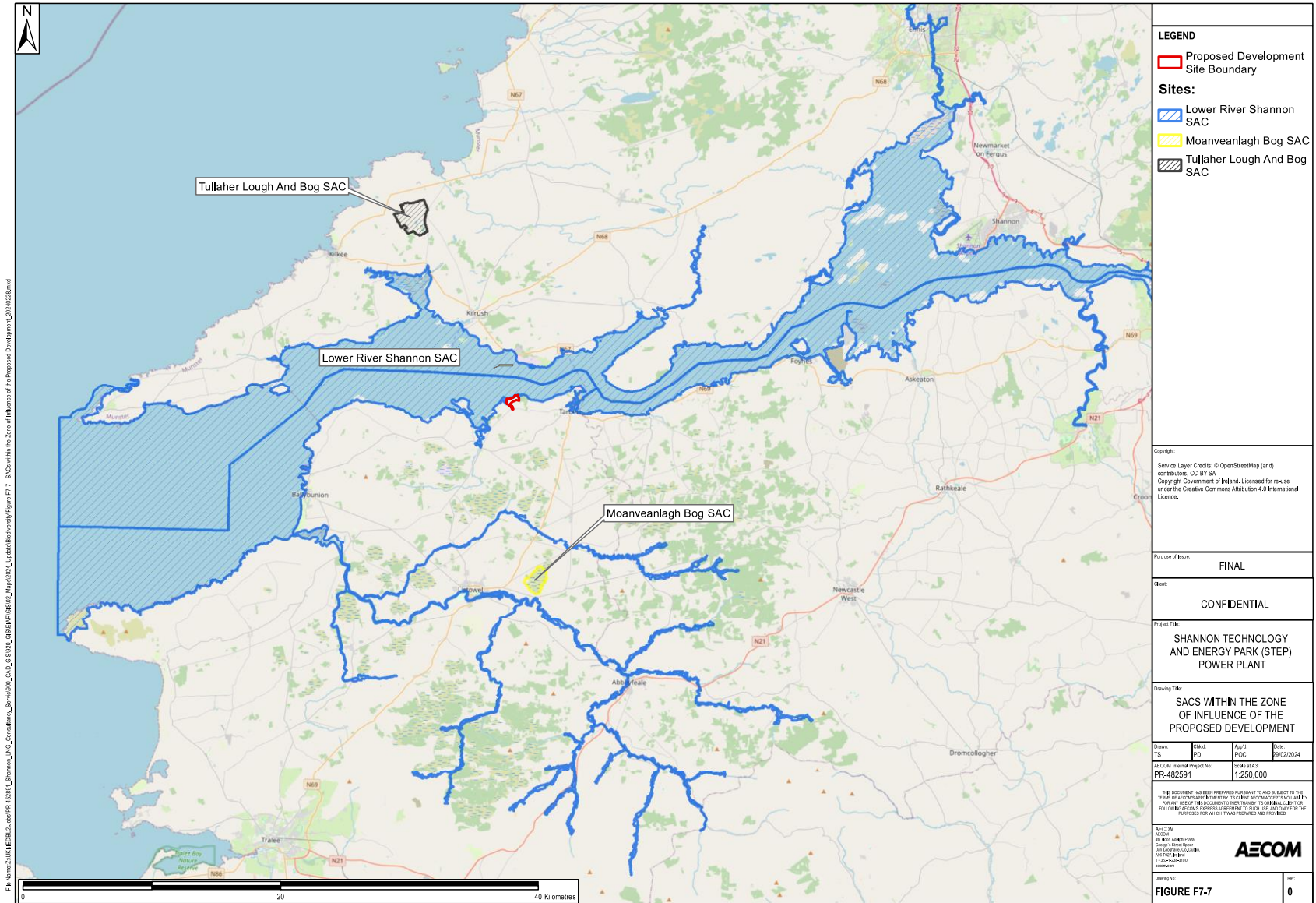


Figure 7.1: Special Areas of Conservation (SAC) and within zone of influence of the Proposed Development

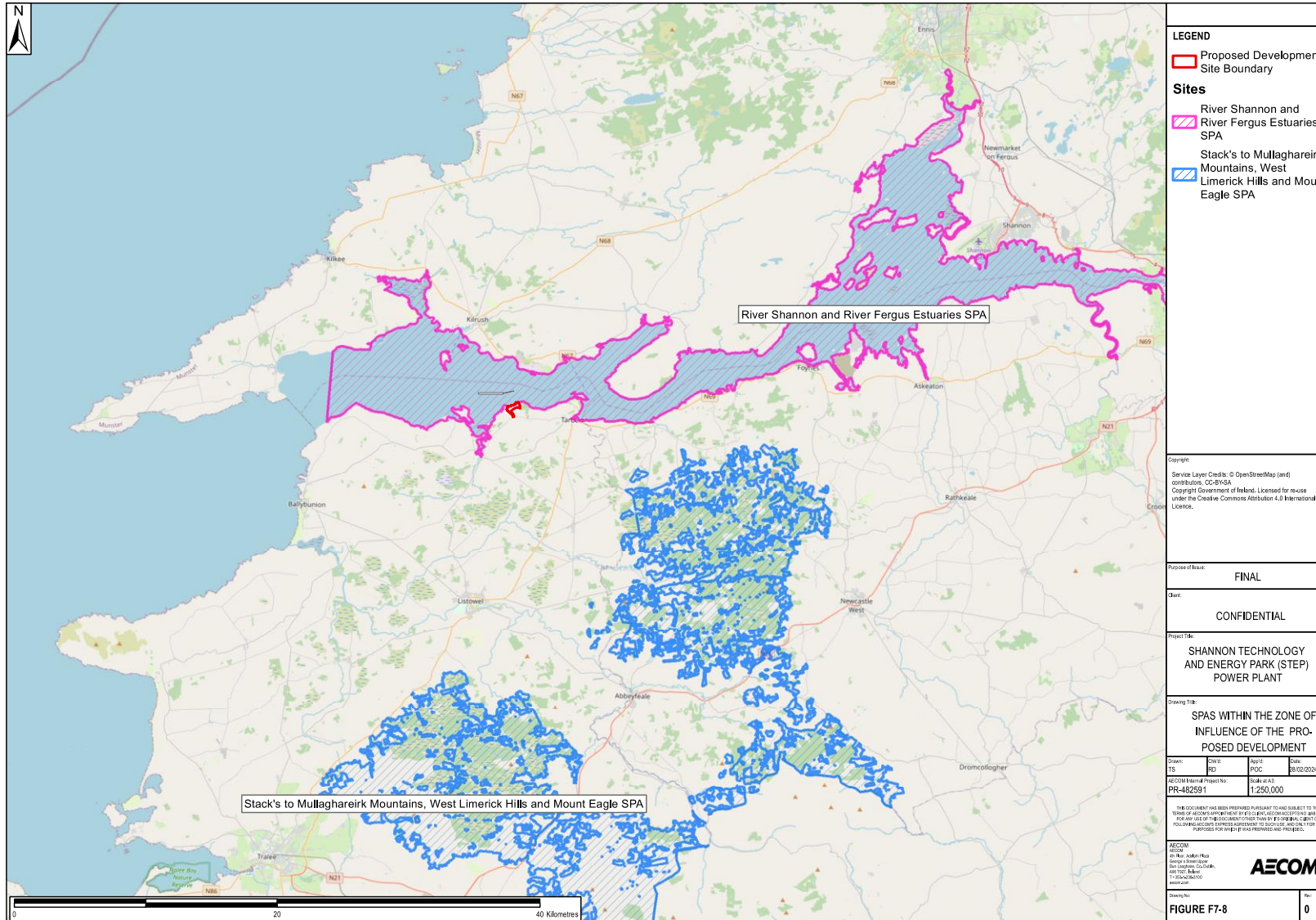


Figure 7.2: Special Protection Areas (SPAs) within zone of influence of the Proposed Development

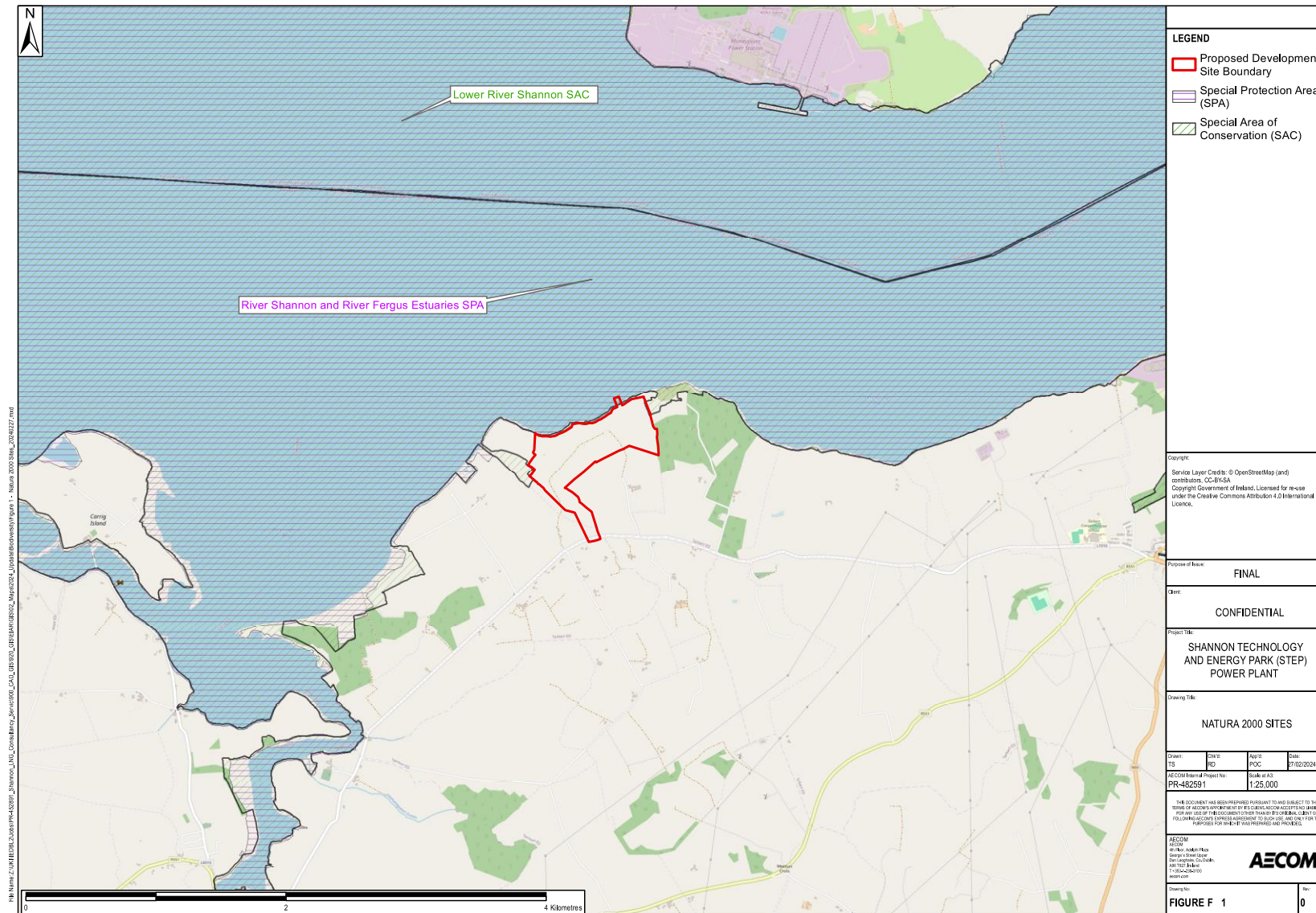


Figure 7.3: Development site and overlapping Natura 2000 sites

Potential impacts on designated Natura 2000 sites (SAC/SAC/SPA) are specifically addressed in the *Shannon Energy Park Screening Statement for Appropriate Assessment and Natura Impact Statement Volume 1 – Main Report* which has been submitted as part of this application. This report concluded that: *Following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the conservation features in light of their Conservation Objectives, it has been concluded that with the construction and operation of the STEP development will have no adverse effect on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.*

7B.4.1.2 National Sites

Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHA) are national designations under the Wildlife Act 1976, as amended. A NHA is designated for its wildlife value and receives statutory protection. A list of proposed NHAs (pNHAs) was published on a non-statutory basis in 1995, but these have not since been statutorily proposed or designated.

NHAs and pNHAs located in the vicinity of the Proposed Development are listed in **Table 7.2** and illustrated in

Figure 7.4 and **Figure 7.5**. Habitats (marine and/or terrestrial) within the Proposed Development do not overlap with any NHA / pNHA.

Ballylongford Bay pNHA (site code 1332) is located west of Knockfinglas Point. It includes the wetland area along the Ralappane Stream to the west of the Proposed Development and the adjacent heathland and the salt marsh further west of the Proposed Development. This pNHA is an inlet on the southern side of the Shannon Estuary and runs northwards from the town of Ballylongford in County Kerry. The scientific interest of the bay lies in the large concentrations of waterfowl that feed on the mudflats. The Ballylongford Bay pNHA makes up a valuable part of the Shannon Estuary.

Tarbert Bay pNHA (site code 001386) is also located within the Shannon Estuary. Tarbert Bay is a sandy intertidal bay fringed by saline vegetation, which is best developed at Tarbert Village. Some deciduous woodland is included in the pNHA and this comes down to the estuary edge in places. The site is important for a wintering waterfowl and is part of the large Shannon- Fergus estuarine complex.

The importance of the Shannon estuary is underlined by its designation as a Special Protection Area and both Ballylongford Bay pNHA and Tarbert Bay pNHA overlap with the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA.

The Proposed Development is potentially hydrologically connected to both these pNHAs via the Shannon Estuary. Further details on indirect impacts to the Ballylongford Bay pNHA are included in **Chapter 06** (Water). Given the distance from the Tarbert Bay pNHA (2.1km) and the dilution available within the Shannon Estuary no significant impact on this pNHA are predicted to occur. No significant connection with any other NHA/pNHA has been identified.

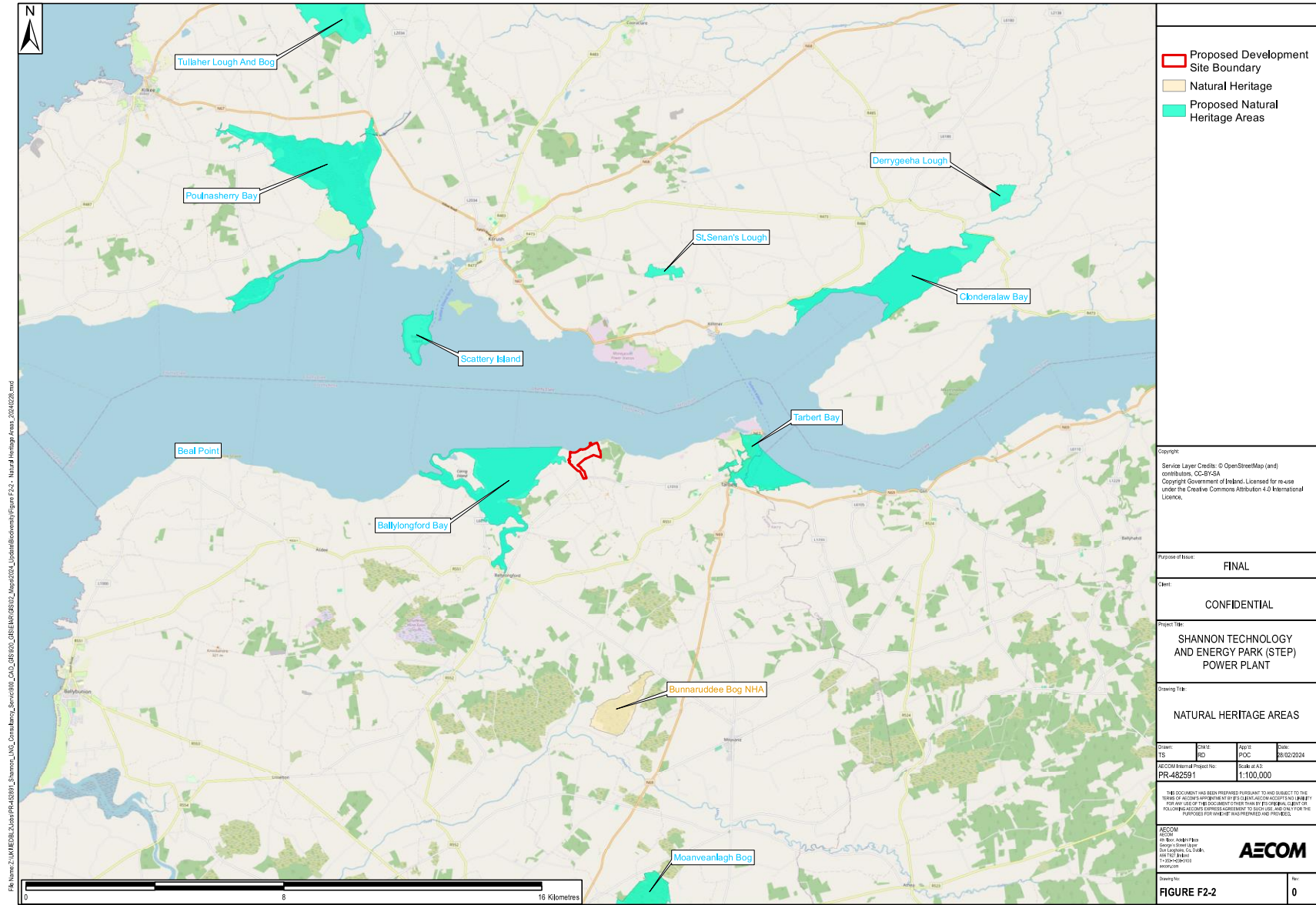


Figure 7.4: Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) in vicinity of Proposed Development

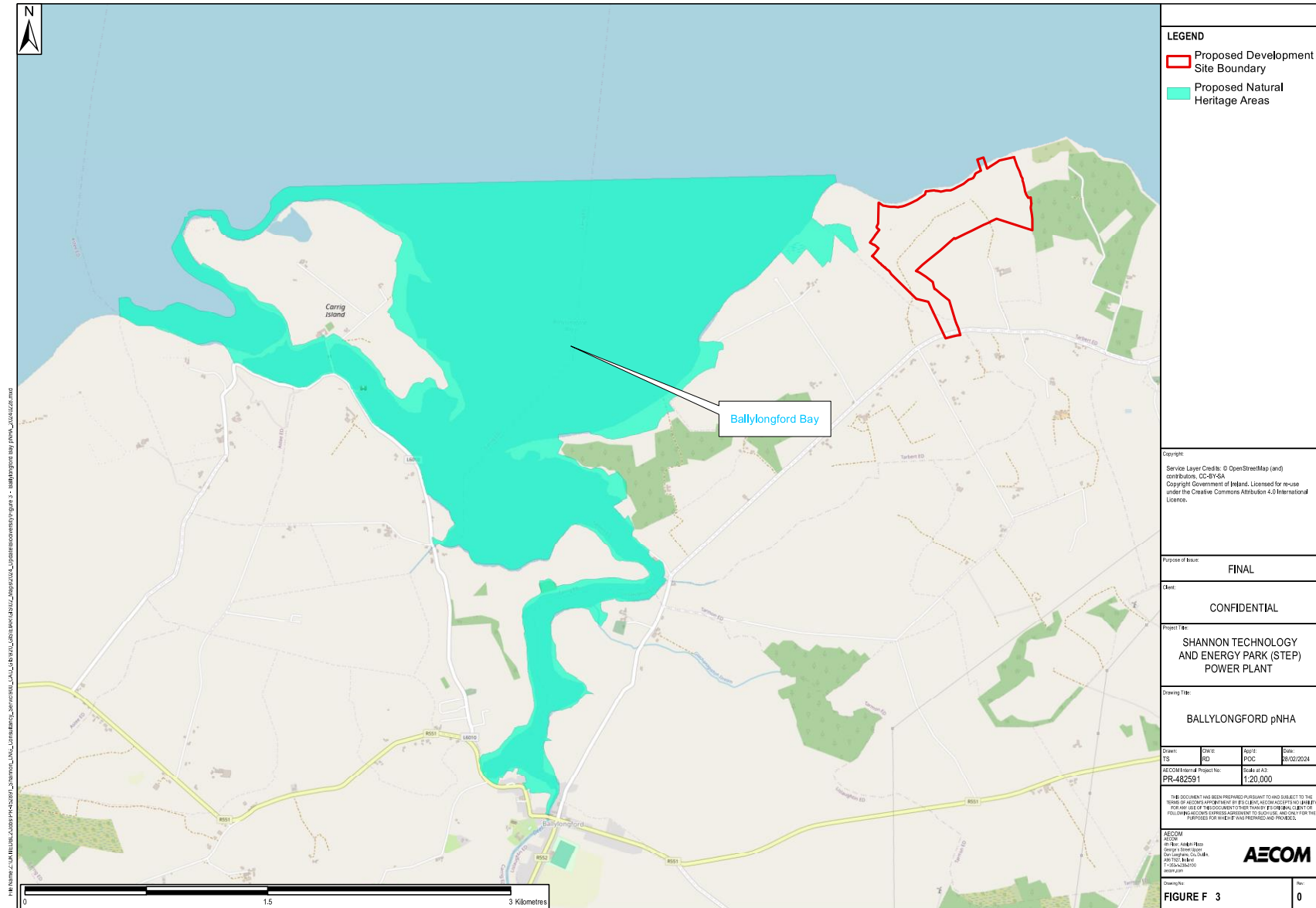


Figure 7.5: Ballylongford Bay pNHA relative to the Proposed Development

7B.4.2 Habitats

Habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication, *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). The terrestrial and aquatic habitats within the Site boundary were classified using the classification scheme outlined in the Heritage Council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and cross referenced with Annex I Habitats where required. The survey results are representative of the habitats within the application site and include the dominant and characteristic species of flora.

A current overview of habitats recorded within the Site boundary is outlined in the habitat maps included in **Figure 7.6**. Habitats recorded within the Site boundary and their ecological value are detailed in **Table 7.3**. Photographs are included in **Appendix A7B.6** of Volume 4.

The ecological value of habitats has been defined using the classification scheme outlined in the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA 2009) which is included in **Appendix A7B.7** of Volume 4. It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape.

- Habitats that are considered to be good examples of Annex I and Priority habitats are classed as being of International or National Importance.
- Semi-natural habitats with high biodiversity in a county context and that are vulnerable, are considered to be of County Importance.
- Habitats that are semi-natural, or locally important for wildlife, are considered to be of Local Importance (higher value).
- Sites containing small areas of semi-natural habitat or which maintain connectivity between habitats are considered to be of Local importance (lower value).



Figure 7.6. Terrestrial and Freshwater Habitats within the Site boundary

Table 7.3: Terrestrial and Freshwater Habitats recorded within the Site boundary

Habitat	Comment	Ecological Value (NRA Guidelines)*
Wet grassland GS4/ Improved agricultural grassland GA1	Several fields within Site boundary Refer to Section 7B.4.2.1 for detail.	Local importance (Lower value)
Improved Agricultural grassland GA1	Several fields within Site boundary Refer to Section 7B.4.2.2 for detail	Local importance (Lower value)
Hedgerows WL1/Treelines WL2	Located within Site boundary. Refer to Section 7B.4.2.3 for detail	Local importance (Higher value)
Sedimentary Sea Cliffs CS3	Located along the northern Site boundary, a small area of this habitat overlaps with the proposed drainage outfall pipe. The cliffs within the Proposed Development site are not an example of this Annex I habitat (1230). Refer to Section 7B.4.2.4 for details.	Local importance (Higher value)
Eroding River FW1	The Ralappane Stream passes through the southern boundary of the Proposed Development before running outside the western planning boundary to its confluence with the Shannon Estuary. Refer to Section 7B.4.2.5 for details	Local importance (Higher value)
Drainage ditches FW4	Drainage ditches flow along hedgerows at a number of locations within the site. Refer to Section 7B.4.2.6 for details	Local importance (Lower value)
Scrub WS1	Patchy distribution within the Site boundary, largely associated with hedgerow WL1/treeline WL2 habitats. Refer to section 7B.4.2.7 for details.	Local importance (Higher value)
Immature woodland WS2 /Wet willow-alder-ash woodland WN6	Small pockets of woodland on waterlogged ground. Refer to Section 7B.4.2.8 for details.	Local importance (Higher value)
Scrub WS2/Broadleaved woodland WD1	Small pocket of woodland developing around a derelict cottage. Refer to section 7B.4.2.9 for details.	Local importance (Higher value)

* Refer to Appendix A7B-7 of Volume 4 of this EIAR. *Guidelines for Assessment of Ecological Impacts of National Road Schemes*

7B.4.2.1 Wet grassland GS4/ Improved agricultural grassland GA1

This habitat consists of areas of pasture dominated by Yorkshire-Fog *Holcus lanatus*, Creeping Bent *Agrostis stolonifera*, Soft Rush *Juncus effusus*, Lesser Spearwort *Ranunculus flammula* and Yellow Flag *Iris pseudacorus*. It generally occurs where ground is waterlogged either due to topography or due to low intensity agricultural management. Within the Proposed Development, wet grassland grades into improved agricultural grassland where reseeding has occurred, and rye grass becomes abundant in the sward. Species noted include Perennial Ryegrass *Lolium perenne*, Meadow Foxtail *Alopecurus pratensis*, Timothy *Phleum pratense* and Sweet Vernal-Grass *Anthoxanthum odoratum*. Associated herbaceous species include Creeping Buttercup *Ranunculus repens*, Cuckoo Flower *Cardamine pratensis*, Silverweed *Potentilla anserina*, Chickweed *Stellaria media*, Ribwort Plantain *Plantago lanceolata*, Curled Dock *Rumex crispus*, Angelica *Angelica sylvestris* and Horsetail *Equisetum* sp.. Particularly in more recent years, drains have not been maintained leading to blockages and increased waterlogging in the surrounding areas. Therefore, although boundaries between habitats are indistinct there is an increase in waterlogged areas of wet grassland in the smaller less intensively managed sections of the site.

7B.4.2.2 Improved agricultural grassland GA1

The drier portions of the site are dominated by improved agricultural grassland which is a very common habitat type in the Irish countryside. Larger fields are located to the east of the Proposed Development and these areas are more intensively managed with lower species diversity. Rye-grasses dominate the sward and other common grasses include meadow-grasses, Timothy, Sweet Vernal-grass and Yorkshire-fog. Common herbaceous include Broadleaved Dock *Rumex obtusifolius*, Ribwort Plantain, Daisy *Bella perennis*, Nettle *Urtica dioica* and Common Mouse Ear *Cerastium fontanum*. There has been some scrub encroachment in recent years along field boundaries. However, the higher quality grassland in the eastern section of the site continues to be grazed at a moderate intensity level which prevents significant areas of scrub from becoming established.

7B.4.2.3 Hedgerows WL1/Treelines WL2

The Proposed Development is dominated by a managed agricultural landscape of fields bounded by defined hedgerows and treelines, which support a variety of species. Included within this category are sections of earth banks (BL2) and stonewalls (BL1) which also occur on field boundaries in conjunction with hedges and tree lines. Where hedges are sheltered, they are generally denser. Hedges exposed to wind are less dense with Hawthorn *Crateagus monogyna* often dominant. In wetter sections of the site, Willow *Salix* spp. is more common.

Other tree species noted include Elm *Ulmus glabra*, Blackthorn *Prunus spinosa*, Holly *Ilex aquifolium*, and Alder *Alnus glutinosa*. Climbing plants include Ivy *Hedera helix*, Honeysuckle *Lonicera periclymenum* and Dog- Rose *Rosa canina*. Grass and herbaceous understory species include Yarrow *Achillea millefolium*, Lords-and- Ladies *Arum maculatum*, Common Knapweed *Centaurea nigra*, Cleavers *Galium aparine*, Herb-Robert Geranium *roberianum*, Hogweed *Heracleum mantegazzianum*, Bluebell *Hyacinthoides non-scripta*, False Oat- Grass *Arrhenatherum elatius*, Cock's-Foot grass *Dactylus glomerata*, Red Fescue *Festuca rubra*, False Brome *Brachypodium sylvaticum*, Meadow Foxtail, Yorkshire-Fog, Timothy and Sweet Vernal-Grass. Hedges provide nesting and foraging habitat and function as wildlife corridors. As there has been no significant management of hedgerows in recent years, there is now a higher percentage of treeline habitat as hedges mature and become less dense.

7B.4.2.4 Sedimentary sea cliffs CS3

Sedimentary sea cliffs (CS3) occur along sections of the boundary between the Shannon Estuary and the Proposed Development. These cliffs run approximately from the Ralappane Stream in the west to the eastern boundary. However, only a small section of this habitat occurs within the Site boundary. This category includes steep to almost vertical coastal cliffs that are formed primarily of unconsolidated material. The small section of cliff within the Proposed Development is composed of glacial till and is subject to erosion making it unstable and difficult for plants to colonise.

The cliff within the Site boundary is relatively low and largely unvegetated. The top of the cliff is dominated by common scrub species such as Bramble and improved agricultural grassland. Although this habitat type is loosely linked with the Annex I habitat 'vegetated sea cliffs of the Atlantic and Baltic coasts 1230' which is a qualifying habitat for the Lower River Shannon SAC, the cliffs within the Proposed Development are not an example of this Annex I habitat and are not considered of high ecological value.

7B.4.2.5 Eroding River FW1

The Ralappane Stream runs through the southern area of the Proposed Development before flowing northwards to its confluence with the Shannon Estuary. With the exception of a small section near the southern boundary of the Proposed Development, this stream is located outside the Site boundary. The section of the Ralappane Stream within the Proposed Development is representative of the habitat type Eroding river FW1. The stream supports a macroflora dominated by Lesser Water-Parsnip *Berula erecta*, Fool's Watercress *Apium nodiflorum* and Common Starwort *Stellaria graminea*. Hemlock Water Dropwort *Oenanthe crocata* also occurs. There is some tidal influence in the lower reaches of the river, outside the Site boundary, and here the river is classified as Tidal River CW2. The lower section of this watercourse, which is outside the Site boundary is included in the Ballylongford pNHA and the Lower Shannon SAC.

7B.4.2.6 Drainage Ditch FW4

Several drainage ditches cross the southern portion of the Proposed Development, generally flowing in a west or north-west direction. The drainage ditches along the access road all ultimately drain to a single watercourse, namely the Ralappane Stream. It is noted that, with the exception of D3 (Refer to **Section 6.5.8.8**), all drainage ditches were dry during the summer months. Therefore, they do not support fish and do not provide significant foraging habitat for Otter. Surrounding vegetation consists of typical riparian and field flora including Rushes *Juncus* spp., Willow, Alexanders *Smyrniololus atrum* and Nettle. Aquatic flora includes Water Crowsfoot *Ranunculus aquatilis*, Pondweeds *Potamogeton* spp and Water Starwort *Callitriche* spp.

7B.4.2.7 Scrub WS1

Scrub habitat has a patchy distribution within the Site boundary but is largely associated with treeline and hedgerow habitat. The main species recorded in these areas are Hawthorn, Blackthorn, Bramble *Rubus fruticosus* and Gorse *Ulex europaeus*. Willow and immature Elm and Sycamore *Acer pseudoplatanus* are also present. Along the Ralappane Stream scrub species include Goat Willow *Salix caprea*. In the absence of intensive management and / or grazing there has been a marked increase in scrub levels in recent years. Many of the treelines / hedgerows now have a parallel band of scrub with some areas of dense Blackthorn, Bramble and Gorse. These bands of scrub are not uniform in extent as this depends on ground fertility, moisture levels, exposure and management / grazing regimes. In the absence of development or management, areas of scrub are likely to increase in size with more tree species becoming established.

7B.4.2.8 Immature woodland WS2 / Wet willow-alder-ash woodland WN6

It is also noted that in the absence of drainage works or maintenance of existing drains, there is increased waterlogging of wet grassland areas within smaller fields and increased levels of surface water in winter. This is facilitating colonisation of wet grassland areas by Willow. During the spring visit in March 2024 which followed a period of relatively heavy rainfall, extensive ponding of surface water was recorded (due to a blocked drain) within an area of woodland dominated by immature Willow with some older trees. This has led to the development of a small pocket of wet Willow woodland. A second small pocket of this habitat is also developing within a section of wet grassland to the east. In the absence of intensive management or grazing, this habitat is likely to continue to increase in extent.

7B.4.2.9 Scrub WS2 / Broadleaved woodland WD1

An area of scrub with a small number of mature trees has developed around a derelict cottage (Referred to as Location B later in report). In the absence of management and due to the presence of a small number of older trees, this is developing into a small pocket of broadleaved woodland with immature Sycamore, Willow, Bramble and Gorse. This habitat is likely to become more prevalent over time as scrub matures and more taller tree species become established.

7B.4.2.10 Habitats Outside the Proposed Development Boundary

The Lower River Shannon SAC and Ballylongford Bay pNHA are located to the north and west of the Proposed Development. A small section of the Lower River Shannon SAC overlaps with the Site boundary (**Figure 7.3**). These sites support a variety of important habitats and species, both terrestrial and aquatic. A number of terrestrial qualifying habitats for the Lower River Shannon SAC are located to the north/west of the Proposed Development *i.e.* Atlantic Salt Meadows (1330), Mediterranean Salt Meadows (1410), Perennial Vegetation on Stony Banks (1220), Estuaries (1130) and Coastal Lagoons (1150). Estuarine and coastal qualifying habitats are discussed further in **Chapter 07A** (Marine Ecology).

A number of notable terrestrial and freshwater habitats are located outside the planning boundary. These include:

- Lagoon and saline lakes CW1. A brackish lagoon (CW1) occurs, outside the Site boundary, and to the west of the Proposed Development. This habitat comprises a small lake of impounded brackish water that is separated from the sea by banks of shingle. Tidal influence is much reduced by this physical barrier which fluctuates on a daily and seasonal basis, depending on tides and inputs of freshwater. Surveys carried out by Minerex in 2007 confirmed that this habitat is not hydrologically connected to the Proposed Development (*Hydrological and hydrogeological impact assessment of the Proposed Shannon LNG Terminal at Ballylongford, Co. Kerry* (Minerex 2007)). Given there has been no development in this area since 2007, there is no potential for changes to local hydrology or hydrogeology and the conclusions of the 2007 report remain valid.
- Reed and large sedge swamps FS1. A large area of reedbed dominated by Common Reed *Phragmites australis* occurs to the west of the Ralappane Stream. This reed bed is species poor and dominated by Common Reed. This area, which is outside the Site boundary, is included within the Ballylongford pNHA and Lower River Shannon SAC. Surveys carried out by Minerex in 2007 confirmed that this habitat is not hydrologically connected to the Proposed Development (*Hydrological and hydrogeological impact assessment of the Proposed Shannon LNG Terminal at Ballylongford, Co. Kerry* (Minerex 2007)). Given there has been no development in this area since 2007, there is no potential for changes to local hydrology or hydrogeology and the conclusions of the 2007 report remain valid.
- Lower salt marsh CM1. Along the lower reaches of Ralappane Stream a typical saltmarsh zonation occurs. It is subject to periodic tidal influence and comprises only small areas of pioneer and low-mid marsh. This area, which is outside the boundary of the Proposed Development, is included within the Ballylongford pNHA. Lower salt marsh is allied to four types of salt marsh habitat listed in Annex I of the Habitats Directive (habitat codes 1310, 1320, 1330 and 1420) however correspondence is not exact. This habitat has deteriorated in quality in recent years. Surveys carried

out by Minerex in 2007 confirmed that this habitat is not hydrologically connected to the Proposed Development (*Hydrological and hydrogeological impact assessment of the Proposed Shannon LNG Terminal at Ballylongford, Co. Kerry* (Minerex 2007)). Given there has been no development in this area since 2007, there is no potential for changes to local hydrology or hydrogeology and the conclusions of the 2007 report remain valid.

- Conifer plantation WD4. A mature Sitka Spruce *Picea sitchensis* coniferous forestry plantation is located to the east of the Proposed Development.

These habitats are located outside the Site boundary and it is noted there will be no direct or indirect impacts on these habitats as a result of the Proposed Development.

7B.4.2.11 Rare Flora

The National Biodiversity Data Centre's (NBDC) online database provides data on the distribution of species within 10km grid squares. The Proposed Development site lies within 10 km grid square (hectad) R04 of Ordnance Survey Ireland's National Grid System.

The NBDC lists two threatened plant species within R04 *i.e.* Pale Flax (*Linum bienne*) and Shepherd's-needle (*Scandix pecten-veneris*). As detailed in **Section 7B.3.5.1**, floral surveys were carried out during the growing season alongside habitat surveys. These threatened plant species were not recorded within the Proposed Development. No rare plant species were recorded within the Site boundary during the site surveys (2022-2024). A full list of plant species recorded during site surveys is included in **Appendix A7B.5** of Volume 4.

7B.4.3 Mammals

The following mammals were recorded during the 2022-2024 site surveys: Badger, Otter, Fox *Vulpes vulpes*, Irish Hare *Lepus timidus*, Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Leisler's Bat *Nyctalus leisleri*, Brown Long-eared Bat *Plecotus auritus* and Lesser Horseshoe Bat *Rhinolophus hipposideros*. The following mammals were recorded during the 2019-2021 site surveys: Badger, Otter, Mink *Mustela lutreola*, Fox *Vulpes vulpes*, Irish Hare *Lepus timidus*, Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus* and Leisler's Bat *Nyctalus leisleri*. During the 2006/2007 and 2011/2012 surveys Irish Hare, Fox, Otter, Badger and Common Pipistrelle were recorded. Full details of mammal surveys are included in **Appendix A7B.1** of Volume 4.

7B.4.3.1 Badgers

As detailed in **Section 7B.3.5.2** Badger surveys were carried out within the Proposed Development in 2023 and 2024. Badger surveys, including bait marking surveys, were previously carried out at the Proposed Development in 2007, 2011, 2019 and 2021 and the aim of the 2023/2024 surveys was to identify if there were any changes in the patterns of Badger usage within the Proposed Development since those previous surveys. It is noted that Badgers live in territorial groups (clans) and they occupy and defend their territory against neighbouring Badgers. Badger territories are by definition exclusive and do not overlap and members of the group generally show high fidelity to their territory. Therefore, territories are unlikely to change significantly in the absence of any major alternations or disturbance to the local landscape. Full details of bait marking survey methods and results are included in **Appendix A7B.1** of Volume 4.

Surveys of the Proposed Development by DixonBrosnan for Badgers began in 2007 following the discovery of three separate Badger setts; two within the Proposed Development (proposed extent in 2007) and one

immediately outside the eastern boundary. The location of these setts is shown in **Appendix A7B.1** of Volume 4. A site visit on 28th November 2011 ascertained that these three setts remained in place and activity levels remain similar to those recorded in 2007. The two setts (Sett 1 and Sett 3) are respectively located east and south-west of the overall Site boundary. Sett 2, which was located within the Site boundary was a much smaller sett, which had developed on a disused track. Signs of activity were recorded at this sett in 2011. It was concluded in 2011 that a possible sett nominated as Sett 2a in 2007 was not used by Badger. It was noted that the results of the survey may have been distorted by site clearance works (during the 2011 surveys) and in particular by unseasonably dry weather which may have impacted on feeding patterns and use of latrines.

An assessment of the 2007 bait marking survey was carried out prior to the implementation of the 2019 survey. Results from the 2007 survey were tentative and were considered uncertain due to agricultural works during the survey period and particularly dry weather. No such issues were recorded during the 2019 bait marking survey and results from this more recent survey are considered more reliable. The primary purpose of the bait marking survey in 2019 was to more accurately determine the status of Sett 1 and Sett 2 which are located within the Site boundary.

The results of the bait marking survey which was carried out in 2019 are considered conclusive and provide a relatively clear picture of Badger usage patterns. A number of latrines were located which contained coloured pellets which illustrates the distribution of Badger social groups. The results of the Bait marking surveys are outlined in **Table 7.4**. An overview of Badger sett distribution from the surveys within the Proposed Development is provided **Figure 7.7**

Table 7.4: Bait Marking Survey Conclusions

Sett	Description of sett	Colour of pellets
Sett 1	Outlier sett located inside the Site boundary	Blue pellets
Sett 2	Subsidiary sett located within the Site boundary	Yellow pellets
Sett 3	Very large main sett located outside the Site boundary	Red pellets
Sett 4	Main sett located outside the Site boundary	White pellets

Based on the results of the 2019 bait marking survey, it was concluded that Sett 3 and Sett 2 belong to the same social group and that Sett 2 is a subsidiary sett (Sett 3 is the main sett). As expected, uptake of bait was high at Sett 3 as this is a large main sett. Uptake of bait was much lower at Sett 2, which was expected as this is a smaller subsidiary sett. The presence of yellow and red pellets in latrines indicated that these setts are linked as the main and subsidiary sett of the same social group.

At Sett 1 which is located just inside the Site boundary showed relatively low levels of activity in 2019. Following identification of a large sett (Sett 4) outside the Site boundary, white and blue pellets were identified in Sett 4 latrines indicating that Sett 1 and Sett 4 are linked, with Sett 4, the main sett (outside the site boundary) and Sett 1 (within the eastern boundary) an outlier sett with very limited usage.

Following the 2019 surveys it was concluded that two main Badger setts occur near the Proposed Development, namely Sett 3 and Sett 4. However, neither sett will be directly impacted by the Proposed Development. Bait marking surveys indicated that Sett 2 is a subsidiary sett and the main sett for this social

group is Sett 3, which will be unaffected by the Proposed Development. Sett 1, which had contracted since initial surveys in 2007, now consists of one unused sett entrance and one outlier sett just within the Site boundary.

No changes in the distribution of Badger setts or significant changes in activity patterns associated with Setts 2,3 and 4 were recorded in 2023 and 2024. All three sets were still in active usage and it is considered highly improbable that any significant changes in the distribution of social groups has occurred in the intervening period, given the territorial behaviour of Badgers and in the absence of any significant change to the Proposed Development. No evidence of active usage of Sett 1 was recorded. Overall, it has been concluded that the distribution of social groups and activity patterns has not changed for Setts 2,3 and 4. However, Sett 1 is no longer considered active.

It is noted that neither of the main setts (Sett 3 and Sett 4) will be impacted by the Proposed Development and exclusion of the Badgers from outlier and subsidiary setts (Sett 1 and Sett 2) is a viable option in relation to the Proposed Development.

Overall, the Proposed Development is of Local importance (Higher value) for Badger.



Figure 7.7: Badger Latrine with Recorded Pellets (2019) and sett Locations (2019 and confirmed 2023 / 2024)

7B.4.3.2 Bats

As detailed in **Section 7B.3.5.3** night-time bat emergence surveys and activity surveys as well as daytime building surveys and were carried out within the Site boundary in May 2023, September 2023 and February 2024. Full details of survey methods and results are included in **Appendix A7B.1** of Volume 4.

The hedgerows and treelines, grassland areas, shoreline and river corridor around the Proposed Development may be used by bats for feeding, however no trees were recorded which could potentially support bat roosts were recorded during site surveys.

During the 2023/2024 (and 2020/2021) surveys, no buildings with significant potential to support bats were recorded within the Site boundary.

A disused farmhouse within the Site boundary (Location B in **Figure 7.8**) has a heavy growth of ivy and is draughty due to an absence of windows or doors. A number of bat species were recorded foraging in the vicinity of this building during the 2021 and 2023 bat emergence surveys i.e. Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat as well as occasional Brown Long-eared bat and an unidentified Myotis bat (probably Whiskered bat). However, no bats were recorded emerging from the buildings. Following daytime visual searches, it was concluded that Location B is of low potential roost value for bats as no signs of bat usage (i.e. staining, dropping etc) were recorded. A pillbox within the Proposed Development (Location C in **Figure 7.9**) close to the Shannon Estuary lacks suitable crevices for bats and no signs of bats were recorded within this structure.

Overall, the buildings within the Site boundary are considered of low suitability as potential bat roosts under the guidelines set out in '*Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th end*)' (Collins 2023).

A small derelict building is located close to the shoreline west of the Site boundary (Location D **Figure 7.8**). However, this building lacks the crevices and spaces which would make it suitable as roosting sites for bats and the presence of bat roosts at this location is considered highly improbable.

A derelict farmhouse, part of a complex of farm buildings (Location A, in **Figure 7.8**) is located c. 170 m west of the Site boundary. It consists of a number of buildings including a disused cottage with a corrugated iron roof (Building 2), a disused dwelling with a slate roof (Building 1) and a number of derelict outbuildings with minimal bat roosting potential. Surveys in 2007 and 2020 recorded small numbers of Common Pipistrelle (i.e. <20 individuals in 2007 and 8 individuals in 2020) roosting at this location.

On the 11th of May 2023, two Lesser Horseshoe Bats were recorded within Building 1. One was recorded within a downstairs hallway and the second was recorded in a downstairs room. Approximately four Common Pipistrelle were recorded emerging from the roof of Building 1 close to the chimney at the same location on 11th May 2023.

Searches of Building 2 later in the survey season on the 4th and 9th September 2023 did not record any roosting Lesser Horseshoe bats within the same structure, although a static detector in the building did record Lesser Horseshoe bat signals (on the 4th, 5th and 6th September 2023). Based on the findings of the surveys, it is considered probable that the Buildings 1 and 2 at Location A are used as night roosts by a small number of Lesser Horseshoe Bats.

No trees of potential value as bat roosts were recorded within the Site boundary during the 2020/2021 or the 2023/2024 bat surveys.

Bats spend much of the winter in torpor at hibernation sites although they will rouse on warmer nights to drink, forage and expel waste products. Bats can change hibernacula depending on weather conditions. In general winter roosting sites have a constant temperature and high humidity (Collins, 2023) and are often in basements or underground cellars. The buildings within the Proposed Development and in immediate proximity to it, are in an advanced state of disrepair and draughty in winter with extreme fluctuations in temperature. There are no cellars or underground structures associated with these buildings. Therefore, no potential winter roosting habitat for bats will be affected.

Surveys along internal hedgerows/treelines, cliffs, scrub, woodland and stream habitat found small numbers of bats foraging/commuting in these areas. Common Pipistrelle and Soprano Pipistrelle were the most common species recorded. Activity levels were generally low along linear features within the eastern section of the Proposed Development and along the more exposed fields close to the coast. A moderate level of activity was recorded in the smaller fields on the western side of the Proposed Development. It is noted that these smaller fields are now farmed less intensively with more scrub development around the margins of the fields. Pockets of immature and wet woodland have developed in some areas. This may have improved habitat foraging quality in more sheltered areas for some bat species. Therefore, internal hedgerows, scrub and woodland habitats within the Proposed Development are considered to have moderate suitability for commuting and foraging bats under the guidelines set out Collins (2023).

Leisler's Bats were regularly recorded foraging and commuting within the Proposed Development. Brown Long-eared bat was sporadically recorded in fields close to Location B and an unidentified Myotis bat (probably Whiskered bat) was recorded on one occasion foraging in the same area.

No foraging Lesser Horseshoe Bats were recorded within the Site boundary or along the Ralappane Stream. Lesser Horseshoe Bats preferentially feed in woodlands close to the ground (Marnell *et al.* 2022) a habitat which is largely absent from the Site boundary. While the Proposed Development is unlikely to provide high value foraging habitat for Lesser Horseshoe Bat, some limited foraging by this species could potentially occur.

Overall, the Proposed Development is Local importance (Higher value) for bats. Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, Brown-long Eared Bat and an unidentified Myotis bat (potentially Whiskered Bat) were recorded foraging within the Proposed Development, but no roosting sites were recorded.



Figure 7.8: Bat roost survey locations

7B.4.3.3 Otter

As detailed in **Section 7B.3.5.4**, Otter surveys were carried out within a minimum of 150m of the Proposed Development in 2022, 2023 and 2024. Otter is a qualifying interest for the Lower River Shannon SAC and impacts on Otter are discussed further in the AA screening and NIS which accompany this planning application. Otter surveys were previously carried out at the Proposed Development in 2007, 2011, 2019, 2020 and 2021 and these are referred to where relevant. Full details of survey methods and results are included in **Appendix A7B.1** of Volume 4. An overview of the lands in the vicinity of the Site boundary which were surveyed for Otter and the location of Otter records are shown in **Figure 7.9**.

Surveys carried out in 2022, 2023 and 2024, indicated that the lower section of the Ralappane Stream to the west of the Proposed Development is used by Otter. A well-worn Otter track was recorded running alongside the tidal section of the stream. Along its length there were several sprainting sites. A path was also observed where Otter cross into the large reed bed to the west of the Site boundary. No holts or couches were recorded during the site surveys.

The 2022, 2023 and 2024 results support the findings of surveys previously carried out at the site in 2007, 2011, 2019 and 2021 which did not recorded any signs of Otter holts or couches within the survey area (Refer to **Figure 7.9**). It is noted that no signs of Otter were recorded along the upper reaches of the Ralappane Stream within the Site boundary or along any of the drainage ditches within the Proposed Development during any of the surveys between 2007 and 2024. Live Otters were recorded on several occasions foraging within the waters of the Shannon Estuary west of Ralappane Point (outside the Proposed Development) and/or moving along the shoreline in this area (October 2019, January 2020, June 2021). Otter activity within the survey area is focused to the west of the Proposed Development, although in 2018 a dead Otter was recorded within the Shannon Estuary to the east.

It is noted that in June 2019, trail cameras recorded two adult Otters close to the confluence of the Ralappane Stream and the Shannon Estuary, outside the Site boundary (Refer to **Figure 7.9**). Otters are generally solitary and therefore the presence of two adults may be indicative of breeding behaviour. However, no holts were recorded within 150 m of the Proposed Development.

Overall, the Proposed Development is of Local Importance (Higher value) for Otters. Otters were recorded in the vicinity of the Proposed Development but there are no records of Otters within the boundary.



Figure 7.9: Otter Survey Results

7B.4.3.4 Other Terrestrial Mammals

Nine other species of terrestrial mammal have been recorded within R04, the grid square within which the Proposed Development is located (NBDC) (Source NBDC 12/02/24). Five of these are protected under the Wildlife Act 1976, as amended, namely Red Squirrel *Sciurus vulgaris*, Fallow Deer *Dama dama*, Irish Hare *Lepus timidus subsp. hibernicus*, Sika Deer *Cervus nippon* and Hedgehog *Erinaceus europaeus*.

7B.4.3.4.1 Red Squirrel

Red Squirrel is known to occur in the wider area (NBDC records). The closest record of Red Squirrel in approximately 1 km south-east of the Proposed Development at Cockhill, Tarbert in 2017. However, no signs of Red Squirrel were recorded during any of the site surveys and given there are no significant areas of woodland habitat within the Proposed Development for this species. The Site is of negligible local ecological value for Red Squirrel.

7B.4.3.4.2 Hedgehog

No signs of Hedgehog were recorded during any of the site surveys, although they are likely to use hedgerows and treelines within the Site boundary. The site of Local importance (Lower value) for Hedgehog.

7B.4.3.4.3 Irish Hare

Two Hares were recorded foraging in grassland at the southeast of the Proposed Development on 22nd of April 2021. A single Hare was also recorded along the shoreline to the east of the Site boundary on 21st January 2019. (**Figure 7.10**). A Hare was also observed in grassland at the southwest of the Proposed Development on the 29th of June 2023. The Proposed Development of Local importance (Lower value) for Irish Hare.

7B.4.3.4.4 Fallow Deer

No sign of Fallow Deer was recorded during any of the surveys within the Site boundary and habitats present are suboptimal for this species. The site is of negligible local ecological value for Fallow Deer.

7B.4.3.4.5 Sika Deer

No sign of Sika Deer was recorded during any of the surveys within the Site boundary and habitats present are suboptimal for this species. The site is of negligible local ecological value for Sika Deer.



Figure 7.10: Other Species recorded within the Proposed Development

7B.4.4 Amphibians and reptiles

7B.4.4.1 Amphibians

According to records held by the NBDC, Common Frog *Rana temporaria* and Smooth Newt *Lissotriton vulgaris* have been recorded within grid square R04, the 10 km grid square in which the Proposed Development is located.

A single Common Frog was recorded in wet grassland near the west of the Site on 22nd April 2021 (**Figure 7.10**). No signs of amphibians were recorded within the drainage ditches onsite. No other amphibian species were recorded during site surveys. The site is of Local importance (Higher value) for Common Frog.

7B.4.4.1.2 Reptiles

Common Lizard *Lacerta vivipera* has been recorded within R04 on two occasions, however the most recent record dates back to 1976. No sign of Common Lizard was recorded during Proposed Development site surveys. The Site is of negligible value for reptiles. No habitats of particular significance for this species will be affected by the Proposed Development.

7B.4.5 Birds

7B.4.5.1 Breeding Birds

The NBDC online database lists 132 species of bird recorded within grid square R04. Of these species, a number are listed under Annex I of the Birds Directive and are Red Listed Birds of Conservation Concern in Ireland (Gilbert *et al.* 2021). Corncrake *Crex crex*, Grey Partridge *Perdix perdix*, Curlew *Numenius arquata*, Barn Owl *Tyto alba* and Yellowhammer *Emberiza citrinella* have historically bred within 10km of the Proposed Development (Sharrock 1976, Gibbons *et al.* 1993). As detailed below, breeding Barn Owl was recorded to the west of the Proposed Development during 2023 surveys. However, the Proposed Development does not contain suitable habitat for breeding Corncrake, Curlew, Barn Owl or Grey Partridge.

A national survey of breeding Hen Harriers *Circus cyaneus* in Ireland in 2015 and 2022, recorded no evidence of breeding Hen Harriers in the 10km grid square containing the Proposed Development (Ruddock *et al.* 2016; Ruddock *et al.* 2024). It is noted that a juvenile (Ringtail) Hen Harrier was recorded over the reed bed habitat to the west of the Proposed Development in July 2021 (19th July 2021). However, there is no high value foraging or suitable breeding habitat for this species within the Site boundary and there are no records of breeding Hen Harrier within 10km of the Site boundary. Given the habitats within the Proposed Development, it is of negligible value for breeding Hen Harrier and of low potential value for foraging Hen Harrier.

As detailed in **Section 7B.3.5.5**, breeding bird surveys were conducted in March, April, May and June 2023. It is noted the Proposed Development was previously surveyed for breeding birds in March 2019, July 2019, April 2020 and May 2020. Full details of these surveys are included in **Appendix A7B.2** of Volume 4.

The breeding bird survey area encompassed a range of habitats including areas along the shoreline of the Shannon Estuary, hedgerows, improved agricultural grassland, scrub and woodland within the Proposed Development as well as less intensively managed grassland and scrub habitats to the west within the Tarbert-Ballylongford landbank. The intensity of agricultural management varied across the survey area, with less intensively managed grassland at the west of the survey area (outside the Proposed Development). With less intensive grazing in these areas over the last number of years, scrub and woodland habitat has

developed, hedgerows have matured and diverse semi-natural grassland has developed. This has provided higher value foraging habitat for birds such as Barn Owl and Kestrel *Falco tinnunculus*.

A total of 37 species were recorded during the 2023 breeding bird surveys (**Table 7-5**). One Annex I species, Little Egret *Egretta garzetta*, was recorded within the study area. Five species are classified as Red List species (Meadow Pipit, Curlew, Barn Owl, Kestrel and Snipe). Eleven Amber List species of conservation concern were also recorded during breeding bird surveys (Black-headed Gull *Larus ridibundus*, Herring Gull *Larus argentatus*, Light-bellied Brent Goose *Branta bernicla hrota*, Linnet *Linaria cannabina*, Mallard *Anas platyrhynchos*, Shelduck *Tadorna tadorna*, Skylark *Alauda arvensis*, Starling *Sturnus vulgaris*, Swallow *Hirundo rustica*, Teal *Anas crecca* and Willow Warbler *Phylloscopus trochilus*). Of these BOCCI species, five were recorded within the Site boundary during the breeding bird surveys i.e. Meadow Pipit, Skylark, Snipe, Willow Warbler and Kestrel.

A Barn Owl was confirmed to be breeding in a building c.170m west of the Proposed Development (refer **Figure 7.8**) Location A) in May 2023. However, there are no buildings suitable for breeding Barn Owl within Site boundary. Curlew recorded during surveys to the west of the Proposed Development are likely to be non-breeding individuals, as Curlew frequently forage along the estuary during the summer months. Light-bellied Brent Geese were recorded during the March survey to the west of the Proposed Development and are likely to be migrating birds staging near the estuarine habitats. Birds associated with wetland habitats i.e. Shelduck, Teal, Mallard, gulls, etc, may breed in the vicinity of the Proposed Development, but there is no suitable breeding habitat for these species within the Proposed Development.

One Annex I species, Little Egret, was recorded during site surveys. It is noted that Little Egret was recorded within the salt marsh habitat which is located outside the Site boundary. Little Egret is a Green List species in Ireland with the first breeding record of this species dating to 2007.

The survey area provides breeding habitats for a range of BOCCI species including Barn Owl, Kestrel, Snipe, Meadow Pipit, Skylark and Willow Warbler. Species such as Skylark, Snipe, Linnet and Meadow Pipit are under threat due to intensification of agricultural practices as they rely on less intensively managed agricultural grassland habitat. The mix of less intensively managed agricultural land and wet grassland within the Tarbert-Ballylongford landbank provides valuable habitat for these species. While only two species were confirmed to be breeding in 2023, many of the terrestrial species recorded are likely to breed within the area surveyed. A number of BOCCI species are likely to breed within the Proposed Development i.e. Meadow Pipit, Skylark, Snipe, Linnet, Willow Warbler. Other species, such as Kestrel and Mallard could breed in nearby habitats.

It is noted that four juvenile White-Tailed Sea Eagles *Haliaeetus albicilla* have been released in the Tarbert area to date and a further eight birds were released in 2021 (Allan Mee, personal communication). White-tailed Sea Eagle have a foraging range of up to 250km² (Evans *et al.* 2011). During the February 2023 winter bird surveys, a single bird was observed overflying the estuary from a vantage point at Knockinglas Point. While the waters of the Shannon Estuary are likely to provide valuable foraging habitat for this species, there is no suitable foraging or breeding habitat for Sea Eagle within the Proposed Development.

Sandwich Tern *Thalasseus sandvicensis*, an Annex I (and Amber List) species was recorded foraging within intertidal waters to the west of the Proposed Development in summer 2021 (Refer to **Section 7B.4.5.2** for detail). Sandwich Tern and Common Tern *Sterna hirundo* breed within the Shannon Estuary at Rat Island,

approximately 33km northeast of the Proposed Development. Common Tern, which were not recorded during any site survey, also breed at Sturamus Island 24km east of the Proposed Development (Hannon *et al.* 2007; Natura 2012).

There are a number of Red List and Amber List species breeding and/or foraging within the Proposed Development. Overall, the Proposed Development is of Local Importance (Higher value) for birds of conservation concern and Local importance (Higher value) for other breeding birds.

Table 7-5: Birds of Conservation Concern Recorded during Proposed Development site Surveys

Species		Breeding Status	Estimated number of territories within survey area	Conservation Status: Annex I of Birds Directive or Red/Amber List*
Barn Owl	<i>Tyto alba</i>	Confirmed	1	Red List
Black-headed Gull	<i>Larus ridibundus</i>	Possible	0	Amber List
Curlew	<i>Numenius arquata</i>	Non-breeder	0	Red list
Herring Gull	<i>Larus argentatus</i>	Possible	0	Amber List
Kestrel	<i>Falco tinnunculus</i>	Possible	1	Red List
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>	Non-breeder	0	Amber List (Wintering)
Linnet	<i>Carduelis cannabina</i>	Probable	1	Amber List
Little egret	<i>Egretta garzetta</i>	Possible	1	Annex I
Mallard	<i>Anas platyrhynchos</i>	Confirmed	Several	Amber List
Meadow pipit	<i>Anthus pratensis</i>	Possible	Several	Red List
Skylark	<i>Alauda arvensis</i>	Possible	Several	Amber List
Snipe	<i>Gallinago gallinago</i>	Probable	3	Red List
Starling	<i>Sturnus vulgaris</i>	Possible	2	Amber List
Swallow	<i>Hirundo rustica</i>	Probable	3	Amber List
Teal	<i>Anas crecca</i>	Non-breeder	0	Amber List
Willow warbler	<i>Phylloscopus trochilus</i>	Possible	4	Amber List

* EU Birds Directive 2009/147/EC and Gilbert *et al.* (2021)

7B.4.5.2 Estuarine Birds

As detailed in **Section 7B.4.1.1**, the terrestrial habitats within the Proposed Development are adjacent to the River Shannon and River Fergus Estuaries SPA. The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. The SPA holds internationally important populations of four species, *i.e.*, Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, *i.e.*, Whooper Swan, Golden Plover and Bar-tailed Godwit.

As detailed in **Section 7B.3.5.6**, estuarine bird surveys (summer/winter) were carried out from several vantage points overlooking the Shannon Estuary to the west and east of the Proposed Development from 2021 to 2023 (**Figure 7.11**). Estuarine bird surveys have been carried out within this area in 2006 / 2006, 2011 / 2012, 2018 / 2019 and 2019 / 2020 and the results of these surveys are also referred to below where relevant. Full details of estuarine bird surveys are included in **Appendix A7B.3** of Volume 4 and within the AA screening / NIS which accompanies this application.



Figure 7.11: Estuarine Bird Survey Locations

A total of 42 bird species were recorded during the 2021-2023 estuarine bird surveys. Four Annex I species were recorded *i.e.* Great Northern Diver, Red-throated Diver, Sandwich Tern and Little Egret. Thirteen of the 21 SCI species for the River Shannon and River Fergus Estuaries SPA were recorded *i.e.* Cormorant, Wigeon, Teal, Ringed Plover, Grey Plover, Lapwing, Light-bellied Brent Goose, Dunlin, Curlew, Redshank, Greenshank, Shelduck and Black-headed Gull. Eight other Red List species were recorded, Curlew, Dunlin, Grey Plover, Lapwing, Oystercatcher, Razorbill, Redshank and Snipe.

Between 2021 and 2023, peak numbers were recorded in November. This was during high tide, when a large flock of Black-headed Gull (300) were recorded foraging and loafing on the water around Point C (30/11/22). During the 2019 / 2020 survey, peak numbers were recorded in February (22/02/20). This was mainly influenced by a large flock of Dublin (260) and Light-bellied Brent Goose (100) recorded at Point D, loafing on the shoreline within a large mixed flock of waders.

The largest diversity of species was recorded in October and February during both the 2018/2019 and 2019/2020 surveys. Sixteen species recorded during October 2019 and 2020 and 15 and 16 respectively in February 2019 and 2020. During the 2021-2023 survey, the largest species diversity was recorded in May 2022 *i.e.* 15 species. However, peak bird numbers during all years of survey were during winter months. Small numbers of birds were recorded during all summer surveys. With the exception of gull, species, peak bird numbers and diversity of birds across all years of survey were recorded at the Robert's Rock (Point D) which is located a considerable distance from the Proposed Development. Here there is a larger area of intertidal foraging habitat, including an area of mudflat exposed at low tide and saltmarsh habitat, habitats which are largely absent from all other survey points. This area is located c.1.3km west of the Proposed Development.

The coastline adjoining the Proposed Development is between Point B and Point C (refer to **Figure 7.11**). Point B is located at Knockfinglas Point to the west of the Proposed Development. Low numbers of gulls, diving birds, and waders were recorded here during both low and high tide surveys. Peak bird numbers at this site were 65 Black-headed Gulls (13/01/22), 40 Light-bellied Brent Goose (19/03/22), 15 Herring Gull (17/12/21) and 12 Cormorant (17/12/21). All other species and SCI wading birds/waterfowl *i.e.* Curlew (peak number 6), Oystercatcher (peak number 10), Redshank (peak number 1), Shelduck (peak number 2), Pochard (peak number 8), Wigeon (peak Number 7), Ringed Plover (peak number 4) and Turnstone (peak number 2) were recorded in low numbers.

Point C is located at Ardmore Point to the east of the Site boundary. This overlooks slightly deeper waters than the other survey points with limited intertidal habitats. Gull and divers were regularly recorded at this site, albeit in small numbers. A mixed flock of gulls including 300 Black-headed Gull was recorded in November 2022. Few waders were recorded here, likely due to the limited foraging habitat present; Oystercatcher (peak number 9), Curlew (peak number 10), Lapwing (peak number 4) and Turnstone (peak number 7). Small numbers of duck species *i.e.* Mallard (peak number 2) and Wigeon (peak number 12), were recorded here at low tide. Small numbers of Sandwich Tern were recorded foraging off Point C in July 2022.

The Red List species Curlew and Snipe were recorded foraging on both intertidal and terrestrial habitats within the study area. Curlew were recorded in wet grassland habitats adjacent to Ralappane point to the west of the Proposed Development. There is a small area of agricultural grassland/wet grassland mosaic on

the northwest corner of the Proposed Development. This grades into less intensively managed wet grassland habitats to the west of the proposed development site. It was within these grasslands (outside the Site boundary) that terrestrial foraging Curlew (and Snipe) were recorded. While Curlew were occasionally recorded foraging along the Shannon estuary shoreline on the northern boundary of the proposed development site (i.e., between point B and point C), terrestrial habitats of value for Curlew are outside the site boundary. The wet grassland with encroaching scrub within the Proposed Development is generally not suitable for wading birds, as they find it difficult to move around and feed in such habitats (Chapman 2017). However, Snipe will utilise this type of wet grassland habitat and were recorded within the Site boundary.

The deeper waters of the estuary provide foraging grounds for seabirds and divers including Black Guillemot *Cepphus grylle*, Common Guillemot *Uria aalge*, Red Breasted Merganser *Mergus serrator*, Great Crested Grebe *Podiceps cristatus*, Great Northern Diver and Razorbill *Alca torda*. These birds generally occurred in small numbers at both high and low tides.

The peak number of benthic foraging divers were recorded feeding within deeper waters of the survey area during the 2021-2023 surveys including Great Northern Diver (3), Red-throated Diver (1) and Great Crested Grebe (7) as well as other piscivorous species such as Cormorant (17), Shag *Phalacrocorax aristotelis* (3) and Sandwich Tern (4). While peak numbers of birds were generally recorded to the west of the Proposed Development, the waters to the north of the Proposed Development are also regularly used by small numbers of piscivorous and diving birds. The foraging distribution of these birds is highly influenced by water depth and tidal conditions. Many of these species however exhibit a widespread coastal distribution during winter, utilising shallow nearshore waters to a greater degree at certain times (e.g., storms, driving onshore winds).

A small area of the Proposed Development (location of drainage outfall pipe) overlaps with the River Shannon and River Fergus Estuaries SPA and small numbers of SCI birds use the waters in the vicinity of the site. However, no birds were recorded in nationally or internationally important numbers. It is noted that an extensive survey of the Shannon Estuary found that bird species richness within the SPA was generally correlated with intertidal habitat area (MKO 2019). MKO noted that the Proposed Development had limited intertidal foraging habitat and subsequently very low numbers of birds.

Overall, the Proposed Development is of County importance for Annex I species, Local importance (Higher value) for SCI species and Local importance (Higher value) for non-SCI wintering / estuarine birds.

7B.4.6 Fish

Triturus Environmental Ltd carried out aquatic surveys of the Ralappane Stream in 2022. The details of the survey are included in **Section 7B.3.5.7**. One sampling station was selected along the Ralappane Stream as shown below on **Figure 7.12**. Further detail on the aquatic surveys including instream conditions and surrounding vegetation is included in the report *Aquatic Assessment of Ralappane Stream, Ballylongford, Co. Kerry* (DixonBrosnan, 2024) which is included in **Appendix A7B.4** of Volume 4.

No fish were recorded via electro-fishing during the 2022 survey. The site was not of fisheries value given the very shallow nature (likely ephemeral at the sampling location) and evident siltation pressures. There was no suitability for White-clawed crayfish. It is noted that during the 2022 survey, the stream suffered from low summer flows, with an imperceptible flow during the time of survey.

Table 7.6: Fisheries Assessment - Survey Locations

Location X Y(ITM)	Watercourse	CPUE (elapsed time)	Approx. area fished (m ²)	Fish density (per m ²)			
				Atlantic salmon	Brown trout	European eel	Stone loach
502865 648084	Ralappane Stream	5	60	0.000	0.000	0.000	0.000

Previous surveys were carried out along the Ralappane Stream in 2011 and 2021. During the ASU survey of the Ralappane Stream in 2011, small numbers of fish were caught during the electrofishing survey and only three species were detected. Two species (Stone Loach *Nemacheilus barbatus* and European Eel *Anguilla anguilla*) were found in low numbers with higher numbers of Stickleback *Gasterosteus aculeatus* recorded. European Eel is listed by the International Union for Conservation of Nature (IUCN) as a critically endangered species, with numbers in catastrophic decline. No salmonids were recorded. It is noted that European Eel and Stickleback were also observed within the stream during kick sampling carried out by DixonBrosnan in April 2021 (Refer to **Appendix A7B.4** of Volume 4).

The low fisheries value of this stream is likely linked to the short length of the stream, low flows, lack of available spawning substrate or due to debris and marginal vegetation blocking migration routes through the stream. There is no evidence to indicate that the stream has significant spawning habitat or is generally of high value for fish.

Small numbers of fish use the stream, and no Annex II species were recorded. However, European Eel which is critically endangered, was recorded within the stream in 2021 and 2011. Therefore, taking a conservative approach, the Ralappane Stream is considered of Local importance (Higher value) for fish species.

7B.4.7 Aquatic (Freshwater) Invertebrates

Triturus Environmental Ltd carried out aquatic surveys of the Ralappane Stream. One sampling station was selected along the Ralappane Stream as shown below on **Figure 7.12**. Further detail on the aquatic surveys including instream conditions and surrounding vegetation is included in the report *Aquatic Assessment of Ralappane Stream, Ballylongford, Co. Kerry* (DixonBrosnan, 2024) which is included in **Appendix A7B.4** of Volume 4.

The 2022 aquatic survey location along the Ralappane Stream (EPA code: 24R30) was located approximately 1.6 km upstream of the Shannon Estuary confluence. Here the stream is heavily modified and had been historically straightened and deepened. The stream suffered from low summer flows at the time of the 2022 survey, with an imperceptible flow. The stream averaged 2 m wide and 0.05-0.1 m deep in a deep U-shaped channel with bank heights of 2-2.5m. The substrata comprised scattered gravels and cobble with abundant deep silt accumulations. Cover of macrophytes was high with abundant fool's watercress (*Apium nodiflorum*) and very localised water starwort (*Callitriche* sp.). Aquatic bryophytes were not recorded. The riparian areas were open on the south bank with no trees while the north bank supported dense Grey willow (*Salix cinerea*), Hawthorn, Blackthorn and Ivy, with Bramble and ferns on an earthen bank in the understory. The Site was bordered by heavily improved pasture (GA1).

Biological water quality was calculated as Q4 (good status). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner *et al.*, 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling. Biological monitoring at 3 locations carried out by DixonBrosnan along the Ralappane Stream in 2021 classified all sites at Q3 (poor status). The Q4 rating is in-line with biological monitoring carried out by the ASU in 2011.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of the Ralappane Stream was of local importance (lower value).



Figure 7.12: Aquatic Sampling Locations

7B.4.8 Invasive Species

The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Regulation 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed (*Fallopia japonica*), as follows: “any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [...] shall be guilty of an offence.”

As outlined in **Section 7B.3.5.1**, a survey for invasive species was carried out in conjunction with habitat surveys 2022-2024 and any observations of invasive species made during other surveys were recorded. No third schedule invasive species were recorded within the planning boundary (Wildlife Act 1976, as amended) or any High impact or Medium impact invasive species as classified by the NBDC were recorded within the Proposed Development.

7B.4.9 Other species

A search of NBDC recorded one threatened species within 2km of the Proposed Development (R04J and R04E) *i.e.*, *Ochthebius (Ochthebius) viridis* (Source NBDC 01/03/24). This was recorded to the west of Ralappane Point during the Water Beetles of Ireland survey in 2007. It is noted that this species was also recorded within the Reed bed habitat during a 2007 DixonBrosnan survey. The Reed bed is located outside the Proposed Development to the west of the Ralappane Stream and will not be impacted by the Proposed Development.

During the 2022 / 2023 surveys within the Site boundary, no rare or notable invertebrate species were observed within the Proposed Development site boundary. Whilst no site is without invertebrate interest, it is considered highly unlikely, given the habitat types within the site boundary, that the Proposed Development would support any protected, rare or uncommon invertebrate species and no specialised surveys were considered necessary.

7B.5 Assessment of Impact and Effect

7B.5.1 Likely Significant Effects

Annex III of Directive 2011/92/EC (as amended by 2014/52/EU) requires that the EIAR should assess:

- The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected).
- The nature of the impact.
- The transboundary nature of the impact.
- The intensity and complexity of the impact.
- The probability of the impact.
- The expected onset, duration, frequency and reversibility of the impact.
- The cumulation of the impact with the impacts of other existing and / or approved projects.
- The possibility of effectively reducing the impact.

Potential effects of the construction, operational and decommissioning phases of Proposed Development on terrestrial and aquatic biodiversity include:

- Potential Effects on Terrestrial and Aquatic Habitats.

- Potential Effects on Badgers.
- Potential Effects on Bats.
- Potential Effects on Otter.
- Potential Effects on Other Mammals.
- Potential Effects on Birds.
- Potential Effects on Fish.
- Potential Effects on Other Species.
- Potential effects on Air Quality.
- Potential Effects from Non-native Invasive Species.
- Potential Effects on Climate Change and Biodiversity.
- Potential Effects from Accidents.
- Potential Effects of Decommissioning.

7B.5.2 Impact Assessment

When describing changes / activities and impacts on ecosystem structure and function, important elements to consider include positive/negative, extent, magnitude, duration, frequency and timing, and reversibility.

Section 3.7 of the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, (EPA 2022) provides standard definitions which have been used to classify the effects in respect of ecology. This classification scheme is outlined below in **Table 7.6**.

Table 7.6: EPA Impact Classification

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Duration and Frequency	Momentary Effects	Effects lasting from seconds to minutes.
	Brief Effects	Effects lasting less than a day.
	Temporary Effects	Effects lasting less than a year.

Impact Characteristic	Term	Description
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible Effects	Effects that can be undone.
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.
	'Worst Case'	The effects arising from a development in the case where mitigation measures substantially fail.

7B.5.2.1 Determining Impact Significance

According to the EPA (2022), significance of effects is usually understood to mean the importance of the outcome of the effects and is determined by a combination of objective (scientific) and subjective (social) concerns.

The EPA further notes that:

“While guidelines and standards help ensure consistency, the professional judgement of competent experts plays a role in the determination of significance. These experts may place different emphases on the factors involved. As this can lead to differences of opinion, the EIAR sets out the basis of these judgements so that the varying degrees of significance attributed to different factors can be understood”.

With this in mind, the geographic frame of reference applied to determining impact significance by the NRA (2009) in Ireland and CIEEM (2022) in Ireland and the UK, has been adopted in this report in tandem with the EPA's qualitative significance criteria. **Table 7.7** compares the qualitative versus geographic approaches to determining the significance of effects.

Table 7.7: Equating the Definitions of Significance of Effects Using a Geographic vs. Qualitative Scale of Reference

Geographic Scale of Significance (NRA, 2009; CIEEM, 2022)	Qualitative Scale of Significance of Effects (EPA 2022)
Negligible or Local Importance (Lower Value). No significant effects predicted to significant ecological features.	Imperceptible. An effect capable of measurement but without significant consequences. Not significant. An effect which causes noticeable changes in the character of the environment but without significant consequences.
Local Importance (Higher Value), County, National, Regional, or International.	Slight / Moderate / Significant / Very Significant / Profound

**Geographic Scale of Significance
(NRA, 2009; CIEEM, 2022)**

**Qualitative Scale of Significance of Effects
(EPA 2022)**

i.e. effects can be slight, moderate, significant, very significant, or profound at Local scale, subject to the proportion of the local population/habitat area affected.

The geographic frame of reference can be a good fit to assessments of biodiversity impacts because it allows clear judgements to be made about the scale of significance, with reference to published estimates for the population size of a given species at county, national and / or international scales or areas of habitats at such scales.

The proportion of a known feature impacted at county scale (i.e., 1% of the known or estimated population in a given county) is measurably different from that impacted at national scale (i.e., 1 % of the known or estimated national population).

A non-geographic qualitative approach can be a poor fit to assessments of biodiversity, since the definitions provided for the different qualitative terms do not relate to measurable units of space such as a county or national boundary. For instance, a significant effect is defined by the EPA as “*an effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment without affecting its sensitivities*”, whilst a very significant effect is that which “*by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment*”.

7B.5.2.2 Summary Valuation of Significant Terrestrial Ecology Features

As per the impact assessment methodology outlined in **Section 7B.5.2**, significant ecological features are considered to be those valued at Local Importance (Higher Value) or higher as per NRA (2009) and CIEEM (2022) definitions. **Table 7.8** summarises all significant ecological features identified within the Zone of Influence of potentially significant impacts.

It is noted that direct and indirect impacts on marine / intertidal habitats within the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are discussed in **Chapter 7A** (Marine Ecology) and the AA screening / NIS. Indirect impacts on these sites, as well as the Ballylongford Bay pNHA, via water discharges are also discussed in **Chapter 06** (Water).

Table 7.8: Summary Valuation of Significant Terrestrial Ecological Features and Identification of Features at Risk of Significant Effects

Feature	Highest Value within Zone of Influence	At risk of significant effects	Scoped into terrestrial biodiversity assessment*
Designated sites	Lower River Shannon SAC	International	Yes
	River Shannon and River Fergus Estuaries SPA	International	Yes
	Ballylongford Bay pNHA	National	Refer to Chapter 06
	Other National Sites	National	No
			No (No potential for direct impacts, indirect impacts assessed in Chapter 06)

Feature		Highest Value within Zone of Influence	At risk of significant effects	Scoped into terrestrial biodiversity assessment*
Habitats	Wet grassland GS4/Improved agricultural grassland GA1	Local importance (Lower value)	Yes	Yes
	Improved Agricultural grassland GA1	Local importance (Lower value)	Yes	Yes
	Hedgerows WL1/Treelines WL2	Local importance (Higher value)	Yes	Yes
	Sedimentary Sea Cliffs CS3	Local importance (Higher value)	Yes	Yes
	Scrub WS1	Local importance (Higher value)	Yes	Yes
	Eroding River FW1	Local importance (Higher value)	Yes	Yes
	Drainage ditches FW4	Local importance (Lower value)	Yes	Yes
	Immature woodland WS2 /Wet willow-alder-ash woodland WN6	Local importance (Higher value)	Yes	Yes
	Scrub WS2/Broadleaved woodland WD1	Local importance (Higher value)	Yes	Yes
Terrestrial mammals	Badger	Local Importance (Higher Value)	Yes	Yes
	Bats (Common Pipistrelle, Soprano Pipistrelle, Leisler's, Brown-long Eared, Lesser Horseshoe, <i>Myotis</i> sp.)	Local Importance (Higher Value)	Yes	Yes
	Otter	Local Importance (Higher Value)	Yes	Yes
	Red Squirrel, Fallow Deer, Sika Deer, Red Fox, Mink	Negligible	No	No
	Hedgehog, Irish Hare	Local importance (Lower value)	Yes	Yes
Amphibians	Common Frog	Local importance (Higher Value)	Yes	Yes
Reptiles	Common Lizard	Negligible	No	No
Birds	SCI birds (River Shannon and River Fergus Estuaries SPA)	Local importance (Higher Value)	Yes	Yes
	Annex I species (Great Northern Diver, Red-throated Diver, Little Egret, Sandwich Tern)	Local importance (Higher Value)	Yes	Yes
	Red list bird species (Non SCI) (Meadow Pipit, Barn Owl, Kestrel, Snipe, Curlew)	Local importance (Higher Value)	Yes	Yes
	Amber list bird species (Several)	Local importance (Higher Value)	Yes	Yes
	Other breeding birds (Several)	Local importance (Higher Value)	Yes	Yes
	Annex I (White-tailed Sea Eagle, Chough)	Local importance (Lower value)	Yes	Yes
	Annex I (Hen Harrier, Little Egret)	Negligible value	No	No

Feature		Highest Value within Zone of Influence	At risk of significant effects	Scoped into terrestrial biodiversity assessment*
Aquatic species	Fish (Stickleback, Eel, Stone Loach)	Local importance (Higher value)	Yes	Yes
	Aquatic invertebrates	Local importance (Lower value)	Yes	Yes
Other species	Invertebrates	Negligible	No	No

* Should be read in conjunction with **Section 7B.12**

7B.5.3 Construction Phase

Construction activities are described in detail in **Appendix A2.3** Construction Environmental Management Plan (CEMP) and **Appendix A2.6** Construction Equipment Onsite, Volume 4. In the absence of mitigation measures, construction phase impacts have the potential to remove a range of habitats and disturb or displace protected species throughout the estimated 32-month duration of construction. Significant potential impacts on terrestrial biodiversity include habitat loss, noise and visual disturbance (including lighting) to protected fauna species, and the potential for suspended solids or other contaminants to be carried into local watercourses, particularly following topsoil stripping and bridge construction.

It is noted that main sources of noise and vibration associated with the construction of the Proposed Development are the blasting within terrestrial habitats and rock breaking along the cliff/estuary during the construction of the drainage outfall pipe. Vibration levels are expected to be highest during blasting operations, however these will be carefully managed. No more than one blast is envisaged to occur in any given day and associated noise and vibration levels will be transient and temporary. All construction works will take place during normal daytime hours (07:30 to 18:00 Monday to Friday and 08:00 to 14:00 of Saturdays).

Three watercourse crossing are required within the Proposed Development i.e. a bridge over the Ralappane Stream and two culverts on drainage ditches. Direct impacts on the Ralappane Stream will be avoided through the use of the single span bridge for the stream crossing and no instream works will be carried out. Two drainage ditches, which do not have the potential to support fish, in the southwest section of the Proposed Development will be culverted (**Section 2.3.10.2**). The proposed crossings of the watercourses within the Proposed Development have been adequately sized to have a minimal impact on the current hydraulic regime in the area.

This Section, which presents potential construction phase impacts for the Proposed Development alone, should be read in conjunction with summary tables of potential impacts (**Table 7.11. S**).

7B.5.3.1 Terrestrial and Freshwater Habitats

The Site layout is shown on **Figure F2.3**, Volume 3. Habitats and flora in this area will be removed during the construction phase. Potential impacts on terrestrial habitats, are included in **Table 7.9**. As noted in **Section 7B.4.2**, a small area of terrestrial habitat along the shoreline overlaps with the Lower River Shannon SAC i.e., Sedimentary Sea cliffs CS3. Further details on marine habitats are included in **Chapter 07A**

(Marine Ecology) Potential impacts on habitats within the Lower River Shannon SAC are discussed in the AA Screening / NIS.

It should be noted that the value of a habitat is site specific and will be partially related to the amount of that habitat in the surrounding landscape. The classification scheme, used in **Table 7.6** and **Table 7.7** for the value of habitats and the impacts on them, is detailed in the NRA publication *Guidelines for assessment of ecological impacts of National Road Schemes* (**Appendix A7B.7** of Volume 4). Predicted impacts on habitats within the Proposed Development in the absence of mitigation are detailed in **Table 7.9**.

Table 7.9: Impact on Habitats within Site Boundary

Habitat type	Approximate extent within the site (ha or linear km)	Maximum extent habitat loss during construction	Habitat value	Impacts
Wet grassland GS4/ Improved agricultural grassland GA1	2.42 ha	2.42 ha	Local importance (Lower value)	This habitat will be removed. Negative, slight, long-term at local level.
Improved agricultural grassland GA1	31.2ha	31.2ha	Local importance (Lower value)	This habitat will be removed. Negative, slight, long-term at local level
Hedgerows (WL1)/ Treelines (WL2)	2.6km	2.6km	Local importance (Higher Value)	This habitat will be removed. Negative, moderate, long-term at local level
Sedimentary sea cliffs CS3	40 m	40 m	Local importance (Higher value)	The development of the drainage outfall pipe will result in the removal of a small area of this habitat. Negative, slight, long-term at local level
Scrub WS1	4.6ha	4.6 ha	Local importance (Higher Value)	This habitat will be removed. Negative, moderate, long-term at local level
Eroding river FW1	137m (approx.)	0m	Local importance (Higher Value)	A single-span bridge will cross the Ralappane Stream at the site entrance. While no instream works are proposed, this may lead to bank destabilisation. Indirect impacts on water quality through the generation of excessive silt levels or spillage of cement or hydrocarbons during construction. Negative, moderate, short-term at local level
Drainage ditch FW4	600m (approx.)	80m	Local importance (Lower Value)	Two drainage ditches at the southwest of the site will be culverted. This will lead to minor habitat loss. Indirect impacts on water quality through the generation of excessive silt levels or spillage of cement or hydrocarbons during construction. Negative, slight, long-term at local level

Habitat type	Approximate extent within the site (ha or linear km)	Maximum extent habitat loss during construction	Habitat value	Impacts
Immature woodland WS2 /Wet willow-alder-ash woodland WN6	0.3 ha	0.3 ha	Local importance (Higher value)	This habitat will be removed. Negative, moderate, long-term at local level.
Scrub WS2/Broadleaved woodland WD1	0.15 ha	0.15 ha	Local importance (Higher value)	This habitat will be removed. Negative, moderate, long-term at local level

7B.5.3.2 Badger

Two main Badger setts occur in proximity to the Proposed Development, namely Sett 3 and Sett 4. However, neither sett will be directly impacted by the Proposed Development. Bait marking surveys indicate that Sett 2 is a subsidiary sett of Sett 3, which will be unaffected by the Proposed Development. During the 2023/2024 surveys Sett 1 appears to be inactive. Sett 1 is linked to the main sett, Sett 4 which is located to the east of the Proposed Development.

During construction two smaller setts (Sett 1 which is now inactive and Sett 2) which are located within the Site boundary will be removed. Blasting works will take place within 150m of Sett 1. This has the potential to create significant disturbance to Sett 1 and/or block or damage tunnels that radiate from the entrance to the sett, leading to Badger injury or mortality. Construction works close to breeding setts can cause serious disturbance to Badgers and mortality of cubs.

Neither of the main setts (Sett 3 and Sett 4) will be impacted by the Proposed Development and exclusion of the Badgers from subsidiary or outlier setts is a viable option. During peak construction works (Construction Peak 1 and Peak 2), construction noise would be 51dB at Sett 3 and 45dB at Sett 4 and no significant noise and vibration effects are predicted to occur (Refer to **Appendix A7B.1** of Volume 4 for details on noise receptors).

The Proposed Development will result in a net loss of foraging habitat within agricultural grassland. Conservatively it is estimated that this will be greater than 25% habitat loss within the territories of both social groups. Where loss of habitat is likely to be greater than 25%, the impact may be considered as significant on the affected social group (NRA 2005a). Furthermore, Badgers may be killed or injured by road traffic as they attempt to access their feeding areas. However, given that the recommended speed limit at the Proposed Development is 15km/hr, there is unlikely to be any significant impact from traffic fatalities.

During construction Badgers are likely to remain *in situ* (in Sett 3 and Sett 4) and continue to use existing territories. However, the reduction in territory size is likely to create a contraction in the size of both social groups. It is noted that no Badger latrines were recorded in the large agricultural fields as the southeast of the Proposed Development, so this habitat may not be critical within their foraging territories. A net loss of grassland foraging habitat will therefore be a long-term impact of the Proposed Development but given the alternative resources available both Badger territories are likely to remain extant.

Impacts to Badgers during the construction phase in the absence of mitigation will be negative, significant and long-term at a local geographic level.

7B.5.3.3 Bats

No buildings with significant potential to support bats were recorded within the Site boundary. Two structures (Location B and Location C (Refer to **Figure 7.8**)) within the Site boundary will be removed as part of the Proposed Development. However, neither have the potential to support roosting bats. During the 2023 site surveys, a small Lesser Horseshoe Bat roost (two bats) and a Common Pipistrelle roost (four bats) were recorded within Location A, approximately 170 m west of the Proposed Development (Refer to **Figure 7.8**). A small Common Pipistrelle roost was previously at this location in 2007 and 2020. Buildings at Location A will not be removed as part of the Proposed Development. No trees with potential to support bat roosts were recorded within the Site boundary and no other buildings of value for bats will be affected.

While direct impacts to bat roosting sites will be avoided, the removal of treelines and hedgerows will result in a reduction in foraging resources within the Proposed Development (**Table 7.9**). Linear features within the Site boundary, including hedgerows, treelines, cliffs, scrub and woodland, have moderate suitability as foraging/commuting areas, to link roost sites to foraging areas and facilitate the dispersal of bats into the wider landscape. Small numbers of Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat as well as occasional Brown Long eared and an unidentified Myotis bat, were recorded foraging along these habitats at the Proposed Development. During construction all internal hedgerows / treelines as well as scrub/woodland and a small area of cliff habitat will be removed. In general activity surveys indicate that the habitats within the Site boundary are used by a mix of bat species which are relatively common in the Irish countryside. Due to less intensive agricultural management, there has been some scrub encroachment (with pockets of woodland developing) in smaller fields which may be benefiting some bat species. It is noted that scrub has become more prevalent within the Tabert-Ballylongford Landbank due to less intensive management (including the north-western corner of the Proposed Development). However, the coastal sections of the site and the large fields in the eastern area of the Site relatively exposed and are still more intensively managed.

In the absence of mitigation, the construction phase of the Proposed Development will result in the long-term loss of moderate value bat foraging and commuting habitat. However, given the availability of similar habitat in the immediate vicinity and the relatively low numbers of bats recorded at the Proposed Development, there is unlikely to be significant fragmentation or loss of connectivity within the wider landscape.

Following a review of the available literature, no evidence of bat migration along the Shannon Estuary was found. Bat Conservation Ireland confirmed that there are no records of bat migration along the Shannon Estuary or in the vicinity of the Proposed Development (personal communication Conor Kelleher). All bat surveys at the Proposed Development found very low numbers of common bat species along the coastal habitats. Surveys did not indicate that this section of the Shannon Estuary coastline is used as a commuting corridor and there is no evidence that this is used as a migratory route for bats.

Noise and lighting during construction has the potential to significantly impact foraging habitats of local bat populations. Construction works will be confined to normal working hours (7:30 to 18:00, Monday to Friday and 8:00 to 14:00 on Saturday) and therefore disturbance from lighting during construction works will be minimal.

Overall, the loss of semi-natural habitat and increased disturbance during construction will reduce the feeding area available for bats. The impact on foraging bats will be negative, moderate and medium term at a local geographic level.

7B.5.3.4 Otter

Otter activity was recorded west of the Proposed Development along the lower reaches of the Ralappane Stream. No signs of Otters was recorded in the eastern section of the Proposed Development where shoreline works are proposed or on the section of the Ralappane Stream where a bridge is proposed. No breeding holts were recorded during any of the site surveys.

There is no evidence of Otter usage upstream of the tidal section of the Ralappane Stream (or evidence of usage of drainage ditches) and given its limited size this small watercourse is unlikely to be a critical foraging resource for this species. The bridging works could potentially indirectly affect existing fish stocks via impacts on water quality. However, it is noted that this stream is small with limited fish stocks and it is unlikely to be a significant source of prey for Otter. The drainage ditches do not support fish species, are unlikely to provide significant breeding habitat for Common Frog and therefore have negligible value for Otter foraging.

During the construction phase it is expected that there will be considerable disturbance of the site, particularly during blasting works. Rock breaking works along the shoreline will take place over approximately 4 months. These activities will be centred to the east of the Proposed Development, a significant distance from the areas of Otter activity. Peak construction noise at the Ralappane Stream is predicted to be 58dB (Refer to **Appendix A7B.1** of Volume 4 for details on noise receptors). While there may be some short-term displacement of Otter, this increased noise and disturbance during the construction phase is unlikely to significantly impact on Otter due to their ability to move away from and/or adapt to short-term disturbance. It is noted that construction works will primarily take place during daytime hours (7:30 to 18:00 Monday to Friday and 8:00 to 14:00 on Saturday) which will avoid the largely nocturnal foraging habits of Otter.

No adverse impacts on Otter from underwater noise have been identified. All blasting location are onshore and there is not significant potential for the significant underwater noise. Further details are included in the AA screening / NIS.

Chapter 07A (Marine Ecology) notes that impacts on fish stocks from changes in water quality (Section 7.5.3) will be negative and not significant. However, the loss of wet grassland within the Proposed Development, where frogs are known to occur, could potentially lead to a small loss of prey availability for Otter (**Section 7B.4.4.1.1**). While frogs use this habitat, use is limited in extent and is unlikely to support a significant population of Common Frog (only one was observed within the Site boundary over several years of survey). Therefore, wet grassland habitat is unlikely to be a significant foraging area for Otter.

Overall, it is expected that effects on Otter will be negative, not significant and long-term at a local geographic level in the absence of mitigation.

7B.5.3.5 Other Terrestrial Mammals

The only other protected mammal species (Wildlife Act 1976 (as amended)) which was recorded within the Proposed Development during 2018-2024 surveys was Irish Hare. While there were no confirmed field signs (or trail camera recordings) of Hedgehog observed during Proposed Development site surveys, this species

is nocturnal, and field signs are less frequently observed than for other mammals. Given the mix of habitats onsite they are very likely to be present.

The habitats to be affected are common and there is no evidence to indicate that the Proposed Development is of particular value for these species in the context of the surrounding countryside. Effects on these species during construction due to loss of habitat, increased noise and disturbance and lighting are predicted to be negative, not significant and temporary at a local geographic level in the absence of mitigation.

7B.5.3.6 Amphibians

One Common frog was recorded in wet grassland at the west of the Proposed Development. Small numbers of frog are likely to utilise this habitat within the Proposed Development. In the absence of mitigation, construction works could lead to habitat loss as well as direct mortality or injury during vegetation clearance. The impact on this species during construction will be negative, moderate and long-term at a local geographic level.

7B.5.3.7 Birds

7B.5.3.7.1 Breeding Birds

The most significant impacts on breeding birds will be direct impacts during the construction phase through habitat loss, fragmentation and modification. Hedgerows, treelines, scrub and woodland areas as well as grasslands and disused farm buildings within the Proposed Development will be lost during the course of construction. This will result in loss of connectivity with the wider environment, as well as loss of habitat for birds. During the construction phase it is expected that there will be indirect impacts with considerable disturbance of the Site, particularly during blasting works. The duration of works (approximately 32 months) means that works will overlap with two breeding bird seasons. This is likely to displace foraging and breeding birds from the Proposed Development. During construction works, noise levels will fall off quickly outside the Site boundary even during peak construction works (Refer to **Appendix A7B.1** of Volume 4 for details on noise receptors). Given the mobile nature of birds, the common nature of habitats within the site and the availability of alternative foraging habitat in the immediate vicinity, the impact from disturbance will be moderate during the construction phase at a local level. There are no trees suitable for breeding Cormorant within the Proposed Development and there are no recorded roosting sites within 10 km of the Proposed Development (NPWS 2012c). No seabirds breed in the vicinity of the Proposed Development and there will be no impact on breeding seabirds during the construction phase.

Several territories of breeding birds of conservation concern including the Red List species *i.e.* Meadow Pipit and Snipe, as well as Amber List species Skylark, House Sparrow, Linnet, Starling *Sturnus vulgaris* and Willow Warbler *Phylloscopus trochilus* will be removed during the construction phase (Gilbert *et al.* 2021). While displaced birds are likely to use alternative grassland and hedgerow/treeline habitats in the vicinity, intensification of agriculture and the loss of suitable grassland habitats are a significant threat to these species. In the absence of mitigation, potential impacts include disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites and foraging habitat. Assuming several pairs of each Red List and Amber List species are impacted, this would not be a significant impact on the local population. The impact on breeding birds of conservation concern is likely to be negative, moderate and long-term at a local level due to loss of breeding territories.

Several birds of conservation concern may forage within, but breed outside the Proposed Development i.e. Barn Owl, Black-headed Gull, Herring Gull *Larus argentatus*, Little Egret, Mallard, Kestrel, Shelduck, Woodcock and Swallow *Hirundo rustica*. The Annex I species White-tailed Sea Eagle could also potentially forage within subtidal habitats adjoining the Proposed Development. On the basis of short-term disturbance impacts during construction, the impact birds of conservation concern which forage within but breed outside the Proposed Development is likely to be negative, slight and short-term at a local level.

Several territories of many common Green List bird species (Blackbird, Great Tit, Wren etc) will be removed. In the absence of mitigation, potential impacts include disturbance and injury to eggs, young and nests, and long-term loss of potential nesting sites and foraging habitat. The impact on Green List bird species will be negative, slight, and long-term at a local level.

7B.5.3.7.2 Estuarine Birds

From a species conservation viewpoint, the most significant potential impact arising from the Proposed Development would be the loss of individuals of a rare or uncommon species. The following rare/uncommon bird species were recorded during winter and summer surveys of estuarine habitats:

- Three Annex I listed species, Red-throated Diver, Great Northern Diver and Sandwich Tern, were recorded in the inshore waters bordering the Proposed Development as well as the Red List species Razorbill.
- The Annex I species Little Egret was recorded west of the Proposed Development, foraging on the shoreline and within salt marsh habitat. Seven other Red List species i.e., Curlew, Dunlin, Grey Plover, Lapwing, Oystercatcher, Redshank and Snipe were recorded foraging on intertidal habitats to the west of Proposed Development. It is noted that Dunlin, Grey Plover and Lapwing forage at least 1km from the Proposed Development and will not be impacted by construction works.
- Two of these Red List species, Curlew and Snipe, were regularly recorded feeding in agricultural/wet grassland to the west of the Proposed Development during the winter months. Snipe was recorded in wet grassland within the Proposed Development.
- Thirteen of the 21 SCI species for the River Shannon and River Fergus Estuaries SPA were recorded within the survey area i.e. Cormorant, Wigeon, Shelduck, Teal, Ringed Plover, Grey Plover, Lapwing, Dunlin, Curlew, Redshank, Greenshank, Light-bellied Brent Goose and Black-headed Gull. Further details on the impact of the Proposed Development on the SPA and SCI birds are discussed in the AA screening / NIS which accompanies this application.

Potential impacts on estuarine birds during the construction phase include habitat loss due to the construction of the drainage outfall pipe, land-based construction noise, visual disturbance (including lighting), underwater noise and changes in prey availability due to a deterioration in water. Further detail on potential impacts on estuarine birds is discussed in **Appendix A7B.3** of Volume 4 and the AA screening/NIS which accompanies this application.

There are no significant areas of mudflat or sandflat habitat along the coastline adjoining the Proposed Development and no habitat which could support large numbers of wading birds or waterfowl. The intertidal habitats encountered are typical of cobbly rocky shores in Ireland being dominated by *Pelvetia canaliculata*, *Fucus* sp. and *Ascophyllum nodosum* (**Chapter 07A**). The intertidal waters in the vicinity of the drainage

outfall pipe provide foraging habitat for small numbers of diving birds including two Annex I species i.e., Red-throated Diver, Great Northern Diver as well as Cormorant and Great Crested Grebe. Sandwich Tern, also an Annex I species was also recorded foraging near Point C. The drainage outfall pipe construction will lead to temporary disturbance effects within the estuary. There will also be a small, temporary loss of estuarine and reef habitat (loss of 0.000041% and 0.000030% of the Annex I habitats 1130 Estuaries and 1170 Reefs respectively. 100 m² and 65 m² respectively). However, given that this area will be reinstated immediately following the pipelaying works, the temporary nature of these works (approximately 4 months), the low numbers of birds using the Proposed Development, the availability of alternative foraging habitat in the immediate vicinity and the foraging range of diving birds within the estuary, no significant impact from habitat loss will occur. Whilst the amount of estuarine habitat available to foraging birds will be very slightly reduced during the temporary construction of the drainage outfall pipe, this will be a temporary impact in an area which does not represent critical foraging habitat for seabirds or shorebirds, and this will not have a significant impact on the overall numbers of birds within the Shannon Estuary.

As noted in **Section 7B.4.5.2**, small numbers of wading birds were recorded foraging along the shoreline in the vicinity of the drainage outfall location and along the shoreline adjoining the Power Plant. As illustrated in the noise contour drawings included in **Appendix 7B.3** of Volume 4, construction noise levels will fall off quickly outside the site boundary. These peaks represent the worst case (i.e. highest) construction phase noise emissions. Noise levels at all other times will be lower. Noise levels of 70 dB and above are regularly cited within the literature as being the threshold beyond which disturbance to estuarine bird species can be predicted to occur (Cutts *et al.* 2013). In the absence of mitigation, significant noise levels i.e. >70 dB will be confined to terrestrial habitats. Noise levels along the shoreline of the Shannon Estuary during peak construction works are predicted to be between 50 dB-65 dB. Peak construction noise at Ralappane Point is predicted to be 55 dB-60 dB. Where larger numbers of estuarine birds were recorded to the west of Ralappane Point, noise levels even during peak construction works are predicted to be <55dB. Based on Cutts *et al.* 2013, noise levels between 50 dB and 70 dB represent a moderate to low level of disturbance. Based on disturbance distances calculated by Cutts *et al.* (2013), visual disturbance impacts for wading birds will be confined to the shoreline within 300m of the construction works and given the small numbers of birds foraging in this area, the impacts of visual disturbance will not be significant. Therefore, during peak construction works, where noise and visual disturbance will occur in the vicinity of the construction works area, a very small number of wading birds would be temporarily displaced. This would not have a significant impact on overall numbers of birds foraging within the Shannon estuary.

Diving birds, such as Red-throated Diver and Great Northern Diver, are generally regarded as highly sensitive to disturbance (Furness *et al.* 2013)). Small numbers of these species forage in the vicinity of the Proposed Development (peak numbers of 1 Red-throated Diver and 3 Great Northern Diver within 500m of the shoreline works for the drainage outfall pipe). Disturbance impacts for these species can extend up to 1.2 km (Red-throated Diver (750m ± 437m)). Using a conservative approach and extending the displacement area to 2 km, few Great Northern Diver (peak n=6) and Red-throated Diver (peak n=1) forage within this area. Given the small-scale nature of these works (*i.e.* using a tracked excavator with hydraulic rock-breaker and individual divers with hand tools), no significant disturbance impacts are predicted to occur to diving birds in the vicinity of the works area. In a worst-case scenario, a small number of these species

will be displaced during construction works. Other seabirds and diving birds are relatively flexible with respect to habitat use (Garthe and Hüppop 2004; Furness and Wade 2012) and show significantly lower disturbance distances e.g. Black Guillemot (417m ± 186m), Great Crested Grebe (308m ± 248m), Cormorant (258m ± 215m), Lesser Black-backed Gull (157m ± 105mm), Herring Gull (133m ± 83m) and Black-headed Gull (84m ± 70m). Sandwich Tern as also regarded as to have low behavioural sensitivity to disturbance (Furness *et al.* 2013). While estuarine birds may temporarily avoid water in the immediate vicinity of construction, given the small scale of construction works and the size of the Shannon Estuary, these species are likely to readily forage in other areas within the estuary during peak construction works.

Higher numbers of birds were recorded to the west/southwest of Knockinglas Point, over 1km from the onshore construction area, although none in nationally or internationally important numbers. During construction the Proposed Development will be visible from within the Shannon Estuary (and SPA), but the topography of the coastline largely hides the Proposed Development from shoreline habitats to the west of the Knockinglas Point. Given the distance involved, the topography of the shoreline and predicted noise levels, there will be no disturbance impacts to birds west of Knockinglas Point during construction works.

Noise and lighting during construction has the potential to significantly impact wading birds and waterfowl along the estuary. However, construction works within will be confined to daytime hours and therefore disturbance from lighting during construction works will be minimal (07:30 to 18:00 Monday to Friday and 08:00 to 14:00 of Saturdays).

Although lethal effects of hard underwater noise, such as blasting are well-known on cetaceans and fish, the effects of hard underwater sound on seabirds have been the focus of limited studies. Bird species most likely to be vulnerable to underwater sound are those that forage by diving after fish or shellfish i.e., Red-throated Diver, Great Northern Diver, Razorbill, Cormorant, Shag, Black Guillemot, Common Guillemot and Great Crested Grebe. Underwater noise during blasting works would be significantly below the threshold for mortality or injury in diving birds (Refer to AA screening/NIS for further detail). All blasting location are onshore and there is not significant potential for the significant underwater noise. Details of underwater noise (by Vysus Group) (VG)) are presented in **Appendix A7A.3**, Volume 4.

The potential for release of pollutants to impact on water quality and subsequently on fish and invertebrate numbers is discussed in the **Chapter 07A (Marine Ecology)** Section 7.5.3. Given the small-scale temporary nature of pipelaying works, most of which will take place above the tide, as well as the large dilution available within the Shannon Estuary, there will be no potential for significant pollution and/or impacts on fish/invertebrate populations. No significant impact on intertidal or subtidal foraging birds from changes in prey availability and water quality have been identified.

Chapter 07A (Marine Ecology) notes that impacts on fish stocks from changes in water quality (Section 7.5.3) will be negative and not significant following mitigation. Impacts on marine habitats from sedimentation and / or release of pollutants during construction are predicted to be not significant, and therefore no impacts on macro-invertebrate populations are predicted to occur.

As outlined in the AA screening / NIS report which accompanies this application, the impact on SCI birds, including wading and diving birds, from disturbance / displacement during construction as well as accidental release of pollutants (from construction plant) will be negative, slight and short-term at an international level in the absence of mitigation.

The impact on Annex I species i.e. Red Red-throated Diver, Great Northern Diver and Sandwich Tern from disturbance / displacement during construction as well as accidental release of pollutants will be negative, slight and short-term at a local level in the absence of mitigation.

The impact on other estuarine birds/waterbirds from disturbance / displacement during construction as well as accidental release of pollutants will be negative, slight and short-term at a local level in the absence of mitigation.

7B.5.3.8 Fish

No fish were recorded in the Ralappane Stream during the 2022 survey, although it noted that flows were very limited during this survey period. However, Stickleback and European Eel were recorded within the Ralappane Stream in 2021, and Stone Loach, was also recorded in 2011. There is no evidence to indicate that the stream has significant spawning habitat or is generally of high value for fish and it is of insufficient size to be of value for salmonids or lamprey species.

The removal of hedgerow / treeline vegetation along the Ralappane Stream may reduce cover and prey availability for fish. During construction, potential impacts on water quality could arise from mobilised suspended solids as well as spillage of fuels, lubricants, hydraulic fluids and cement from construction plant. In the absence of appropriate mitigation measures, site stripping, earthworks and material stockpiles associated with the construction could potentially give rise to a high degree of solids washout which could discharge into the local drainage network and the Ralappane Stream. Bank destabilisation during bridge construction could lead to increased risk of bank collapse and silt generation. Silt generated during the construction phase could potentially interfere with spawning of Stone Loach and Stickleback smothering spawning habitat and deposited eggs and newly hatched larvae. If sufficient quantities of silt enter local watercourses it could potentially settle on the bottom, smothering benthic flora, ultimately affecting faunal feeding and breeding sites.

All blasting location are onshore and there is not significant potential for the significant underwater noise. Details of underwater noise (by Vysus Group) (VG)) are presented in **Appendix A7A.3**, Volume 4. There is no potential for injury or mortality to fish within the Shannon Estuary. Potential effects of water quality are discussed in **Chapter 06** (Water). The impact of construction works on the fish in the absence of mitigation will be negative, not significant and short-term at a local geographic level.

7B.5.3.9 Aquatic Invertebrates

If sufficient quantities of silt enter the Ralappane Stream, it could potentially settle on the bottom, smothering aquatic invertebrates. The site is of Local importance (Lower value) for aquatic invertebrates. Impacts during the construction phase will be not significant and short-term at a local geographic level.

7B.5.3.10 Spread of Invasive Species

As noted in **Section 7B.4.8** no invasive species were recorded within the Proposed Development. All excavated material will be used onsite and no import of soil is expected. Therefore, no impacts from the spread of invasive species during the construction phase is expected to occur.

7B.5.3.11 Air Quality

The primary concern in relation to air quality arises from the possible deposition of dust from construction operations on vegetation, within watercourses or protected habitats i.e. Lower River Shannon SAC / River Shannon, River Fergus Estuaries SPA and Ballylongford Bay pNHA. It is noted that the majority of the SAC / SPA within 50 m of the Site boundary is tidal estuary with provides high levels of dilution, construction works will be located are over 80 m from Ballylongford Bay pNHA and no impacts are predicted to occur to habitats in the pNHA. No rare species or habitat which are sensitive to air quality impacts are located within the Proposed Development.

In the absence of mitigation, the impact from dust deposition on terrestrial, freshwater and estuarine habitats will be not significant and short-term at a local geographic scale.

7B.5.4 Operational Phase

The Proposed Development will be operational 24 hours a day, seven days a week. However, it is noted that the Proposed Development is designed to operate alongside intermittent renewable electricity power generation and is expected to mainly operate at full capacity during periods of low renewable supply, and otherwise to be turned down or turned off.

In the absence of mitigation measures, significant operation phase impacts could include light spill onto retained vegetation outside the Site boundary (it is assumed that all habitats within the site would be removed) used for feeding or breeding by protected species. Disturbance to protected species could occur from noise associated with human use of the operational site.

It is noted that Shannon LNG executed a 600 MW 220 kV grid connection agreement with Eirgrid for the Power Plant on 14th April 2023. The precise connection details are being developed at this time and cannot be confirmed yet. The development of the grid connection will be subject to a separate planning application and associated EIAR by the Applicant once the precise connection details are known. The aspects and impacts of the construction and operation of the grid connection have been included in the cumulative impact assessments in this EIAR. The cable route will be approximately 4.6 km in length and is anticipated to be located entirely under private and public roadways. Given the expressed preference for underground cabling by the Applicant, and the resistance of the Applicant to overhead powerlines, no assessment of collision risk to birds from overhead powerlines is required.

The operational impacts would affect ecological receptors over many decades subject, to the lifetime of the Proposed Development. The Proposed Development is expected to have a design life of 25 years, but this could be extended by maintenance, equipment replacement and upgrades or by the transition of the site to use hydrogen capability. This Section, which presents potential operation phase impacts for the Proposed Development alone, should be read in conjunction with summary tables of potential impacts (**Table 7.11**).

7B.5.4.1 Terrestrial and Freshwater Habitats

A detailed Flood Risk Assessment (FRA) concluded that with the exception of crossings of the watercourses for the access road, there is no development proposed within either Flood Zone 'A' or Flood Zone 'B' and therefore the Proposed Development will have a negligible impact on the existing flood regime within and around the Site (Refer to **Appendix A6.3** of Volume 4).

The proposed crossing/culverting of the stream/drainage ditches within the Proposed Development have been designed to have a minimal impact on the existing hydraulic regimes in the Ralappane Stream.

Combined stormwater flows and treated sanitary effluent and process effluent from the Proposed Development will be discharged directly to the Shannon Estuary below low tide level. There will be no direct discharges to surface water and no impact on freshwater habitats during the operational phase. Therefore, impacts on terrestrial and freshwater habitats during operation are predicted to be negative, imperceptible and long-term at a local level.

7B.5.4.2 Badger

The removal of subsidiary / outlier setts could potentially have a long-term impact on the social structure of Badgers in the vicinity of the Proposed Development, even though both main setts will continue to exist outside the Site boundary. However, Badgers are expected to continue using semi-natural habitats close to the facility. Increased activity and human presence, noise, fencing and lighting may disturb or displace Badger from reinstated foraging habitats once the facility is operational and/or prevent the movement of Badgers through this area. It is noted that Badgers are nocturnal and as activity and noise levels within the facility will generally be lower at night, potential impacts on Badgers during operation are predicted to be negative, significant and long-term at a local level in the absence of mitigation.

7B.5.4.3 Bats

Increased activity and human presence, noise and artificial lighting may impact and disturb or displace bats during the operational phase of the Proposed Development, including light spillage onto previously unlit boundary habitats, the Ralappane Stream and the Shannon Estuary.

Light spillage around the coastline and at the power plant during the operational phase means that bat foraging in this area is likely be reduced or absent. Lighting deters some bat species, in particular *Myotis* species, from foraging. Pipistrelle species appear to be more tolerant to light and disturbance (Speakman 1991; Stones *et al.* 2009; Haffner 1986). It is also noted that Leisler's bats will opportunistically feed on insect gatherings in lit areas (Bat Conservation Ireland 2010).

While the Proposed Development will be manned 24 hours a day for operations and maintenance purposes, planned maintenance activities will predominantly be conducted during daytime. Lighting levels will meet national and international engineering standards as a minimum. Light spillage will be largely confined to the lands in the immediate vicinity of the power plant and associated infrastructure. Light spillage onto more valuable habitats at the northwest and west of the Proposed Development will be >0.0lux (See Volume 3 **Figure F2.6**). While there will be light spillage onto the coastline area in the immediate vicinity of the power plant (0.0lux - 0.6lux), given the small numbers of bats which forage along the exposed coastline, the impacts on local bat populations during operation will not be significant. Bats are likely to continue to forage in dark areas within the Proposed Development.

Operational lighting and activity will lead to the loss of low value foraging habitats for bats. Impacts on bats during operation are predicted to be negative, moderate and long-term at a local level in the absence of mitigation.

7B.5.4.4 Otter

Increased activity and human presence, noise and artificial lighting may impact and disturb or displace Otter during the operational phase of the Proposed Development, including light spill onto previously unlit boundary habitats, the crossing point of the Ralappane Stream and the Shannon Estuary. Badly designed lighting could displace Otter from nearby habitats and create a barrier to connectivity in the wider area. Changes in water quality due to surface and/or wastewater discharges during operation could impact on prey availability for Otter.

Outdoor lighting at the Proposed Development will be designed to minimise the potential for light spillage. While the Proposed Development will be manned 24-hours a day (7 days a week) for operations and maintenance purposes, planned maintenance activities will predominantly be conducted during daytime. Lighting levels will meet national and international engineering standards as a minimum. It is noted that while Otter activity is centred to the west of the Proposed Development away from the facility buildings, given the importance of the Shannon Estuary for Otter, it cannot be ruled out that Otter forage on the shoreline adjoining the Proposed Development. However, light spillage onto the shoreline of the Shannon Estuary will be negligible (0.0lux and 0.6lux) and no significant barrier or disturbance effects are predicted. While lighting will increase at the crossing point on the Ralappane Stream, no signs of Otters were recorded in this area and the Ralappane Stream upstream and downstream of the bridge will not be significantly affected by light spillage. It is noted there will be no physical barriers (fencing etc) to movement along the shoreline of the Shannon Estuary.

Wastewater/surface water discharges will not impact on water quality or invertebrate and fish abundance in the estuary (**Sections 7B.5.4.8 and 7B.5.4.9**). The Proposed Development will no impact on prey availability for Otter during the operational phase.

Given Otter's ability to habituate to disturbance, their known usage of lands in the vicinity of industrial sites around Ireland, the operational lighting design for the Proposed Development, and the largely nocturnal habits of Otter, impacts to Otter during operation are predicted to be negative, not significant and long-term at a local level in the absence of mitigation.

7B.5.4.5 Other Terrestrial Mammals

Increased activity and human presence, noise, fencing and additional lighting may disturb or displace other mammal species such as Hedgehog and Irish Hare from favoured foraging habitats during the operational phase of the Proposed Development. However, given the availability of similar habitat in the vicinity and the mobile nature of these species, potential impacts on other mammals during operation are predicted to be negative, slight and long-term at a local level.

7B.5.4.6 Amphibians

Wet grassland habitat, where Common Frog has been recorded, will be absent from the Proposed Development during operation. In the absence of mitigation there will be no suitable habitat for Common Frog within the facility. However, it is noted that wet grassland habitat is common outside the Site boundary and frogs are likely to use alternative habitat in the absence of mitigation. The impact on this species will be negative, slight and long-term at a local geographic level.

7B.5.4.7 Birds

7B.5.4.7.1 Terrestrial Birds

Following habitat removal during construction a number of Red List species i.e. Meadow Pipit, and Snipe, as well as Amber List species Skylark, Linnet, Starling and Willow Warbler will be displaced and are no longer likely to use the Proposed Development. This will also be the case for a number of common bird species, as hedgerow and grassland habitats will be absent from the majority of the site during operation. Birds of conservation concern which nest outside the Proposed Development, but are likely to forage within the Site e.g., site *i.e.* Barn Owl, Black-headed Gull, Herring Gull, Little Egret, Mallard, Kestrel, Shelduck, Woodcock and Swallow are unlikely to forage within the Proposed Development during operation due to the absence of semi-natural habitats. However, given the availability of similar habitat in the immediate vicinity, birds are likely to readily breed and/or forage in adjoining habitats.

Visible human presence in previously undisturbed areas and increased noise and lighting may prevent birds from nesting or foraging in retained habitats within or adjacent to the Proposed Development. In areas where nesting habitat is adjoining the facility, operational lighting may impact on breeding birds. Night-length can be very important for birds, as it can determine the onset of the breeding season and migration. Artificial lighting can induce hormonal, physiological and behavioural changes that initiate breeding in birds (Lofts and Merton 1968). Timing of singing and sleep are also strongly affected by light pollution (Kempnaers *et al.*, 2010; Da Silva *et al.* 2014; Raap *et al.* 2015), and such changes are suggested to have physiological consequences (Dominoni *et al.* 2016). The Power Plant will have area lighting installed on a down angle to cover the facility and the car parking areas while minimizing impact to surrounding neighbours. The height of the proposed light columns has been kept to a minimum throughout the Proposed Development and light columns will be fitted with focused luminaires to avoid glare, sky glow and light spill. This will minimise any physiological impacts on birds using adjoining habitats.

The impact on birds of conservation concern which breed within the Proposed Development is likely to be negative, moderate and long-term at a local level due to disturbance and/or displacement of bird species including Meadow Pipit, Linnet, Skylark, Starling, Swallow, Willow Warbler.

The impact on birds of conservation concern which may forage within but breed outside the Proposed Development is likely to be negative, slight and long-term at a local level due disturbance and/or displacement *i.e.*, Barn Owl, Kestrel, Black-headed Gull, Herring Gull, Mallard, Shelduck and White-tailed Sea Eagle

The impact on common bird species is likely to be negative, slight and long-term at a local level due disturbance and / or displacement.

7B.5.4.7.2 Estuarine Birds

Potential impacts on estuarine birds during the operational phase include disturbance due to increased land-based visual, lighting and noise disturbance and a reduction in of prey availability due to changes in water quality resulting from wastewater/surface water discharges.

As noted in **Section 7B.4.5.2**, small numbers of birds were recorded foraging along the shoreline and intertidal habitats in the vicinity of the Proposed Development. Noise contour modelling for the Proposed Development indicates that unmitigated noise along the shoreline and waters of the Shannon Estuary is

predicted to be between 55dB-70dB during operation (Refer to **Appendix 7B.3 of Volume 4**). The terrestrial power plant buildings will be visible within the Shannon Estuary (and SPA) north of the site. However, the topography of the coastline largely hides works from shoreline habitats to the west of the Knockinglas Point, where larger bird numbers have been recorded (Refer to photomontages in **Appendix A10.1**). There will be no visible structures or regular maintenance activity with the estuary during operation and the drainage outfall pipe will be buried under the estuarine muds. This represents a moderate level of noise disturbance to which birds are likely to become habituated to over time (Cutts *et al.* 2013). Wading birds and waterfowl foraging along the shoreline are likely to habituate to the regular nature of the noise and disturbance associated with the Power Plant and continue to forage here. In the absence of mitigation, outside subtidal/intertidal habitats in the immediate vicinity of the Proposed Development, noise levels within the estuary will be below 55 dB(A) throughout the operational phase and will not cause significant disturbance impacts to estuarine birds.

Disturbance from artificial lighting used during the operational phases could potentially cause disruption to estuarine birds. Modelling of light spillage from the power plant shows that light spillage onto the estuary during operation will be negligible i.e. largely 0.0lux to 0.6lux (Volume 3 **Figure 2.6**). It is noted that artificial light may have a positive impact on waterbirds in intertidal habitats by enhancing the efficiency of nocturnal foraging (Dwyer *et al.* 2013) and may also reduce predation risk to roosting birds (cf. Gorenzel and Salmon, 1995). Night-time photomontages show that the light levels from the Proposed Development will be low. It is noted that the level of the proposed lighting is significantly less intrusive than for other developments in the vicinity and there is minimal upward light spillage (Refer to **Appendix A10.1**, Volume 4). While there may be short-term impacts from operational lighting, in the medium to long term birds are likely to habituate to additional lighting and foraging rates will return to pre-construction levels. Therefore, while lighting along the shoreline will increase slightly, this will not have a significant on bird numbers or the distribution of birds within the Shannon Estuary.

Wastewater/surface water discharges will not impact on water quality or invertebrate and fish abundance in the estuary (**Section 7B.5.3.8**). The Proposed Development will no impact on prey availability for estuarine birds during the operational phase.

The impact on SCI birds, including wading and diving birds, from operational activities is predicted to be negative, slight and long-term at an international level in the absence of mitigation.

The impact on Annex I species i.e., Red-throated Diver, Great Northern Diver and Sandwich Tern from operational activities is predicted to be negative, slight and long-term at a local level in the absence of mitigation.

The impact on other estuarine species during operational is predicted to be negative, slight and long-term at a local level in the absence of mitigation.

7B.5.4.8 Fish

Combined stormwater flows and treated sanitary effluent and process effluent from the Proposed Development will be discharged directly to the Shannon Estuary below low tide level. Operational discharges to the estuary will be controlled under the site's IE licence and the operational phase Environmental Management Plan. As outlined in **Chapter 06 (Water)** Section 6.6.1, the impact on water quality within the Shannon Estuary from the combined discharge will be imperceptible. There will be no direct discharges to

surface water during the operational phase and no impact on freshwater habitats. Given the above, the impact on fish within the Ralappane Stream and Shannon Estuary during operation is predicted to be neutral, imperceptible and long-term at a local level.

7B.5.4.9 Aquatic Invertebrates

Combined stormwater flows and treated sanitary effluent and process effluent from the Proposed Development will be discharged directly to the Shannon Estuary below low tide level. Operational discharges to the estuary will be controlled under the site's IE licence and the operational phase Environmental Management Plan. As outlined in **Chapter 06** (Water) Section 6.6.1, the impact on water quality within the Shannon Estuary from the combined discharge will be imperceptible. There will be no direct discharges to surface water during the operational phase and no impact on freshwater habitats. Given the above, the impact on aquatic invertebrates within the Ralappane Stream and Shannon Estuary during operation is predicted to be neutral, imperceptible and long-term at a local level.

7B.5.4.10 Air Quality

The operation of the Proposed Development will include a number of sources with emissions to air associated with the CCGT and other energy generating combustion plant onsite. Emissions to air associated with such plant vary with the type of plant and its purpose, the thermal capacity of the plant and the fuel used to enable combustion.

The PC (impact) and PEC (total pollutant concentration with Proposed Development in operation) as a result of site emissions under normal operations are presented in **Chapter 08** (Air Quality) Table 8.20 for the worst affected human health and worst affected nature conservation receptors (for each pollutant and averaging period).

As detailed in **Chapter 08** (Air Quality), Section 8.6.3.1.2, long-term cumulative impacts at the nature conservation receptors are screened as insignificant for locations where the cumulative PC for all pollutants considered is less than 1% of the relevant air quality standards or Critical Loads. This is the case at receptors E26 (Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA: Northern wet heath), E31 (Bunnaruddee Bog NHA: Active raised bog), and E32 and E33 (both at the Moanveanlagh Bog SAC: Active raised bog).

At the remaining 30 nature conservation receptors considered, 29 experience a PC of more than 1% of the air quality standard for NO_x, including sections of the northern wet heath habitat in the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (E27 to E29) and sections of active raised bog habitat at Tullaheer Lough and Bog SAC (E34 and E35). The cumulative impact on annual nitrogen deposition rates is greater than 1% of the lower Critical Load thresholds at four of the nature conservation receptors, these being sections of perennial vegetation on stony banks (E12) and vegetated sea cliffs (E13), both in the River Shannon SAC, and active raised bog habitat at Tullaheer Lough and Bog SAC (E34 and E35). It is noted, however, that the cumulative nitrogen deposition impact at Tullaheer Lough and Bog SAC (E34 and E35) is less than 1% of the upper Critical Load threshold for that habitat. The cumulative acid deposition impact is greater than 1% of the minimum Critical Load function at receptors within the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (E24, E25, and E27 to E30) Moanveanlagh Bog SAC (E32 and E33) and Tullaheer Lough and Bog SAC (E34 and E35), but remains less than 1% of the maximum Critical Load function at all receptors. It should also be noted the largest

contribution to acid deposition at the nature conservation receptors listed is from cumulative SO₂ impacts, of which the contribution from the Proposed Development is negligible.

Short-term cumulative daily NO_x impacts on nature conservation receptors cannot be screened out as insignificant at 20 of the 35 nature conservation receptors, due to the cumulative PC being greater than 10% of the Environmental Assessment Level at locations within the River Shannon SAC (E01 to E10, E12 to E20 and E22). However, the footnotes provided for **Chapter 08** (Air Quality) Table 8.23 describe why the daily NO_x Environmental Assessment Level is only considered to be a concern to nature conservation receptors where they are already under stress from elevated concentrations of SO₂ and O₃ (Holman 2020). In this instance, none of the nature conservation receptors experiences such conditions, based on the EPA monitoring data available.

The cumulative annual nitrogen and acid deposition rate impacts at receptors E12 and E13 (River Shannon SAC) and receptors E34 and E35 (Tullagher Lough and Bog SAC) could not be screened as insignificant at the worst affected nature conservation sites (i.e. (receptor E12 - perennial vegetation on stony banks habitat or E13 - vegetated sea cliffs) ('Imperceptible' to 'Slight' effects and 'Moderate' effects where those effects relate to a limited number of sensitive receptors and/ or the Air Quality Standards and Environmental Assessment Levels remain not at risk of any exceedance), with PCs in excess of 1% of the lower Critical Load thresholds. No other nature conservation receptors sensitive to nitrogen or acid deposition considered in this assessment experience a PC of more than 1% of their respective lower Critical Load thresholds, and it is again noted that the nitrogen deposition rate at receptors within the Tullagher Lough and Bog SAC is less than 1% of the upper Critical Load threshold for that habitat. With regards to acid deposition, the PC predicted at sensitive habitat within the Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, Moanveanlough Bog SAC and Tullagher Lough and Bog SAC could not be screened as insignificant, with them being more than 1% of the minimum Critical Load function for those habitats. However, further analysis has confirmed the PC is less than 1% of the maximum Critical Load function at locations where the PEC does not exceed either the minimum or the maximum Critical Load function. It is also noted that at receptor E12 and E13, it is noted that the cumulative nitrogen deposition PC accounts for 2.2% of the Critical Loads respectively, and the more elevated PEC reported are therefore primarily due to the ambient background contribution assumed in the assessment. This is particularly the case for nitrogen deposition rates at receptors at the Moanveanlough Bog SAC, where the background contribution alone accounts for 100% of the lower Critical Load threshold for that habitat. It should also be noted that the Critical load Load range against which the cumulative PC and PEC are being compared to is the lower (precautionary) end of a Critical Load Range. The cumulative PC and PEC will account for a smaller proportion of the upper Critical Load Range. Considering the above, it is determined that the operation of the Proposed Development will not contribute significantly to any exceedance of the Critical Loads for acid and nitrogen deposition and that the impact will not have a significant effect.

Given the above, no significant impacts from operational air emissions are predicted to occur.

7B.5.4.11 Climate Change and Biodiversity

The EU Commission guidance document on integrating climate change and biodiversity into environmental impact assessment (EU Commission, 2013) aims to improve the way in which climate change and biodiversity are integrated into Environmental Impact Assessment.

An assessment of the impact of the Proposed Development on climate change is included in **Chapter 15** (Climate) Table 15.20. This assessment looked at the influence of climate change to the Project-related impacts to neighbouring sensitive receptors. Technical specialists used the climate change projections to examine if there were any changes to either the likelihood or severity of impact to their receptors, however no combined impacts were identified. This assessment also looked at the influence of climate change to the Proposed Development itself, particularly its physical and functional aspects. Any identified vulnerabilities were found to be sufficiently mitigated against by aspects of the design, particularly aspects of flood design such as drainage systems and building/infrastructure heights that take sea level rise into account. This assessment did not identify any significant impacts related to climate.

In the absence of any significant impacts of the Proposed Development on sensitive neighbouring receptors no significant interactions between the effects on biodiversity resulting from this development and climate change have been identified.

7B.5.4.12 Accidents

Identification of potential MAH / MATTE scenarios in this assessment has been based on the application of an industry standard qualitative risk assessment methodology, which considers the substances that could be present on the Proposed Development and their properties, including potential health, safety and environmental hazards.

The results of the accidents and disasters identification exercise has resulted in identifying potential MAH / MATTE scenarios for the Proposed Development, which are presented in **Chapter 14** (Major Accidents and Disasters) **Table 14.3**. These represent 'worst-case' events which, although they have the potential for significant consequences, have a very low probability of occurrence. This is borne out by the historic evidence presented in **Chapter 14** (Major Accidents and Disasters), which contains a description of key safety systems used in the engineering design and natural gas systems, similar to the Proposed Development.

In terms of potential effects on ecological receptors the following potential accident scenarios could pose a risk in the absence of mitigation:

- **Distillate Oil / Major Release to the Environment.** A release of distillate oil from equipment or pipework could be caused by mechanical failure, impact damage or an operator error, resulting in a loss of containment.

The most likely impacts resulting from a major loss of containment of distillate oil are on the environment, should a catastrophic simultaneous failure of primary, secondary and tertiary containment measures occur.

In such an event, distillate oil could enter soil, groundwater and the Shannon Estuary via local surface water drains. Distillate oil is toxic to aquatic receptors e.g. fish, Otter, estuarine birds with

long lasting effects, and as such a major release to the environment could cause death to the aquatic life in the Shannon Estuary.

- **Firewater / Major Release to the Environment of firewater containing toxic substances from BESS** In the event of a major fire and / or explosion at the BESS firewater may be used to contain the fire and to mitigate thermal runaway, which may entrain toxic substances which could enter soil, groundwater and the Shannon Estuary via local surface water drains. The BESS could include substances such as heavy metal ions and fluoride, which are very toxic to aquatic life with long lasting effects, and as such a major release to the environment has the potential cause harm to the aquatic life in the Shannon Estuary e.g. fish, Otter, estuarine birds.

These incidents have an extremely low probability of occurrence but could have significant effects on the environment in the absence of mitigation. It is noted that similar facilities have been in operation for many years across the world and the power generation has a very good safety record. It is not possible to completely eliminate the risks associated with the use of materials such as Distillate Oil. Consequently, the Site will comply with all applicable safety legislation, national and international design standards, industry guidance and other control measures, including those set out in **Chapter 14** (Major Accidents and Disasters) **Table 14.3**, which will be adopted at the Proposed Development. Based on the detailed assessment outlined in **Chapter 14**, overall the construction, operation and decommissioning of the Proposed Development is considered 'Not Significant' for Major Accidents and Disasters as all risk events will be mitigated to a level commensurate with ALARP.

7B.5.5 Decommissioning Phase

As described in **Chapter 02** (Description of the Proposed Development), the Proposed Development is expected to have a design life of 25 years, but this could be extended by maintenance, equipment replacement and upgrades or by the transition of the site to use hydrogen capability (which would be subject to a future planning application). It is expected that it would be a condition of the industrial emissions licence for the Proposed Development that a closure and residuals management plan, including a detailed decommissioning plan, be submitted to the EPA for their approval.

Decommissioning activities are detailed in **Chapter 02** (Description of the Proposed Development), **Section 2.10**.

When operations have ceased, and assuming confirmation from the monitoring programme that all emissions have ceased, it is expected that there would be no requirement for long-term aftercare management at the Proposed Development.

During decommissioning, measures would be undertaken by the Applicant to ensure that there would be no significant, negative environmental effects during the decommissioning phase. The decommissioning plan would incorporate measures to satisfy all regulatory requirements and to achieve targeted environmental goals. The decommissioning measures would have to be implemented to the satisfaction of the EPA. As the terrestrial site of the Proposed Development is generally of relatively low habitat and species value, the impact of decommissioning will be temporary and slight.

7B.6 Mitigation and Monitoring Measures

7B.6.1 Construction

The mitigation and monitoring measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts. The following mitigation and monitoring measures will be implemented.

7B.6.1.1 General Mitigation and Monitoring Measures

An CEMP has been prepared (included in **Appendix A2.3** of Volume 4). The CEMP contains the construction mitigation and monitoring measures, which are set out in this EIAR. This will have particular emphasis on the protection of habitats and species of the SAC, SPA and pNHA which adjoin the Proposed Development.

These sites (SAC, SPA and pNHA) are by definition internationally/nationally important for their habitats and/or the species they support. It is essential that all construction staff, including all sub-contracted workers, be notified of the boundaries of these Natura 2000 sites and be made aware that no construction waste of any kind (rubble, soil, etc.) is to be deposited in these protected areas and that care must be taken with liquids or other materials to avoid spillage.

Mitigation and monitoring measures (of relevance in respect of any potential ecological effects) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:

- Control of water pollution from construction sites. Guidance for consultants and contractors (C532). CIRIA. Masters-Williams *et al.*, (2001).
- Control of water pollution from linear construction projects. Technical guidance (C648). CIRIA. Murnane, *et al.*, (2006).

All personnel involved with the Proposed Development will receive an onsite induction relating to construction and operations and the environmentally sensitive nature of European sites and to re-emphasise the precautions that are required as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures.

All staff and subcontractors have the responsibility to:

- Understand the importance of avoiding pollution onsite, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact.
- Respond in the event of an incident to avoid or limit environmental impact.
- Report all incidents immediately to the project manager and the Environmental (Ecological) Clerk of Works (ECoW).
- Monitor the workplace for potential environmental risks and alert the site manager if any are observed.
- Co-operate as required, with site inspections.

As part of the assessment of the required construction mitigation, best practice construction measures which will be implemented for the Proposed Development were considered. A summary of the measures relevant to hydrology are provided as follows and are in accordance with Construction Industry Research and Information Association (CIRIA) guidance – *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors* (Masters-Williams *et al.* 2001). Further detail is provided in **Chapter 05** (Land, Soils and Geology), **Chapter 06** (Water), **Chapter 09** (Airborne Noise and Groundborne Vibration) and in the CEMP included in **Appendix A2.3** of Volume 4.

7B.6.1.2 Water Quality

Details of water quality mitigation and monitoring measures are included in **Chapter 06** (Water) and in the CEMP included in **Appendix A2.3** of Volume 4.

7B.6.1.3 Bridge and Culvert Construction

Bridge construction on the Ralappane Stream will use a single span, pre-cast concrete bridge near the southern boundary of the Proposed Development. Two drainage ditches within the Proposed Development will be culverted. In addition to the general measures described above, the following specific mitigation measures will be implemented for crossing of the Ralappane Stream and drainage ditch:

- Works will comply with The IFI's *Guidelines on protection of fisheries during construction works in and adjacent to waters* (IFI, 2016).
- No instream works will take place in the Ralappane Stream.
- Appropriate silt control measures such silt barriers (e.g. straw or silt fence) will be employed where required.
- Construction activities will be undertaken during daylight hours only (i.e. 7:30 to 18:00 Monday to Friday and 8:00 to 14:00 on Saturday). This will ensure that there is potential for undisturbed fish passage at night. The works will be temporary and will not create a significant long-term barrier to fish movement.
- An appropriate native wildflower mix as determined by the ECoW based on ground conditions, will be utilised to re-vegetate any disturbed areas along the bank of the Ralappane Stream.
- Although no Common Frog were observed in drainage ditches within the Site boundary, they will be surveyed prior commencement of site works by the ECoW as a precautionary measure. Any Common Frog, if recorded, will be moved to suitable habitat in the wider landscape under licence from NPWS.

7B.6.1.4 Noise

The employment of good construction management practice, as described in the CEMP and in **Chapter 09** (Airborne Noise and Groundborne Vibration), will minimise the risk of adverse impacts from the noise and vibration during the construction phase.

Mitigation and monitoring measures will be employed to ensure that potential noise and vibration impacts at nearby sensitive receptors due to construction activities are minimised. The preferred approach for controlling construction noise is to reduce source levels where possible, but with due regard to practicality.

The CEMP will be updated by the contractor, prior to construction, to include any specific conditions attached to the approval and other specific construction information, but will at a minimum, include the measures described in **Chapter 09** (Airborne Noise and Groundborne Vibration), **Section 9.8**.

7B.6.1.5 Lighting

Lighting associated with the Proposed Development works could cause disturbance/ displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success.

Construction works will take place largely during 7:30 to 18:00 Monday to Friday and 8:00 to 14:00 on Saturday. Construction works outside these hours will only take place in exceptional circumstances (i.e., for specific engineering works e.g., concrete pours etc.). It is likely that a number of continuous construction phase works will also be required outside these hours on a limited number of occasions. Where site lighting is required during construction, the following mitigation measures will be followed.

Site lighting will be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding habitats. Lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting:

- Lighting will be provided with the minimum luminosity necessary for safety and security purposes. Where possible, lighting will be restricted to the working area and using the cowl and angling noted above, will minimise overspill and shadows on sensitive habitats outside the construction area.
- During construction, lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact at the SAC / SPA boundary, the Ralappane Stream as well as hedgerows, treelines along the boundary of the Proposed Development. There will be no directional lighting focused towards these areas and cowling and focusing lights downwards will minimise light spillage.

7B.6.1.6 Protection of Habitats

The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from 1st March to 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. If works are carried out during the breeding season, a pre-construction survey will be carried out by the ECoW and if birds are detected appropriate mitigation measures will be implemented. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Site boundary.

Particular care will be taken at the boundary between the Proposed Development and the SAC, SPA and pNHA so that construction activities do not cause damage to habitats in this area. These habitats will be securely fenced off early in the construction phase. The fencing will be clearly visible to machine operators.

The Ralappane Stream runs from the Proposed Development through the SAC and pNHA to the estuary, it is important that construction activities do not result in pollution of this watercourse, either through siltation, which interferes with water flow, vegetation growth and aquatic fauna, or pollution (e.g. chemical). Refer to **Chapter 06 (Water) Section 6.10** for further details on mitigation and monitoring measures for water.

To prevent incidental damage by machinery or by the deposition of spoil during site works, hedgerow, tree and scrub/woodland vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. The ECoW will specify appropriate protective fencing where required.

Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary.

Native woodland and shrub planting will include Scot's Pine, Willow, Oak, Alder, Rowan, Hazel, Blackthorn and Holly. Native wildflower mixes will provide a variety of flowers to encourage biodiversity. Wildflower seed mixes will be from 100% native Irish provenance and sourced within Ireland. The overall site will undergo seeding once, and then will be left to naturally recolonise. Natural regeneration of vegetation will also occur. Details on landscaping are included in **Figure F2.4** in Volume 3.

There will be a defined working area which will be fenced off with designated haul routes to prevent inadvertent damage to adjoining habitats.

Tree root systems can be damaged during site clearance and groundworks. Materials, especially soil and stones, can prevent air and water circulating to the roots. No materials will be stored within the root protection area / dripline of trees earmarked for retention. The ECoW will specify appropriate protective fencing where required.

7B.6.1.7 Badgers

The Proposed Development will require exclusion of Badgers from subsidiary/ outlier setts, however in both instances both social groups of Badgers would be expected to continue to use their main setts. Prior to construction works, the ECoW will obtain a derogation licence from the NPWS if required, to facilitate licenced exclusion of Badgers from Sett 1 (if active) and Sett 2 in accordance with a plan approved by the NPWS. The destruction of a successfully evacuated Badger sett may only be conducted under the supervision of qualified and experienced personnel under licence, if required, from the NPWS. The possibility of Badgers remaining within a sett must always be considered; suitable equipment should be available on hand to deal with Badgers within the sett or any Badgers injured during sett destruction.

Badger sett tunnel systems can extend up to approximately 20 m from sett entrances. Therefore, no heavy machinery should be used within 30m of Badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) should not be used within 20 m of a sett entrance; light work, such as digging by hand or scrub / vegetation clearance should not take place within 10 m of sett entrances.

During the breeding season (December to June inclusive), none of the above works should be undertaken within 50 m of active setts nor blasting within 150 m of active setts.

Affected Badger setts will be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage.

The most recent surveys show that the two main Badger setts are located outside of the Site boundary and the two setts to be directly affected are subsidiary setts. The bait marking survey indicates that the setts are linked as follows:

- Sett 4 (main sett) is located to the east of the Proposed Development. Sett 1 is located within the Site boundary. These setts are used by the same social group.
- Sett 3 (main sett) is located to the east of the Proposed Development. Sett 2 is located within the Site boundary. These setts are used by the same social group.

The presence of alternative setts within the particular social group's territory is required to ensure that excluded Badgers are able to relocate to a suitable alternative refuge. The objective is to allow the Badgers to remain within their territory, even though a portion of their current territory may be lost as a result of a particular development. There is a standard methodology which can be utilised to exclude Badgers from setts

A methodology for the exclusion of Badgers from affected setts and displacement of Badgers to artificial setts is outlined in the National Roads Authority's publication *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes* (NRA 2005a). Detailed mitigation and monitoring measures including method statements will be agreed with the NPWS prior to implementation.

Prior to the commencement of works, setts will be surveyed by the ECoW to determine current usage patterns.

Exclusion of Badgers from any currently active sett will only be carried out during the period of July to November (inclusive) in order to avoid the Badger breeding season.

In the instance of disused setts or setts verified as inactive, and to prevent their reoccupation, the entrances may be lightly blocked with vegetation and a light application of soil (soft blocking). The purpose of soft-blocking is to confirm that an apparently inactive sett is not occupied by Badgers. If all entrances remain undisturbed for approximately five days, the sett should be destroyed immediately using a mechanical digger, under the supervision of the licensee. Should there be any delay in sett destruction, the soft-blocked entrances should be hard-blocked and the sett destroyed as soon as possible, again under the supervision of the licensee. Hard-blocking is best achieved using buried fencing materials and compacted soil with further fencing materials laid across and firmly fixed to blocked entrances and surrounds

Where field signs or monitoring reveal any suggestion of current or recent Badger activity at any of the sett entrances, the sett requires thorough evacuation procedures.

Inactive entrances may be soft and then hard-blocked, as described for inactive setts, but any active entrances should have one-way gates installed (plus proofing around sides of gates) to allow Badgers to exit but not to return. The gates should be tied open for three days prior to being set to exclude. Sticks should be placed at arm's length within the gated tunnels to establish if Badgers remain within the sett.

Gates should be left installed, with regular inspections, over a minimum period of 21 days (including period with gates tied open) before the sett is deemed inactive. Any activity at all will require the procedures to be repeated or additional measures taken. Gates might be interfered with by other mammals or members of the public - hence the importance of regular exclusion monitoring visits. Sett destruction should commence immediately following the 21-day exclusion period, provided that all Badgers have been excluded.

Badgers will often attempt to re-enter setts after a period, and if gates are left in place for any long period, they may attempt to dig around them or even create new entrances and tunnels into the sett system.

Where an extensive sett is involved, an alternative method of evacuating Badgers is to erect electric fencing around the sett (ensuring all entrances are included) with one-way Badger-gates installed within the electric fence at points where the fence crosses Badger paths leading to and from the sett. The exclusion should again take place over a minimum period of 21 days before sett destruction; this monitoring period would be contingent upon no Badger activity being observed within the fenced area. Fencing may not be practical in many situations due to the topography or the terrain – and can be difficult to install effectively. If no activity is observed, then the sett may be destroyed, under supervision by the ECoW.

Destruction is usually undertaken with a tracked 12-25 tonne digger, commencing at approximately 25m from the outer sett entrances and working towards the centre of the sett, cutting approximately 0.5 m slices in a trench to a depth of 2 m. Exposed tunnels may be checked for recent Badger activity, with full attention paid to safety requirements in so doing. The sett should be destroyed from several directions, in the above manner, until only the central core of the sett remains.

Once it is ensured that no Badgers remain, the core may then also be destroyed and the entire area back-filled and made safe. Sett excavation should, preferably, be concluded within one working day, as Badgers may re-enter exposed tunnels and entrances.

A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues will be submitted to the NPWS.

Construction activities within the vicinity of affected setts may commence once these setts have been evacuated and destroyed under licence (if required) from the NPWS. Where affected setts do not require destruction, construction works may commence once recommended alternative mitigation measures to address the Badger issues have been complied with.

Badger access points will be provided to allow Badgers to access the development area once complete (See NHBS, 2021 or similar). Gates will be placed within fences along the western, eastern and southern boundaries to maximise potential usage by the different social groups that occur within this area.

Monitoring of Badger setts will be carried out during construction works and a five-year post-construction monitoring programme will be implemented.

7B.6.1.8 Bats

During the site works, general mitigation measures for bats will follow the National Road Authority's 'Guidelines for the Treatment of Bats during the Construction of National Road Schemes' NRA (2005c) and 'Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats or prevent avoidable effects resulting from significant alterations to the immediate landscape.

A small night roost for Lesser Horseshoe Bats and a small Common Pipistrelle roost was recorded in a complex of farm buildings southwest of the Proposed Development. These buildings will not be affected by the Proposed Development. Two structures are located within the Site boundary and these will be demolished. However, no bat roosts were recorded within these structures. Mitigation measures will be

agreed with the National Parks and Wildlife Service (NPWS) prior to any demolition works and will include the following:

- In all cases immediately in advance of demolition a bat specialist will undertake an examination of the building. If bats are present at the time of examination it is essential to determine the nature of the roost (i.e. number, species, whether it is a breeding population) as well as its exact location.
- If bats are recorded in buildings earmarked for demolition, special mitigation measures to protect bats will be put in place and a license to derogate from the conservation legislation will be sought from the NPWS prior to the commencement of demolition works.
- The contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary.
- If roosting habitat for bats is removed, replacement habitat will be provided.

A number of trees will be removed prior to construction. Although mature trees with the potential of be of value as bat roosts are absent from the site, the following precautionary measures will be implemented.

- The bat specialist will work with the contractor to ensure that the loss of trees is minimised and that trees earmarked for retention are adequately protected.
- Tree-felling of mature trees will ideally be undertaken in the period September to late October/ early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken.
- Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted.
- Tree will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety.
- Treelines outside the Proposed Development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage.
- During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused towards watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage.
- If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS.
- As a biodiversity enhancement measure it is proposed that bat boxes will be put up within the Proposed Development. It is proposed that eight bat boxes will be located within the overall site (see Wildcare, 2021 for box proposed or similar). The boxes will be erected by the ECoW taking into account landscape plans, vehicle movements and lighting.

As noted in **Section 7B.6.1.5**, lighting mitigation measures will follow *Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers* (Bat Conservation Ireland, 2010).

All mitigation measures including detailed method statements will be agreed with the NPWS prior to commencement of works, which could affect any bat populations onsite.

7B.6.1.9 Otter

No signs of Otter or Otter holts were noted within 150 m of the Proposed Development however Otter was recorded along the Ralappane Stream and to the west of the Proposed Development. A detailed pre-construction survey will be carried out no more than 10-12 months prior to the commencement of construction works to confirm the absence of Otter holts within 150 m of the Proposed Development.

If Otter holts are recorded at that time, the ECoW will determine the appropriate means of minimising effects i.e. avoidance, moving works, timing of works etc. If required the ecologist will obtain a derogation licence from the NPWS, to facilitate licenced exclusion from the breeding or resting site in accordance with a plan approved by the NPWS.

Any holts found to be present will be subject to monitoring and mitigation as set out in the NRA publication *Guidelines for the Treatment of Otter prior to the Construction of National Road Schemes* (2008). If found to be inactive, exclusion of holts may be carried out during any season. No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, Otter holts. Light work, such as digging by hand or scrub/vegetation clearance will also not take place within 15m of such holts, except under licence. The prohibited working area associated with Otter holts will be fenced and appropriate signage erected. Where breeding females and cubs are present no evacuation procedures of any kind will be undertaken until after the Otters have left the holt, as determined by the ECoW. Breeding may take place at any season, so activity at a holt must be adjudged on a case-by-case basis. On occasion, Otter holts may be directly affected by the scheme. To ensure the welfare of Otter, they must be evacuated from any holts present prior to any construction works commencing. The exclusion process, if required, involves the installation of one-way gates on the entrances to the holt and a monitoring period of 21 days to ensure the Otters have left the holt prior to removal.

7B.6.1.10 Common Frog

A visual search of the wet grassland habitat and drainage ditches to be removed will be carried out in the days prior to commencement of works and any frogs will be removed to alternative wet grassland habitat elsewhere within the landholding. This will be carried out under licence from the NPWS and under supervision of the ECoW.

7B.6.1.11 Birds

Breeding Birds

No signs of nesting birds were recorded in buildings at the Proposed Development during the 2023 breeding bird surveys. However, prior to demolition buildings will be checked for nesting Swallows (and other birds). If nesting birds are recorded, all demolition operations will be carried out between October and March, when birds have finished breeding.

As noted in **Section 7B.6.1.6**, where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Site boundary.

As a biodiversity enhancement measure ten bird nesting boxes (various types) will be located within the Site boundary at locations specified by the ECoW. It is noted that provision of woodland planting and the use of native wildflower planting will provide additional nesting and feeding sites for birds, particularly as these habitats mature.

Estuarine Birds

A detailed method statement will be drawn up by the ECoW and agreed with the NPWS prior to commencement of works. The method statement will specify the timing of blasting operations and the need, if any, for ecological supervision.

7B.6.1.12 Biodiversity and Landscaping Plans

Details of the landscaping plan for the Proposed Development are included in **Figure F2.4** in Volume 3. This includes detailed areas of native woodland and native scrub habitat as well as native wildflower planting.

The woodland planting mix will be dominated by native species including Scots Pine *Pinus sylvestris*, Willow, Pedunculate Oak *Quercus robur* and Sessile Oak *Quercus petraea*, Alder, Rowan *Sorbus* spp. and Crab Apple *Malus* spp.. The woodland edge planting mix will include Hazel *Corylus* spp., Hawthorn, Blackthorn, Elder *Sambucus* spp. and Holly *Ilex* spp.. The objective of these elements is to create natural, multi-layered woodland habitat which will be of local ecological value and has the potential to support native flora and fauna. A linear strip of woodland along the southern boundary will help to maintain connectivity (east to west) between habitats in the wider landscape.

Additional native specimen trees (Willow, Wild Cherry *Prunus avium*, Rowan, Whitebeam *Sorbus subg. Aria* and Silver Birch) will be planted on peripheral areas such as the road edge and administration area.

As detailed in **Figure F2.4** in Volume 3 a native wildflower mixes (of 100% Irish provenance) will be utilised to provide a more diverse sward which is of higher ecological value for invertebrates and birds. Native wildflower mixes will provide a variety of flowers to encourage biodiversity. Wildflower seed mixes will be from 100% native Irish provenance and sourced within Ireland. The overall site will undergo seeding once, and then will be left to naturally recolonise. Perennial Rye Grass or other vigorous amenity/ agricultural grass species will not be utilised as they tend to over-dominate the sward and reduce overall biodiversity. The final wildflower mix will be specified by the ECoW based on final ground conditions including alkalinity, fertility and moisture levels.

Based on the seed mix utilised and on prevailing ground conditions, the ECoW will specify the management regime, including weed control and mowing regime, necessary to maximise biodiversity and habitat value.

Five insect nesting boxes suitable for *Hymenoptera* spp. (bees and wasps) will be put in place within the site boundary as a biodiversity enhancement measure.

7B.6.1.13 Invasive Species

Prior to the commencement of construction works an invasive species survey will be undertaken within the Proposed Development boundary by a competent ecologist to determine if invasive species listed under Part 1 of the Third Schedule of S.I No. 477 of 2011 have established in the area in the period between pre-

planning and post consent. In the event that invasive species are identified within the works area a site-specific Invasive Species Management Plan will be developed and implemented by a competent specialist on behalf of the Contractor. In addition, in order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011) the appointed Contractor will ensure biosecurity measures are implemented throughout the construction phase to ensure the introduction and translocation of invasive species is prevented. The appointed ECoW will carry out a toolbox talk which will identify invasive species and will also implement biosecurity measures such as the visual inspection of vehicles for evidence of attached plant or animal material prior to entering and leaving the works area.

7B.6.2 Operations

During the operational phase the site environmental management system will address management of potentially contaminating materials such as fuel, lubricating oils, solvent, etc. and ensure such material is appropriately controlled, in accordance with regulatory requirements and industry best practice.

The drainage design for the Power Plant will consider the magnitude of the changes in infiltration and runoff characteristics and the significance of potential impacts at the wetland. Further details on operational water management are included in **Chapter 06 (Water)**.

Lighting shall be provided in plant areas where safe access and safe conditions for work activities is required at night. The facility would have area lighting installed on a down angle to cover the Power Plant. Lighting levels will meet national and international engineering standards as a minimum.

Badger access points will be provided to allow Badgers to access the development area once complete (See NHBS, 2021 or similar). Gates will be placed within fences along the western, eastern and southern boundaries to maximise potential usage by the different social groups that occur within this area.

Where possible (and in compliance with industry standards) lighting will follow the Bat Conservation Ireland Lighting Guidelines and the Bat Conservation Trust '*Bats and artificial lighting in the UK*' 2018 Guidelines. As outlined in **Chapter 10 (Landscape and Visual Impact) Section 10.9.1.3**, operational mitigation measures to reduce the visual effects of increased lighting along the Shannon Estuary include the following:

- Lighting will be kept to essential locations only, with the position and direction of lighting being designed to minimise intrusion and disturbance to adjacent areas.
- Use of full cut-off lanterns are proposed to minimise light spillage and upward escape of light onto adjacent areas.
- LED type lanterns, of the Warm White type will be utilised where possible with a Colour Temperature of 3,000 kelvin, as is considered least disruptive to the emergence of bats from roosts at dusk, and subsequent movement from habitats to foraging locations.
- Lighting will be minimised in terms of number of lights and the power of the lights (lux level).
- Directional lighting, facing and located away from any surrounding vegetation.
- Lighting will be turned off where possible when not in use except to meet the minimum requirements for Health and Safety (refer to night-time photomontages for Viewpoints / Photomontages 8 and 12 and the differences between 'main lights turned on only' and 'all lights turned on' as described in **Chapter 10 (Landscape and Visual) Sections 10.3.7.10 and 10.3.7.12**).

The principal mitigation measures required for the development in relation to noise concern selection of equipment, sound containment, and acoustic attenuators, in order to achieve the required limits. The predicted noise levels, as outlined in **Chapter 09** (Airborne Noise and Groundborne Vibration) are considered to be readily technically achievable using standard methods.

7B.7 Cumulative Impacts

The cumulative impacts of the Proposed Development and nearby consented projects in the vicinity of the Proposed Development are discussed below. A planning search of granted and pending planning applications made within the vicinity of the Site is presented in **Appendix A1.2**, Volume 4.

Applications in relation to smaller planning applications predominantly for extensions or alterations to existing dwellings are not considered to be relevant to the cumulative assessment within this EIAR, given their small scale. Therefore, only projects of sufficient size and scale that may potentially act cumulatively with the Proposed Development and are assessed herein.

7B.7.1 Summary of Schemes Considered in Cumulative Impact Assessment

7B.7.1.1 SLNG Gas Pipeline

Planning permission exists for the development of a 26 km Natural Gas Pipeline which will facilitate connection from the Site to the GNI transmission network at Leahy's, located to the west of Foynes, Co. Limerick. The application was accompanied by an Environmental Impact Statement (EIS). No significant residual effects were identified to geology and soils in the EIS for the Natural Gas Pipeline. A revised assessment and an updated EIAR of the permitted pipeline will be included within the required future application to CRU for consent under Section 39A of the Gas Act 1976 (as amended).

7B.7.1.2 Data Centre Campus

The Masterplan for the Shannon Technology and Energy Park (STEP) will integrate the Proposed Development and a (future) Data Centre Campus, **Figure F1.1, Volume 3**. Note – The potential future Data Centre Campus is not included in this application and will therefore be subject to a separate planning application. It is important to note the STEP Power Plant (the Proposed Development) is not functionally dependent on the Data Centre. The Strategic Gas Reserve Facility, Data Centre Campus, the High Voltage 220 kV and the Medium Voltage (10 / 20 kV) cables have been considered as part of the cumulative impact assessment within this chapter.

7B.7.1.3 High Voltage 220 kV and Medium Voltage (10 / 20 kV) Power Transmission Networks

An application to connect to the national electrical transmission network via a 220 kV high voltage connection was submitted to EirGrid in September 2020. Shannon LNG executed a 600 MW 220 kV grid connection agreement with EirGrid for the Proposed Development Power Plant on 14th April 2023. The exact route cannot be confirmed until the detailed design is completed and approved by Eirgrid and other stakeholders. This process is currently underway. The development of the grid connection will be subject to a separate planning application and associated EIAR by the Applicant once the precise connection details are known. This sequencing is standard and the connection details will be confirmed at a later date. The current proposal is that the connection point will be the ESNB / EirGrid Kilpaddoge 220 kV substation which is located approximately 5 km east of the Site with connection provided via a 220 kV cable(s) under the L1010 road.

If the 220 kV grid connection is not available medium voltage (10 / 20 kV) grid connection will be used as a backup power supply. However, the connection is subject to a connection agreement with ESNB and will be considered under a separate planning application.

The medium voltage (10 / 20 kV) and 220 kV power connections will be constructed in parallel with the Proposed Development but will be subject to separate planning design and planning applications.

Further details on the proposed 220 kV and medium voltage power transmission networks can be found in **Section 2.3.12.1 of Chapter 02** (Description of the Proposed Development).

7B.7.1.4 SLNG Strategic Gas Reserve Facility

The location of the Proposed Development is the subject of a SID pre-application for a Proposed Shannon Technology and Energy Park (STEP) Strategic Gas Reserve Facility (APB-319245-24) comprising of a floating storage and regasification unit (FSRU), jetty and access trestle, onshore receiving facilities, and all ancillary works.

A pre-application was submitted to An Bord Pleanála (ABP) on 8th March 2024, and a request for a pre-application consultation meeting is pending from the Board. The Proposed STEP Strategic Gas Reserve Facility (APB-319245-24) will include onshore facilities, jetty and FSRU which will extend into the Shannon Estuary at the north-east corner of the Site. It is important to note the Power Plant (the Proposed Development) is not functionally dependent on the Strategic Gas Reserve Facility. The Strategic Gas Reserve Facility, Data Centre Campus, the High Voltage 220 kV and the Medium Voltage (10 / 20 kV) cables (discussed below) have been considered as part of the cumulative impact assessment within this chapter.

7B.7.1.5 Construction Phase Impact

If works associated with these schemes (described above) in close proximity to the Proposed Development are concurrent with the bulk excavation works at the Proposed Development, there is potential for cumulative impacts and effects on terrestrial ecology features. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management team for the Shannon Technology and Energy Park.

The implementation of best practice standard construction environmental measures and the CEMP for the Proposed Development as detailed, no significant cumulative effects on biodiversity will result.

If works are concurrent with the bulk excavation works on the Proposed Development, there is potential for cumulative disturbance effects, as the sites are located close to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management team for the scheme.

Discharges from both this project and the Proposed Development are governed by strict limits to ensure compliance with quality standards. No long-term cumulative impact on water quality will occur.

While the implementation of best practice standard construction environmental measures and the CEMP for the Proposed Development as detailed, will ensure there are no significant cumulative from changes in water quality, disturbance etc, the cumulative loss of habitats associated with the projects listed above could potentially have local impacts on fauna and flora.

7B.7.1.6 Operational Phase Impacts

Potential impacts from consented development elsewhere, combined with the potential impacts of the Proposed Development, could result in increased disturbance to sensitive fauna.

Potential effects to terrestrial biodiversity from the Proposed Development range from significant to negligible and mitigation measures proposed to manage and control potential impacts during operation would further reduce the magnitude and significance of effects.

Potential impacts primarily relate to disturbance impacts from increase noise, activity and lighting at the site. The site is located in a largely rural area with little or no disturbance. Therefore, the cumulative operational effect from increased noise, activity and lighting of the Proposed Development and other consented or potential developments on terrestrial biodiversity is considered to be imperceptible. However, as noted above the cumulative loss of habitats associated with the projects listed above could potentially have local impacts on fauna and flora.

7B.8 Do Nothing Scenario

Most of the habitats to be affected have been significantly modified from their natural state by human activity. In pockets of semi-natural habitats within the Site boundary, the general pattern of succession from grassland to scrub to woodland would be expected to continue. In the absence of development, it is expected that the lands within the planning boundary would largely remain under the same management regimes. No significant changes to the habitats within the boundary are likely to occur, in the 'do nothing' scenario.

7B.9 Residual Impacts

7B.9.1 Habitats

Replacement planting of native tree species within the Proposed Development will provide alternative foraging and commuting habitat for fauna (Refer to **Figure F2.4** in Volume 3). This will compensate for some of the habitat loss at the site including hedgerows / treelines, scrub, woodland and grassland habitat as replacement planting matures.

Table 7.10: Residual Impacts on Habitats within Site Boundary Following Mitigation

Habitat type	Habitat value	Impacts
Wet grassland GS4	Local importance (Lower value)	Negative, slight (not significant), long-term
Improved agricultural grassland GA1	Local importance (Lower value)	Negative, slight (not significant), long-term
Hedgerows (WL1) / Treelines (WL2)	Local importance (Higher Value)	Negative, slight, (not significant) long-term
Sedimentary sea cliffs CS3	Local importance (Higher value)	Negative, slight (not significant), long-term
Scrub WS1	Local importance (Higher Value)	Negative, slight (not significant), long-term
Eroding river FW1	Local importance (Higher Value)	Negative, slight (not significant), long-term
Drainage ditch FW4	Local importance (Lower Value)	Negative, slight (not significant), long-term
Immature woodland WS2 /Wet willow-alder-ash woodland WN6	Local importance (Higher Value)	Negative, slight (not significant), long-term

Habitat type	Habitat value	Impacts
Scrub WS2/Broadleaved woodland WD1	Local importance (Higher Value)	Negative, slight (not significant), long-term

7B.9.2 Badgers

Based on conservative estimates, it is probable that 25% of the feeding territory of both feeding groups will be impacted by the Proposed Development. Where loss of habitat is likely to be greater than 25%, the impact may be considered as significant on the affected social group (NRA 2005a). The reduction in territory size is likely to create a reduction in the size of both social groups. A nett loss of grassland foraging habitat will therefore be a long-term impact of the Proposed Development but given the alternative resources available, both Badger territories will remain extant. It is noted that a range of measures will be adopted during the blasting stage of the construction phase to minimise the impact of air overpressure as far as practicable. Given the distance from Badger setts overpressure and vibration impacts from blasting will not be significant. Noise modelling which was carried out for peak construction noise at Sett 3 and Sett 4, found that peak noise (LAeq) at Sett 3 would be 51dB(A) during daytime works. At Sett 4 this would be 45dB(A) during daytime (Refer to **Appendix A7B.1**, Volume 4). Therefore, even during peak construction works there will no disturbance impacts to the main Badger setts in the vicinity of the Proposed Development. During operation noise levels at Sett 3 and Sett 4 will be <26dB (A) following noise mitigation measures.

Given the alternative resources available, both Badger territories will remain extant. Residual impacts on Badgers following mitigation will be **negative, significant and long-term** at a local level.

7B.9.3 Bats

The residual impact of the Proposed Development will include loss of hedgerows/ treelines and scrub as well as smaller areas of woodland and cliff habitat which are used as commuting and/or foraging habitat. Lit areas of the Proposed Development will be avoided by bats, although they are likely to continue to forage in dark areas. The Proposed Development will result in a net loss of moderate value feeding habitat. Replacement planting of native tree species within the Site boundary will provide alternative foraging and commuting habitat for bats in the medium to long term as planting matures. This will also help to shield retained boundary habitats from lighting within the Power Plant and create dark areas for bat foraging. The residual impact of the Proposed Development is expected to be **negative, slight and long-term** at a local level on Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat and Brown Long-eared Bat. It is possible that Lesser Horseshoe Bat will forage within the Proposed Development, although the habitats are sub-optimal for this species, Taking a worst-case scenario, the residual impact of the Proposed Development on Lesser Horseshoe bat would be **negative, slight and long-term** at a local level

7B.9.4 Otter

Otter is known to forage outside the Proposed Development, but no Otters were recorded within the Site boundary. During peak construction works, noise levels along the tidal section of the Ralappane Stream (R8), the closest location to the Proposed Development where Otter was recorded, will be 58 dB(A) during daytime construction works (Refer to **Appendix A7B.2**, Volume 4). Following mitigation, operational noise levels at R8 will be less than 35dB(A). Therefore, even in during the worst-case scenario for noise, there will

no significant disturbance at known Otter foraging sites. There may be some short-term displacement of Otters foraging offshore during the works period. However, this species is tolerant to a high degree of noise and/ or disturbance. Thus, any impacts during the construction phase are expected to be localised, slight and short-term.

The residual impact on Otter will be **negative, not significant and long-term** at a local level.

7B.9.5 Other Terrestrial Mammals

Hares are a highly mobile species which can move away from the site of disturbance. There will be a net loss of feeding habitat. However, grassland habitats within the wider area are common. The residual impact on Irish Hare is predicted to the **negative, slight (not significant) and long-term** at a local level.

Hedgehog is likely to recolonise newly planted hedgerows/ treelines at the Proposed Development following the new landscape planting. The residual impact is predicted to the **negative, slight (not significant) and long-term** at a local level.

7B.9.6 Amphibians

Common Frog will no longer use the site following the removal of wet grassland. However, following relocation the residual impact on Common Frog will not be significant. The residual impact is predicted to the **negative, not significant and long-term** at a local level.

7B.9.7 Birds

7B.9.7.1 Terrestrial Birds

Breeding birds will be displaced from grassland and boundary habitats at the site. Noise levels within terrestrial habitats during construction are likely to be significant and birds will be displaced during peak construction works. During operation and following the implementation of the landscape plan, woodland edge species are likely to recolonise the new hedgerows/ treelines at the Proposed Development. Native seeded grassland is likely to provide alternative nesting habitat for ground nesting species such as Meadow Pipit, Skylark and Snipe. The residual impact will be **negative, slight to moderate (not significant) and long-term** at a local level.

7B.9.7.2 Estuarine Birds

The numbers of estuarine birds displaced during construction, following mitigation and monitoring measures for noise and lighting, will be minimal. Outside of blasting works, birds are predicted to continue to forage along all areas of the Shannon Estuary outside the immediate working area. According to Cutts *et al.* (2013), a single sudden sound such as blasting will generally cause more disturbance than a constant or regular noise regardless of noise level. The typical response would be for birds to move away from affected areas to less disturbed areas. Birds that remain in the affected area may not forage effectively and this may impact on survival and foraging rates. Blasting works will take place only within terrestrial habitats i.e., grassland on southeast of Proposed Development. No significant estuarine bird numbers were recorded in the vicinity of the Proposed Development and given the limited use of blasting and the distance from more valuable bird foraging areas (i.e., west of Knockfinglas Point), no significant effects are predicted to occur to estuarine birds during construction works.

Following mitigation, peak operational noise levels will be 45-55 dB(A) along the along the Shannon Estuary shoreline adjacent to the Proposed Development site. To the east and west of the Proposed Development, noise levels will be 35-40 dB(A) falling to <35 dB(A) west of Knockfinglas Point (**Appendix A7B.3** of Volume 4). In the subtidal waters within the immediate vicinity of the Proposed Development, noise levels following mitigation will be <55 dB(A). Waders and waterfowl in the Shannon Estuary are likely to habituate to operational noise and disturbance and continue to forage along the intertidal and sub-tidal habitats.

The residual impact on SCI birds will be **negative, not significant and long-term** at an international level following mitigation.

The residual impact on Annex I species i.e., Red-throated Diver, Great Northern Diver and Sandwich Tern will be **negative, not significant and long-term** at a local level following mitigation.

The residual impact on other estuarine species will be **negative, not significant and long-term** at a local level following mitigation.

7B.9.8 Fish

Residual impacts on water quality are predicted to be imperceptible. The impact of residual impact on fish will be **negative, not significant and long-term** at a local level.

7B.9.9 Aquatic Invertebrates

Residual impacts on water quality are predicted to be imperceptible. The impact of residual impact on aquatic invertebrates will be **negative, not significant and long-term** at a local level.

7B.9.10 Other Species

No residual impacts identified.

7B.9.11 Spread of Invasive Species

No residual impacts identified.

7B.9.12 Air Quality

No residual impacts predicted.

Table 7.11. Summary of Potential impacts from the Proposed Development for Designated Sites, Habitats and Flora

Feature	Highest Value within Zone of Influence	Potential Construction Phase impacts	Significance of Potential Construction-Phase Impact	Potential Operational Phase impacts	Significance of Potential Operational-Phase Impact	Mitigation Proposed	Residual Impact Significance (Construction and Operation)	Cumulative Residual Impact Significance	
Designated sites	Lower River Shannon SAC	International	Direct habitat loss/ Pollution	Refer to NIS	Refer to NIS	Refer to NIS	Refer to NIS	Refer to NIS	
	River Shannon and River Fergus Estuaries SPA	International	Direct habitat loss/ Pollution	Refer to NIS	Refer to NIS	Refer to NIS	Refer to NIS	Refer to NIS	
	Ballylongford Bay NHA	National	Pollution	Refer to Chapter 06	Refer to Chapter 06	Refer to Chapter 06	Refer to Chapter 06	Refer to Chapter 06	
	Other National Sites	National	Not significant	Not significant	Not significant	N/A	N/A	N/A	
Habitats	Wet grassland GS4	Local importance (Lower value)	Direct habitat loss	Local	None	N/A	Yes	Local; Negative, slight (not significant), long-term	Local
	Improved Agricultural grassland GA1	Local importance (Lower value)	Direct habitat loss	Local	None	N/A	Yes	Local; Negative, slight (not significant), long-term	Local
	Hedgerows WL1/ Treelines WL2	Local importance (Higher value)	Direct habitat loss	Local	None	N/A	Yes	Local; Negative, slight (not significant), long-term	Local
	Sedimentary Sea Cliffs CS3	Local importance (Higher value)	Direct habitat loss	Local	None	N/A	No	Local; Negative, slight (not significant), long-term	Local
	Scrub WS1	Local importance (Higher value)	Direct habitat loss	Local	None	N/A	Yes	Local; Negative, slight (not significant), long-term	Local
	Eroding River FW1	Local importance (Higher value)	Pollution	Local	Not significant	N/A	Yes	Not significant	Not significant

Feature	Highest Value within Zone of Influence	Potential Construction Phase impacts	Significance of Potential Construction-Phase Impact	Potential Operational Phase impacts	Significance of Potential Operational-Phase Impact	Mitigation Proposed	Residual Impact Significance (Construction and Operation)	Cumulative Residual Impact Significance
Drainage ditches FW4	Local importance (Lower value)	Direct habitat loss/ Pollution	Local	Pollution	Local	Yes	Local; Negative, slight (not significant), long-term	Local
Immature woodland WS2 /Wet willow-alder-ash woodland WN6	Local importance (Higher value)	Direct habitat loss	Local	None	N/A	Yes	Local; Negative, slight (not significant), long-term	Local
Scrub WS2/Broadleaved woodland WD1	Local importance (Higher value)	Direct habitat loss	Local	None	N/A	Yes	Local; Negative, slight (not significant), long-term	Local
Fauna								
Badger	Local Importance (Higher Value)	Mortality or injury Disturbance/ Displacement/ Loss of foraging habitat/ territory	Local	Disturbance/ displacement from noise and lighting	Local	Yes	Local; Negative, significant, long-term	Local
Bats (Common Pipistrelle, Soprano Pipistrelle, Leisler, Brown Long eared, <i>Myotis</i> sp. Lesser Horseshoe)	Local Importance (Higher Value)	Loss of foraging habitat/ Habitat fragmentation/ Disturbance/ Displacement	Local	Disturbance/ displacement from noise and lighting	Local	Yes	Local; Negative, slight (not significant), long-term	Local
Otter	Local Importance (Higher Value)	Loss of foraging habitat/	Local	Disturbance/ displacement from noise and lighting	Local	Yes	Local; Negative, not significant, long-term	Local

Feature	Highest Value within Zone of Influence	Potential Construction Phase impacts	Significance of Potential Construction-Phase Impact	Potential Operational Phase impacts	Significance of Potential Operational-Phase Impact	Mitigation Proposed	Residual Impact Significance (Construction and Operation)	Cumulative Residual Impact Significance	
			Disturbance/ Displacement						
	Hedgehog, Irish Hare	Local importance (Lower value)	Loss of habitat/ Disturbance/ Displacement	Local	Disturbance/ displacement from noise and lighting	Not significant	Yes	Local; Negative, slight (not significant), long-term	Local
Amphibians	Common Frog	Local importance (Higher Value)	Mortality or injury during vegetation clearance/ Habitat loss	Local	None	Not significant	Yes	Local; Negative, not significant, long-term	Local
Birds	Red list bird species (Terrestrial) (Meadow Pipit, Kestrel, Barn Owl, Curlew, Snipe)	Local importance (Higher Value)	Mortality or injury, Disturbance/ displacement Direct loss of breeding/ foraging habitat	Local	Disturbance/ displacement	Local	Yes	Local; Negative, slight to moderate (not significant), long-term	Local
	Amber list bird species (Several)	Local importance (Higher Value)	Mortality or injury Disturbance/ displacement Direct loss of breeding/ foraging habitat	Local	Disturbance/ displacement	Local	Yes	Local; Negative, slight to moderate (not significant), long-term	Local
	Other breeding birds (Green list species)	Local importance (Higher Value)	Mortality or injury Disturbance/ displacement Direct loss of breeding / foraging habitat	Local	Disturbance/ displacement	Local	Yes	Local; Negative, slight (not significant), long-term	Local

Feature	Highest Value within Zone of Influence	Potential Construction Phase impacts	Significance of Potential Construction-Phase Impact	Potential Operational Phase impacts	Significance of Potential Operational-Phase Impact	Mitigation Proposed	Residual Impact Significance (Construction and Operation)	Cumulative Residual Impact Significance
Annex I species (Great Northern Diver, Red-throated Diver, Little Egret, Sandwich Tern)	Local importance (Higher Value)	Disturbance/ displacement Direct loss of foraging habitat/ Pollution	Local	Disturbance/ Displacement/ Collision mortality/ Pollution (reduction in prey availability)	Local	Yes	Local; Negative, not significant, long-term	Local
SCI birds (River and River Fergus Estuaries SPA)	Local importance (Higher Value)	Disturbance/ displacement Direct loss of foraging habitat/ Pollution (reduction in prey availability)	International	Disturbance/ Displacement/ Pollution (reduction in prey availability)	Local	Yes	Local; Negative, not significant, long-term	Not significant
Non-SCI estuarine birds	Local importance (Higher value)	Displacement Direct loss of foraging habitat/ Pollution (reduction in prey availability)	Local	Disturbance/ Displacement/ Pollution (reduction in prey availability)	Local	Yes	Local; Negative, not significant, long-term	Not significant
Aquatic species	Fish (Including Stickleback, Eel, Stone Loach) Local importance (Higher value)	Pollution	Local	Pollution	Not significant	Yes	Local; Negative, not significant, long-term	Local

Feature	Highest Value within Zone of Influence	Potential Construction Phase impacts	Significance of Potential Construction-Phase Impact	Potential Operational Phase impacts	Significance of Potential Operational-Phase Impact	Mitigation Proposed	Residual Impact Significance (Construction and Operation)	Cumulative Residual Impact Significance
Invertebrates	Local importance (Lower value)	Pollution	Local	Pollution	Not significant	Yes	Local; Negative, not significant, long-term	Local
Other species	Negligible	None	Not significant	None	N/A	N/A	N/A	N/A

7B.10 Summary

The impacts on terrestrial biodiversity as a result of the Proposed Development are summarised as follows:

- A small area of the terrestrial elements of the Proposed Development overlap with the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Following mitigation, there will be no adverse effects on designated sites overlapping with the terrestrial elements of the project. The CEMP implemented by the Contractor will conform to industry standards and specify appropriate measures regarding pollution prevention.
- Semi-natural habitats within the Proposed Development will be removed. While replacement habitat will be provided with the Site boundary including native woodland, scrub and grassland areas, overall there will be a of semi-natural habitats at the Proposed Development.
- No invasive species were recorded within the Proposed Development.
- No bats were identified roosting in buildings or trees within the Proposed Development. Five species of foraging and commuting bats were identified using semi-natural habitat, mainly hedgerows. Appropriate lighting design and replacement tree planting will be implemented to minimise impacts on bats.
- Two Badger setts will be removed from the Proposed Development during construction. These are outlier setts and one is no longer in use. While two Badger social groups will be impacted, Badger are likely to remain extant during operation. However, it is probable that 25% of the feeding territory of both feeding groups will be impacted by the Proposed Development and this reduction in territory size is likely create a contraction in the size of both social groups.
- Otter was not recorded within the Proposed Development, but regularly use areas to the west of the Proposed Development as well as the Shannon Estuary. Mitigation and design measures will be implemented to ensure that Otter continue to use the site following development including allowing access for Otter (and other species) and the retention of habitats to the west of the Proposed Development will continue to provide habitat for this species.
- The site currently includes local value habitat for breeding birds, including a number of birds of conservation concern. Timing of vegetation removal will be scheduled to avoid impacts to breeding birds, whilst replacement planting will reduce the impacts on breeding and non-breeding birds within the site.
- The River Shannon and River Fergus Estuaries SPA supports internationally important numbers of wintering waterbirds. However, the small area of the SPA within the Proposed Development site boundary and the SPA to the north of the Proposed Development, support very small numbers of SCI and non-SCI bird species. While disturbance, particularly blasting and rock breaking, during construction may disturb/displace a small number of birds in the vicinity of the Proposed Development, there will be no adverse impact to bird numbers within the SPA during construction or operation.

- Common Frog was recorded in wet grassland habitat within the Proposed Development. Wet grassland habitat at the site will be removed. Mitigation measures including removal of this species under licence have been outlined to avoid direct mortality impacts to Common Frog.
- No rare invertebrate species were recorded at the Proposed Development.
- Assuming successful implementation of mitigation measures as outlined above, all other impacts will not be significant above Local geographic scale of significance.

Table 7.12: Table Summary

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
Construction	General mitigation and monitoring measures	Low	Not assessed	Not assessed	<p>An CEMP has been prepared (included in Appendix A2.3 of Volume 4). The CEMP contains the construction mitigation and monitoring measures, which are set out in this EIAR and the NIS. This will have particular emphasis on the protection of habitats and species of the SAC, SPA and pNHA which adjoin the Proposed Development.</p> <p>These sites are by definition internationally/ nationally important for their habitats and the species they support. It is essential that all construction staff, including all sub-contracted workers, be notified of the boundaries of these Natura 2000 sites and be made aware that no construction waste of any kind (rubble, soil, etc.) is to be deposited in these protected areas and that care must be taken with liquids or other materials to avoid spillage.</p> <p>Mitigation and monitoring measures (of relevance in respect of any potential ecological effects) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:</p> <ul style="list-style-type: none"> • Control of water pollution from construction sites. Guidance for consultants and contractors (C532). CIRIA. Masters-Williams et al (2001); and • Control of water pollution from linear construction projects. Technical guidance (C648). CIRIA. Murnane, et al. (2006). <p>All personnel involved with the Proposed Development will receive an onsite induction relating to construction and operations and the environmentally sensitive nature of European sites and to re-emphasise the precautions that are required as well as the precautionary measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in pollution risks and preventative measures.</p> <p>All staff and subcontractors have the responsibility to:</p> <ul style="list-style-type: none"> • Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts; • Understand the importance of avoiding pollution onsite, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact; • Respond in the event of an incident to avoid or limit environmental impact; 	Not significant	

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<ul style="list-style-type: none"> Report all incidents immediately to the project manager and the Environmental (Ecological) Clerk of Works (ECoW); Monitor the workplace for potential environmental risks and alert the site manager if any are observed; and Co-operate as required, with site inspections. 		
Construction	Bridge and culvert construction	Medium	Culverting of two drainage ditches and bridging of Ralappane Stream	Moderate	<p>Bridge construction on the Ralappane Stream will use a single span, pre-cast concrete bridge near the southern boundary of the Proposed Development. Two drainage ditches within the Proposed Development will be culverted. In addition to the general measures described above, the following specific mitigation measures will be implemented for crossing of the Ralappane Stream and drainage ditch:</p> <ul style="list-style-type: none"> Works will comply with The IFI's Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016); No instream works will take place in the Ralappane Stream; Appropriate silt control measures such silt barriers (e.g. straw or silt fence) will be employed where required; Construction activities will be undertaken during daylight hours only (07:30 to 18:00 Monday to Friday and 08:00 to 14:00 of Saturdays).. This will ensure that there is potential for undisturbed fish passage at night. The works will be temporary and will not create a significant long-term barrier to fish movement; An appropriate native grass seed mix as determined by the ECoW based on ground conditions, will be utilised to re-vegetate any disturbed areas along the bank of the Ralappane Stream; and Although no Common Frog were observed in drainage ditches within the Site boundary, they will be surveyed prior commencement of site works by the ECoW as a precautionary measure. Any Common Frog, if recorded, will be moved to suitable habitat in the wider landscape under licence from NPWS. 	Not significant	7B
Construction	Lighting	Medium	Disturbance and / or displacement of sensitive fauna	Moderate	<p>Lighting associated with the site works could cause disturbance/ displacement of fauna. If of sufficient intensity and duration, there could be impacts on reproductive success.</p> <p>Site lighting will typically be provided by tower mounted temporary portable construction floodlights. The floodlights will be cowled and angled downwards to minimise spillage to surrounding properties. Lighting</p>	Not significant	7B

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<p>mitigation measures will follow Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers (Bat Conservation Ireland, 2010). The following measures will be applied in relation to construction works lighting:</p> <ul style="list-style-type: none"> Lighting will be provided with the minimum luminosity necessary for safety and security purposes. Where possible, lighting will be restricted to the working area and using the cowl and angling noted above, will minimise overspill and shadows on sensitive habitats outside the construction area and During construction, lighting will be positioned and directed so that it does not to unnecessarily intrude on adjacent ecological receptors and structures used by protected species. The primary area of concern is the potential impact at the SAC/ SPA boundary, the Ralappane Stream as well as hedgerows, treelines. There will be no directional lighting focused towards these areas and cowling and focusing lights downwards will minimise light spillage. 		
Construction	Habitats	Medium	Removal of habitat	Slight to moderate	<ul style="list-style-type: none"> The Wildlife Act 1976, as amended, provides that it is an offence to cut, grub, burn or destroy any vegetation on uncultivated land or such growing in any hedge or ditch from 1st March to 31st August. Exemptions include the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided. If works are carried out during the breeding season, a pre-construction survey will be carried out by the ECoW and if birds are detected appropriate mitigation measures will be implemented. Where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Site boundary. Particular care will be taken at the boundary between the Proposed Development and the SAC, SPA and pNHA so that construction activities do not cause damage to habitats in this area. These habitats will be securely fenced off early in the construction phase. The fencing will be clearly visible to machine operators. The Ralappane Stream runs from the Proposed Development through the SAC and pNHA to the sea, it is important that construction activities do not result in pollution of this watercourse, either through siltation, 	Not significant	7B

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<p>which interferes with water flow, vegetation growth and aquatic fauna, or pollution (e.g. chemical). Refer to Chapter 06 Section 6.10 for further details on mitigation.</p> <p>Any disturbance to cliff habitat from vehicular access should be minimised and will require a detailed method statement which will be agreed with the NPWS prior to commencement of works</p> <ul style="list-style-type: none"> To prevent incidental damage by machinery or by the deposition of spoil during site works, hedgerow, tree and scrub vegetation which are located in close proximity to working areas will be clearly marked and fenced off to avoid accidental damage during excavations and site preparation. The ECoW will specify appropriate protective fencing where required. Habitats that are damaged and disturbed will be reinstated and landscaped once construction is complete. Disturbed areas will be seeded or planted using appropriate native grass or species native to the areas where necessary. Natural regeneration of vegetation will also occur. There will be a defined working area which will be fenced off with designated haul routes to prevent inadvertent damage to adjoining habitats. Tree root systems can be damaged during site clearance and groundworks. Materials, especially soil and stones, can prevent air and water circulating to the roots. No materials will be stored within the root protection area/ dripline of trees. The ECoW will specify appropriate protective fencing where required. 		
Construction	Badger	Medium	Sett removal / mortality / injury disturbance and / displacement	Significant	<ul style="list-style-type: none"> This will require exclusion of Badgers from subsidiary/ outlier setts, however in both instances both social groups of Badgers would be expected to continue to use their main setts. Badger sett tunnel systems can extend up to approximately 20 m from sett entrances. Therefore, no heavy machinery should be used within 30 m of Badger setts (unless carried out under licence); lighter machinery (generally wheeled vehicles) should not be used within 20 m of a sett entrance; light work, such as digging by hand or scrub/vegetation clearance should not take place within 10m of sett entrances. 	Significant	7B

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<ul style="list-style-type: none"> • During the breeding season (December to June inclusive), none of the above works should be undertaken within 50 m of active setts nor blasting within 150m of active setts. • Affected Badger setts will be clearly marked and the extent of bounds prohibited for vehicles clearly marked by fencing and signage. • The most recent surveys show that the two main Badger setts are located outside of the Site boundary and the two setts to be directly affected are subsidiary setts. The bait marking survey indicates that the setts are linked as follows: • Set 4 (main sett) is located to the east of the Proposed Development. Set 1 is located within the Site boundary. These setts are used by the same social group. • Set 3 (main sett) is located to the east of the Proposed Development. Set 2 is located within the Site boundary. These setts are used by the same social group. • The presence of alternative setts within the particular social group's territory is required to ensure that excluded Badgers are able to relocate to a suitable alternative refuge. The objective is to allow the Badgers to remain within their territory, even though a portion of their current territory may be lost as a result of a particular development. There is a standard methodology which can be utilised to exclude Badgers from setts. • A methodology for the exclusion of Badgers from affected setts and displacement of Badgers to artificial setts is outlined in the National Roads Authority publication Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes (NRA 2005a). Detailed mitigation measures including method statements will be agreed with the NPWS prior to implementation as part of a licence application. • Exclusion of Badgers from any currently active sett will only be carried out during the period of July to November (inclusive) in order to avoid the Badger breeding season. • In the instance of disused setts or setts verified as inactive, and to prevent their reoccupation, the entrances may be lightly blocked with vegetation and a light application of soil (soft blocking). The purpose of soft-blocking is to confirm that an apparently inactive sett is not occupied by Badgers. If all entrances remain undisturbed for 		

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<p>approximately five days, the sett should be destroyed immediately using a mechanical digger, under the supervision of the licensee. Should there be any delay in sett destruction, the soft-blocked entrances should be hard-blocked and the sett destroyed as soon as possible, again under the supervision of the licensee. Hard-blocking is best achieved using buried fencing materials and compacted soil with further fencing materials laid across and firmly fixed to blocked entrances and surrounds.</p> <ul style="list-style-type: none"> • Where field signs or monitoring reveal any suggestion of current or recent Badger activity at any of the sett entrances, the sett requires thorough evacuation procedures. • Inactive entrances may be soft and then hard-blocked, as described for inactive setts, but any active entrances should have one-way gates installed (plus proofing around sides of gates as illustrated) to allow Badgers to exit but not to return. The gates should be tied open for three days prior to being set to exclude. Sticks should be placed at arm's length within the gated tunnels to establish if Badgers remain within the sett. • Gates should be left installed, with regular inspections, over a minimum period of 21 days (including period with gates tied open) before the sett is deemed inactive. Any activity at all will require the procedures to be repeated or additional measures taken. Gates might be interfered with by other mammals or members of the public - hence the importance of regular exclusion monitoring visits. Sett destruction should commence immediately following the 21-day exclusion period, provided that all Badgers have been excluded. • Badgers will often attempt to re-enter setts after a period, and if gates are left in place for any long period, they may attempt to dig around them or even create new entrances and tunnels into the sett system. • Where an extensive sett is involved, an alternative method of evacuating Badgers is to erect electric fencing around the sett (ensuring all entrances are included) with one-way Badger-gates installed within the electric fence at points where the fence crosses Badger paths leading to and from the sett. The exclusion should again take place over a minimum period of 21 days before sett destruction; this monitoring period would be contingent upon no Badger activity being observed within the fenced area. Fencing may not be practical in many situations 		

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<p>due to the topography or the terrain – and can be difficult to install effectively. If no activity is observed, then the sett may be destroyed, under supervision by the licensed wildlife expert.</p> <ul style="list-style-type: none"> • The destruction of a successfully evacuated Badger sett may only be conducted under the supervision of qualified and experienced personnel under licence from the NPWS. The possibility of Badgers remaining within a sett must always be considered; suitable equipment should be available on hand to deal with Badgers within the sett or any Badgers injured during sett destruction. • Destruction is usually undertaken with a tracked 12-25 tonne digger, commencing at approximately 25 m from the outer sett entrances and working towards the centre of the sett, cutting approximately 0.5 m slices in a trench to a depth of 2 m. Exposed tunnels may be checked for recent Badger activity, with full attention paid to safety requirements in so doing. The sett should be destroyed from several directions, in the above manner, until only the central core of the sett remains. • Once it is ensured that no Badgers remain, the core may then also be destroyed and the entire area back-filled and made safe. Sett excavation should, preferably, be concluded within one working day, as Badgers may re-enter exposed tunnels and entrances. • A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues should be submitted to the NPWS, in fulfilment of usual wildlife licence conditions. • Construction activities within the vicinity of affected setts may commence once these setts have been evacuated and destroyed under licence from the NPWS. Where affected setts do not require destruction, construction works may commence once recommended alternative mitigation measures to address the Badger issues have been complied with. • Badger access points will be provided to allow Badgers to access the development area once complete See (NHBS, 2021 or similar). Gates will be placed within fences along the western, eastern and southern boundaries to maximise potential usage by the different social groups that occur within this area. • Monitoring of Badger setts will be carried out during construction works and a five-year post-construction monitoring programme will be implemented. 		

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
Construction	Bats	High	Disturbance / displacement	Not significant	<ul style="list-style-type: none"> During the site works, general mitigation measures for bats will follow the National Road Authority's 'Guidelines for the Treatment of Bats during the Construction of National Road Schemes' NRA (2005c) and 'Bat Mitigation Guidelines for Ireland: Irish Wildlife Manuals, No. 25' (Kelleher, C. & Marnell, F. (2006)). These documents outline the requirements that will be met in the pre-construction (site clearance) stage to minimise negative effects on roosting bats, or prevent avoidable effects resulting from significant alterations to the immediate landscape. A Common Pipistrelle colony was recorded in a farm building southwest of the Proposed Development. This building will not be affected. No bat roosts were recorded within the site boundary. Mitigation measures will be agreed with the National Parks and Wildlife Service prior to any demolition works and will include the following: Two buildings within the Proposed Development will be demolished as part of the development. No signs of bats were recorded within these buildings. However as a precautionary measure, the following measures will be implemented prior to and/ or during demolition: <ul style="list-style-type: none"> In all cases immediately in advance of demolition a bat specialist will undertake an examination of the building. If bats are present at the time of examination it is essential to determine the nature of the roost (i.e. number, species, whether it is a breeding population) as well as its exact location; If bats are recorded in buildings earmarked for demolition, special mitigation measures to protect bats will be put in place and a license to derogate from the conservation legislation will be sought from the NPWS; The contractor will take all required measures to ensure works do not harm individuals by altering working methods or timing to avoid bats, if necessary; If roosting habitat for bats is removed, replacement habitat will be provided; A number of trees will be removed prior to construction. Although mature trees with the potential of be value as bat roosts are absent from the site, the following precautionary measures will be implemented; 	Not significant	7B

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<ul style="list-style-type: none"> The bat specialist will work with the contractor to ensure that the loss of trees is minimised and that trees earmarked for retention are adequately protected; Tree-felling will ideally be undertaken in the period September to late October/ early November. During this period bats are capable of flight and may avoid the risks of tree-felling if proper measures are undertaken; Felled trees will not be mulched immediately. Such trees will be left lying several hours and preferably overnight before any further sawing or mulching. This will allow any bats within the tree to emerge and avoid accidental death. The bat specialist will be on-hand during felling operations to inspect felled trees for bats. If bats are seen or heard in a tree that has been felled, work will cease and the local NPWS Conservation Ranger will be contacted; Tree will be retained where possible and no 'tidying up' of dead wood and spilt limbs on tree specimens will be undertaken unless necessary for health and safety; Treelines outside the Proposed Development area but adjacent to it and thus at risk, will be clearly marked by a bat specialist to avoid any inadvertent damage; During construction directional lighting will be employed to minimise light spill onto adjacent areas. Where practicable during night-time works, there will be no directional lighting focused towards watercourses or boundary habitats and focusing lights downwards will be utilised to minimise light spillage; If bats are recorded by the bat specialist within any trees no works will proceed without a relevant derogation licence from the NPWS; and As a biodiversity enhancement measure it is proposed that bat boxes will be put up within the Proposed Development. It is proposed that eight bat boxes will be located within the overall site. The boxes will be erected by the ECoW taking into account landscape plans, vehicle movements and lighting. As noted in 7.5.1.5, lighting mitigation measures will follow Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers (Bat Conservation Ireland, 2010). 		

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<ul style="list-style-type: none"> All mitigation measures including detailed method statements will be agreed with the NPWS prior to commencement of works, which could affect any bat populations onsite. 		
Construction	Otter	Medium	Disturbance / displacement	Not significant	<p>No signs of Otter or Otter holts were noted within 150 m of the Proposed Development. Although Otter were recorded along the Ralappane Stream and to the west of the Proposed Development. A detailed pre-construction survey will be carried out no more than 10-12 months prior to the commencement of construction works to confirm the absence of Otter holts within 150m of the site.</p> <p>If Otter holts are recorded at that time, the ECoW will determine the appropriate means of minimising effects i.e. avoidance, moving works, timing of works etc. If required the ecologist will obtain a derogation licence from the NPWS, to facilitate licenced exclusion from the breeding or resting site in accordance with a plan approved by the NPWS.</p> <p>Any holts found to be present will be subject to monitoring and mitigation as set out in the NRA publication Guidelines for the Treatment of Otter prior to the Construction of National Road Schemes (2008). If found to be inactive, exclusion of holts may be carried out during any season. No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, Otter holts. Light work, such as digging by hand or scrub/vegetation clearance will also not take place within 15m of such holts, except under licence. The prohibited working area associated with Otter holts will be fenced and appropriate signage erected. Where breeding females and cubs are present no evacuation procedures of any kind will be undertaken until after the Otters have left the holt, as determined by the ECoW. Breeding may take place at any season, so activity at a holt must be adjudged on a case-by-case basis. On occasion, Otter holts may be directly affected by the scheme. To ensure the welfare of Otters, they must be evacuated from any holts present prior to any construction works commencing. The exclusion process, if required, involves the installation of one-way gates on the entrances to the holt and a monitoring period of 21 days to ensure the Otters have left the holt prior to removal.</p>	Not significant	7B
Construction	Common Frog	Medium	Habitat loss / mortality / injury	Moderate	<p>A visual search of the wet grassland habitat to be removed will be carried out in the days prior to commencement of development and any frogs will be removed to alternative wet grassland habitat elsewhere within the landholding. This will be carried out under licence from the NPWS.</p>	Not significant	7B

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
Construction	Birds	Medium	Habitat loss/ mortality / injury Mortality or injury, Disturbance / displacement Direct loss of breeding / foraging habitat	Not significant to moderate	<p>No signs of nesting birds were recorded in disused farm buildings during the 2018-2021 or 2023 site surveys. However, prior to demolition buildings will be checked for nesting Swallows (and other birds). If nesting birds are recorded, all demolition operations will be carried out between October and March, when birds have finished breeding.</p> <p>As noted in Section 7B.6.1.6 where possible, vegetation will be removed outside of the breeding season and in particular, removal during the peak-breeding season (April-June inclusive) will be avoided. This will also minimise the potential disturbance of breeding birds outside of the Site Boundary.</p> <p>As a biodiversity enhancement measure ten bird nesting boxes (various types) will be located within the Site Boundary at locations specified by the ECoW. It is noted that provision of woodland planting and the use of more diverse grassland planting will provide additional nesting and feeding sites for birds, particularly as these habitats mature.</p> <p>A detailed method statement will be drawn up by the ECoW and agreed with the NPWS prior to commencement of works. The method statement will specify the timing of blasting operations and the need, if any, for ecological supervision.</p>	Not significant	7B
Construction	Biodiversity and landscaping	Low	Habitat loss	Slight positive	<p>Details of the landscaping plan for the Proposed Development are included in Figure F2-4 in Volume 3. This includes detailed areas of native woodland and native scrub habitat as well as native grassland planting.</p> <p>The woodland planting mix will be dominated by native species including Scots Pine <i>Pinus sylvestris</i>, Willow, Pedunculate Oak <i>Quercus robur</i> and Sessile Oak <i>Quercus petraea</i>, Alder, Rowan <i>Sorbus</i> spp. and Crab Apple <i>Malus</i> spp.. The woodland edge planting mix will include Hazel <i>Corylus</i> spp., Hawthorn, Blackthorn, Elder <i>Sambucus</i> spp. and Holly <i>Ilex</i> spp.. The objective of these elements is to create natural, multi-layered woodland habitat which will be of local ecological value and has the potential to support native flora and fauna. A linear strip of woodland along the southern boundary will help to maintain connectivity (east to west) between habitats in the wider landscape.</p> <p>Additional native specimen trees (Willow, Wild Cherry <i>Prunus avium</i>, Rowan, Whitebeam <i>Sorbus subg. Aria</i> and Silver Birch) will be planted on peripheral areas such as the road edge and administration area.</p> <p>As detailed in Figure F2-4 in Volume 3 a native wildflower/ grass mix will be utilised to provide a more diverse sward which is of higher ecological value</p>	Not significant	7B

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<p>for invertebrates and birds. Perennial Rye Grass or other vigorous amenity/ agricultural grass species will not be utilised as they tend to over-dominate the sward and reduce overall biodiversity. The final grassland/ wildflower mix for same will be specified by the ECoW based on final ground conditions including alkalinity, fertility and moisture levels.</p> <p>Based on the seed mix utilised and on prevailing ground conditions, the ECoW will specify the management regime, including weed control and mowing regime, necessary to maximise biodiversity and habitat value.</p> <p>Five insect nesting boxes suitable for Hymenoptera spp. (bees and wasps) will be put in place within the Site boundary as a biodiversity enhancement measure.</p>		
Construction	Invasive species	Slight	Loss of habitat for native flora	Not significant	<p>Prior to the commencement of construction works invasive species survey will be undertaken within the Site boundary by a competent ecologist to determine if invasive species listed under Part 1 of the Third Schedule of S.I No. 477 of 2011 have established in the area in the period between pre-planning and post consent. In the event that invasive species are identified within the works area a site-specific Invasive Species Management Plan will be developed and implemented by a competent specialist on behalf of the Contractor. In addition, in order to comply with Regulations 49 and 50 of the European Communities (Birds and Natural Habitat) Regulations (2011) the appointed Contractor will ensure biosecurity measures are implemented throughout the construction phase to ensure the introduction and translocation of invasive species is prevented. The appointed ECoW will carry out a toolbox talk which will identify invasive species and will also implement biosecurity measures such as the visual inspection of vehicles for evidence of attached plant or animal material prior to entering and leaving the works area.</p>	Not significant	7B
Operation	General	Medium	Displacement / disturbance	Slight	<p>During the operational phase the site environmental management system will address management of potentially contaminating materials such as fuel, lubricating oils, solvent, etc. and ensure such material is appropriately controlled, in accordance with regulatory requirements and industry best practice.</p> <p>The drainage design for the Power Plant will consider the magnitude of the changes in infiltration and runoff characteristics and the significance of potential impacts at the wetland. Further details on operational water management are included in Chapter 06 (Water).</p>	Not significant	7B

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Impact Significance	EIAR Chapter Reference
					<p>Lighting shall be provided in plant areas where safe access and safe conditions for work activities is required at night. The facilities would have area lighting installed on a down angle to cover and Power Plant. The terminals will have a level of lighting sufficient to ensure that all ship/ shore interfaces activities can be safely conducted during periods of darkness. Lighting levels will meet national and international engineering standards as a minimum.</p> <p>The principal mitigation measures required for the development in relation to noise concern selection of equipment, sound containment, and acoustic attenuators, in order to achieve the required limits. The predicted noise levels, as outlined in Chapter 09 (Airborne Noise and Groundborne Vibration) are considered to be readily technically achievable using standard methods.</p>		

7B.11 References

- Ahlen, I., Baagoe, H.J. & Bach, L. (2009). Behaviour of Scandinavian bats during migration and foraging at sea. *Journal of Mammalogy*, 90(6):1318-1323.
- Anderson, R. A. (1997). Rove Beetles (Coleoptera: Staphylinidae). Northern Ireland Species Inventories, Environment and Heritage Service.
- Bat Conservation Ireland (2010). Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers December 2010
- Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. (2000) Bird Census Techniques. Academic Press, London
- Bisson, I.A., Safi, K. & Holland, R.A. (2009). Evidence for Repeated Independent Evolution of Migration in the Largest Family of Bats. *PLoS ONE* 4(10): e7504. doi:10.1371/journal.pone.0007504.
- Burke, B., Lewis, L. J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, T. D. (2018) Estimates of waterbird numbers wintering in Ireland, 2011/12 – 2015/16. *Irish Birds* No. 41, 1-12.
- Chapman, P. 2017. Management and Conservation for Farmland Waders. Scottish Farm Advisory Service. TECHNICAL NOTE TN688 SEPTEMBER 2017 • ELEC
- Chanin P (2003). Ecology of the European Otter. *Conserving Natura 2000 Rivers Ecology Series* No. 10. English Nature, Peterborough.
- Chartered Institute of Ecology and Environmental Management (CIEEM) 2016 Guidelines on Ecological Impact Assessment in the UK and Ireland, 2nd edition
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2022) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.2
- Clabby, K.J., Lucey, J. and McGarrigle, M.L. (2001) Interim report on the Biological Survey of River Quality Results of the 2000 Investigations, Environmental Protection Agency, Wexford.
- Collins, J. 2023 Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edn).
- Cutts, N., Hemingway, K. and J Spencer (2013). Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning & Construction Projects. Institute of Estuarine & Coastal Studies (IECS) University of Hull.
- Da Silva, A., Samplonius, J. M., Schlicht, E., Valcu, M., and Kempenaers, B. H. A. (2014). Artificial night lighting rather than traffic noise affects the daily timing of dawn and dusk singing in common European songbirds. *Behav. Ecol.* 25, 1037–1047.
- Dominoni, D. M., Borniger, J. C., and Nelson, R. J. (2016). Light at night, clocks and health: from humans to wild organisms. *Biol. Lett.* 12:20160015.
- Dwyer, R.G., Bearhop, S., Campbell, H.A. & Bryant, D.M. (2013). Shedding light on light: benefits of anthropogenic illumination to a nocturnally foraging shorebird. *Journal of Animal Ecology*, 82, 478– 485.
- EPA 2022 Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’.
- Evans, R.J. O’Toole, L. and Whitfield, P.D. (2011). The history of eagles in Britain and Ireland: an ecological review of placename and documentary evidence from the last 1500 years. *Bird Study* Volume 59, 2012 - Issue 3; 335-349
- Furness, R.W., Wade, H.M. & Masden, E.A. 2013. Assessing vulnerability of marine bird populations to offshore wind farms. *Journal of Environmental Management* 119: 56-66.
- Garthe S. and Hüppop O. (2004). Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. *Journal of Applied Ecology* 41 (4) p. 724-734.
- Gibbons, D.W., Reid, J.B. & Chapman, R.A. (1993). *The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991*. T. & A.D. Poyser
- Gilbert G, Stanbury A and Lewis L (2021), “Birds of Conservation Concern in Ireland 2020 –2026”. *Irish Birds* 43: 1-22
- Gilbert, G., Gibbons, D.W. & Evans, J. (1998) *Bird Monitoring Methods - a Manual of Techniques for Key UK Species*. RSPB: Sandy.
- Gittings, T., Peppiatt, T. and Troake, T (2015). Disturbance response of Great Northern Divers *Gavia immer* to boat traffic in Inner Galway Bay. *Irish Birds* 10: 163–166 (2015)

Gorenzel, W.P. & Salmon, T.P. (1995). Characteristics of American Crow urban roosts in California. *The Journal of Wildlife Management*, 59, 638–645.

Haffner M, Stutz HP (1986) Abundance of *Pipistrellus pipistrellus* and *Pipistrellus kuhlii* foraging at street-lamps. *Myotis* 23-24: 167–168.

Hannon C., Berrow, S. and Newton, S.F. (1997) The status and distribution of breeding Sandwich, Roseate, Common, Arctic and Little Terns in Ireland in 1995. *Irish Birds*, Vol. 6; No. 1, p1-22.

Holman et al. (2020). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1, Institute of Air Quality Management, London. Available at: <https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf>

Hutterer, R., Ivanova, T., Meyer-Cords, C. & Rodrigues, L. (2005). Bat Migrations in Europe. A Review of Banding Data and Literature. *Naturschutz und Biologische Vielfalt* 28. Federal Agency for Nature Conservation, Bonn.

Johnson, W. F. and J. N. Halbert (1902). "A list of the beetles of Ireland." *Proceedings of the Royal Irish Academy* 6(3): 535-827.

Kelleher, C. & Marnell, F. (2006). Bat Mitigation Guidelines for Ireland: *Irish Wildlife Manuals*, No. 25.

Kempnaers, B., Borgström, P., Loës, P., Schlicht, E., and Valcu, M. (2010). Artificial night lighting affects dawn song, extra-pair siring success, and lay date in songbirds. *Curr. Biol.* 20, 1735–1739.

Lewis, L. J. & Tierney, T. D. (2014) Low tide waterbird surveys: survey methods and guidance notes. *Irish Wildlife Manuals*, No. 80. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Linley E.A.S., Wilding T.A., Black K., Hawkins A.J.S. and Mangi S. (2007). Review of the reef effects of offshore wind farm structures and their potential for enhancement and mitigation. Report from PML Applications Ltd and the Scottish Association for Marine Science to the Department for Business, Enterprise and Regulatory Reform (BERR), Contract No: RFCA/005/0029P

Lofts, C.; Merton, D. (1968). Photoperiodic and physiological adaptations regulating avian breeding cycles and their ecological significance. *J. of the Zoological Society of London* 155: 327-394.

Macklin, R. (2019). Otter Survey of Corkbeg island, Whitegate, Co. Cork. Prepared by Triturus Environmental Services for Arup on behalf of Irving Oil.

McGuire, L.P., Fenton, M.B. & Guglielmo, C.G. (2013). Phenotypic flexibility in migrating bats: seasonal variation in body composition, organ sizes and fatty acid profiles. *The Journal of Experimental Biology*, 218: 800-808.

McGuire, L.P., Guglielmo, C.G., Mackenzie, S.A. & Taylor, P.D. (2011). Migratory stopover in the long-distance migrant silver-haired bat, *Lasionycteris noctivagans*. *Journal of Animal Ecology*: doi: 10.1111/j.1365-2656.2011.01912.x

MKO 2019. Waterfowl numbers, usage and distribution on the River Shannon and River Fergus Estuaries - Final Survey Report. 170160 – F – Final Survey Report – 2019.01.30. 170160 – F – Final Survey Report – 2019.01.30 on behalf of Claire County Council

Natura (2012). Strategic Integrated Framework Plan for the Shannon Estuary Identification and rating of bird areas within the River Shannon and River Fergus Estuaries

Natural England (2006) Natural England Species Information Note SIN006 Otter: European protected species.

NPWS (2012a) Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012b) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012c) River Shannon & River Fergus Estuaries Special Protection Area (Site Code 4077) Conservation Objectives Supporting Document VERSION 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NRA (2005a) Guidelines for the treatment of badgers prior to the construction of national road schemes. National Road Authority

NRA (2005b) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes. National Road Authority

NRA (2005c) Guidelines for treatment of bats during construction of National Road Schemes. National Road Authority

NRA (2006) Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes. National Roads Authority

NRA (2008) Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. National Road Authority

NRA (2009) Guidelines for assessment of ecological impacts of National Road Schemes. National Road Authority

OPR (2021). Practice Note PN01 Appropriate Assessment Screening for Development Management

Popa-Lisseanu, A.G., Sörgel, K., Luckner, A., Wassenaar, L.I., Ibáñez, C., Kramer-Schadt, S., Ciechanowski, M., Görföl, T., Niermann, I., Beuneux, G., Mysłajek, R.W., Juste, J., Fonderflick, J., Kelm, D.H. & Voigt C.C. (2012). A Triple-Isotope Approach to Predict the Breeding Origins of European Bats. *PLoS ONE* 7(1): e30388. doi:10.1371/journal.pone.0030388.

Raap, T., Casasole, G., Costantini, D., AbdElgawad, H., Asard, H., Pinxten, R., et al. (2016a). Artificial light at night affects body mass but not oxidative status in free-living nestling songbirds: an experimental study. *Sci. Rep.* 6:35626.

Reid, N., Hayden, B., Lundy, M.G., Pietravallo, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

RPS (2012). Port of Cork Bird Surveys: Night-roosting Cormorants at Monkstown Creek, Cork Harbour 2011

RPS (2014). Port of Cork Bird Surveys: Report on Night-Time Tree-Roosting Cormorant Survey at Monkstown Creek, Cork Harbour 2011 / 2012. Unpublished report included in the Ringaskiddy Port Redevelopment EIS (2014 version).

RPS (2015). Ringaskiddy Port Redevelopment. Shoreline Otter survey at Ringaskiddy Deepwater Port.

RPS (2017). Capacity Extension at Shannon Foynes Environmental Impact Assessment Report Volume 1 Main Document

Ruddock, M., Mee, A., Lusby, J., Nagle, A., O'Neill, S. & O'Toole, L. (2016). The 2015 National Survey of Breeding Hen Harrier in Ireland. Irish Wildlife Manuals, No. 93. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland.

Ruddock, M., Wilson-Parr, R., Lusby, J., Connolly, F., J. Bailey, & O'Toole, L. (2024). The 2022 National Survey of breeding Hen Harrier in Ireland. Report prepared by Irish Raptor Study Group (IRSG), BirdWatch Ireland (BWI), Golden Eagle Trust (GET) for National Parks & Wildlife Service (NPWS). Irish Wildlife Manuals, No. 147. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Scottish Natural Heritage (SNH) (2018) Surveying for Badgers. Good practice guidelines.

Sharrock, J. T. R. (1976). The atlas of breeding birds in Britain and Ireland. T. & A.D. Poyser, London.

Speakman JR (1991) Why do Insectivorous Bats in Britain Not Fly in Daylight More Frequently? *Funct Ecol* 5: 518–524..

Stace, C.A. *New Flora of the British Isles* 4th Edition.

Stone EL, Jones G, Harris S (2009) Street lighting disturbs commuting bats. *Curr Biol* 19: 1123– 1127.

Toft JD, Cordell JR, Simenstad CA, Stamatiou LA. (2004) Fish distribution, abundance, and behavior at nearshore habitats along city of Seattle marine shorelines, with an emphasis on juvenile salmonids. *Seattle Public Utilities* 2004. p. 52.

Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., ... & MacGarthaigh, M. (2005). *Water quality in Ireland*. Environmental Protection Agency, Co. Wexford, Ireland.

Topping, C. & Petersen, I.K. 2011. Report on a Red-throated Diver agent-based model to assess the cumulative impact from offshore wind farms. Report commissioned by Vattenfall A/S. Aarhus University, DCE - Danish Centre for Environment and Energy.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. and Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

