Planning and Environmental Consultants

Appropriate Assessment Screening Report and Natura Impact Statement

Limerick WWTP Upgrade and Regional Bioresource Centre



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Glossary

Acronym	Definition
AD	Anaerobic Digestion
AGS	Aerobic Granular Sludge
AER	Annual Environmental Report
BOD	Biochemical Oxygen Demand
DIN	Dissolved Inorganic Nitrogen
DAP	Drainage Area Plan
ELV	Emission Limit Value
EO	Emergency Overflow
EQS	Environmental Quality Standards
MRP	Molybdate Reactive Phosphate
NWSMP	National Wastewater Sludge Management Plan
PE	Population Equivalent - The amount of wastewater received at a treatment plant (and its design capacity) is measured in units known as population equivalent (or PE). The wastewater received from all sources, e.g. industrial, tourism, commercial, residential, etc., is converted into these units, with one unit of PE representing the wastewater treatment load typically generated by a single person.
PFF	Pass Forward Flow
PFT	Picket Fence Thickener
PS	Pump Station
RBC	Regional Bioresource Centre
SWR	Surface Water Regulations - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019
SWO	Storm Water Overflow
SuDS	Sustainable Drainage Systems
UWWTD	Urban Wastewater Treatment Directive
WFD	Water Framework Directive
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

1.1 Background

MKO has been appointed to provide the information necessary to allow the competent authority to conduct an Article 6(3) Appropriate Assessment of the proposed upgrade works to the Wastewater Treatment Plant at Limerick, Co. Limerick.

Screening for Appropriate Assessment is required under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). Where it cannot be excluded that a project or plan, either alone or in combination with other projects or plans, would have a significant effect on a European Site then same shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives. The current project is not directly connected with, or necessary for, the management of any European Site. Consequently, the project has been subject to the Appropriate Assessment Screening process.

This Natura Impact Statement (NIS) has been prepared in accordance with the European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021) and Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018) as well as the Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010) and the Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021).

1.2 Statement of Authority

This report has been written by Rachel Walsh (BSc. Env, MCIEEM) who is a Senior Ecologist with 6 years' of experience of ecological impact assessment and appropriate assessment and has worked on a wide range of projects including water services infrastructure and renewable energy projects. This report has been reviewed by Sarah Mullen (BSc., MSC., PhD., ACIEEM). Sarah is a Project Director with MKO and has 10 years' experience in ecological consultancy. Habitat and terrestrial faunal surveys were undertaken by Rachel Walsh. Rachel's key strengths and experience are in botanical surveying, Irish Vegetation Classification, identification of Annex I habitats, invasive species surveys and mammal surveying. Bird surveys were undertaken by Julie O' Sullivan (B.Sc., M.Sc.), Kieran Sugrue (B.Sc. Zoology) and Neansaí O' Donovan (B.Sc. Wildlife Biology).

1.3 Methodology

1.3.1 Appropriate Assessment Process

Screening - The purpose of the screening stage is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project, either alone or in combination with other plans or projects, is likely to have significant effects on a European site in view of the site's conservation objectives.

There is no necessity to establish such an effect; it is merely necessary for the Competent Authority to determine that there may be such an effect. The need to apply the precautionary principle in making any key decisions in relation to the tests of Appropriate Assessment has been confirmed by the case law of the Court of Justice of the European Union (CJEU). Plans or projects that have no appreciable effect on a European site may be excluded. The threshold at this first stage is a very low one and operates as a trigger in order to determine whether Appropriate Assessment of a project is required. Therefore, where significant effects are likely, uncertain or unknown at screening stage, an AA of the project will be required.

Appropriate Assessment - This stage of the process is a focused and detailed examination, analysis and evaluation by the Competent Authority of the implications of the plan or project, either alone or in combination with other plans and projects, on the integrity of a European site in view of that site's conservation objectives. Case law has established that such an Appropriate Assessment, to be lawfully conducted must:

> (i) identify, in the light of the best scientific knowledge in the field, all aspects of the proposed project which may, by itself or in-combination with other plans or projects, affect the conservation objectives of the European site;
>
> (ii) contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps; and
>
> (iii) may only include a determination that the proposed project will not adversely affect the integrity of any relevant European site where the competent authority decides (on the basis of complete, precise and definitive findings and conclusions) that no reasonable scientific doubt remains as to the absence of potential adverse effects. If adverse impacts can be satisfactorily avoided or successfully mitigated at this stage, so that no reasonable doubt remains as to the absence of the identified potential effects, then the process is complete. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to stage three (assessment of alternative) and, if necessary, stage four (IROPI[1]).

1.3.2 Desk Study

The desk study undertaken for this assessment included a thorough review of the available ecological data associated with the screened-in European Sites within the Likely Zone of Influence of the Proposed Development. Sources of data included the following:

- Review of NPWS Conservation Objectives supporting documents, site synopsis, standard data forms and supporting documents for European Designated Sites,
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), Environmental Protection Agency (EPA),
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper,
- Review of NPWS Article 17 metadata and GIS database.
- Review of relevant chapters of the Environmental Impact Assessment Report submitted as part of this application, including Chapter 10 ‘Noise’, and Chapter 16 ‘Water’.

[1] *IROPI - 'imperative reasons of overriding public interest', the test found in Article 6(4) of the Habitats Directive.*

1.3.3 Ecological Survey Methodologies

1.3.3.1 Ecological Multidisciplinary Walkover Survey

Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological baseline conditions are those existing in the absence of proposed activities (CIEEM 2018).

Multidisciplinary walkover surveys, including invasive species surveys, were conducted on the 15th of August 2023, 24th of April 2024, and the 23rd of July 2025 in line with NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes) by MKO. The ecological surveys were undertaken within the optimal time of year to undertake a habitat and flora survey (Smith et al. 2011). No works are proposed at the existing discharge point from the Plant within the Shannon Estuary. The multi-disciplinary surveys covered the extent of the Red Line Boundary and included both Limerick WWTP and Corcanree Pump Station (PS). The multi-disciplinary surveys also covered habitats adjacent to the Limerick WWTP and Corcanree PS which were deemed potentially suitable to host protected species with potential to be impacted by the works. Habitats were identified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000). Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2019), while mosses and liverworts nomenclature follows 'Mosses and Liverworts of Britain and Ireland - a field guide' (British Bryological Society, 2010).

1.3.3.2 Otter Surveys

Dedicated otter surveys were undertaken on the 15th of August 2023, 24th of April 2024, and 23rd of July 2025. The surveys were carried out in accordance with NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes) and NRA (2009) Guidelines for the Treatment of Otter During Construction of National Road Schemes. A search was carried out along drain ditches within and adjacent to the Limerick WWTP and Corcanree PS, as well as along the shores of Bunlicky Lake and associated inflowing watercourse to the north of Limerick WWTP. The shore of the Shannon Estuary in the vicinity of Corcanree PS was also surveyed. The survey included a search for holts, couches, slides, spraints, prints and feeding remains.

1.3.3.3 Wintering Bird Surveys

Full details of Wintering Bird Survey Methodologies are provided in Appendix 1.

Wintering Bird Surveys were undertaken within the Limerick WWTP and Corcanree PS, as well as suitable surrounding habitats, during the 2020/2021, 2022/2023 and 2024/2025 wintering seasons. The survey area covered the development site at Limerick WWTP and Corcanree PS, and areas of potentially suitable supporting habitat in proximity to the Proposed Development site including areas of agricultural grassland adjacent to Limerick WWTP, Bunlicky Lake, the estuarine habitat adjacent to the outfall at Limerick WWTP and the estuarine habitat adjacent to Corcanree Pumping station.

The surveys were undertaken monthly between October and March. Surveys were undertaken at alternate high/low tides, within two hours of high/low tide. A combination of low and high tide counts has been used due to the differences in behaviour and site use between tidal states, with different species likely to be foraging and roosting in different areas of River Shannon and River Fergus Estuaries SPA and the surrounding terrestrial habitats, depending on the stage of the tidal cycle.

The surveys were undertaken by an appropriately qualified Ecologist (surveyor details provided in the Section 1.2 in this report). All observations were recorded, and detailed point data was gathered for each species observation, with all bird species denoted using standard British Trust for Ornithology (BTO) codes and with the number of each species recorded next to each registration. The target

species recorded in the surveys were those covered by Irish Wetlands Bird Survey (I-WeBS) counts, i.e., all divers, grebes, cormorant, shag, herons, swans, geese, ducks, rails, crakes, waders, gulls, and kingfisher. However, in addition to this, all other bird species, including raptors and all common and widespread passerines, were also recorded from within the proposed development sites.

The winter bird surveys at the nearby SPA followed the Irish Wetland Bird Survey (I-WeBS) methodology; the simple 'look-see' method, whereby all birds present within a predefined area are counted (Gilbert et al., 1998; Bibby, C.J., 2000; Birdwatch Ireland, 2018). The surveys were carried out at suitable vantage points within the sites; additional vantage points were located overlooking the section of the River Shannon and River Fergus Estuaries SPA in close proximity to the Proposed Development sites. Vantage points were chosen to have as large as possible a view of the Proposed Development sites, adjacent wetland habitats and potential adjacent daytime foraging habitat in the vicinity of the Proposed Development sites. The chosen vantage points were stopped at for 15-minute intervals each, along a transect walk on each survey day. Vantage points focused on areas which were deemed to be of likely significance to wintering waterbirds of River Shannon and River Fergus Estuaries SPA. Walked transects were undertaken within the site boundaries in conjunction with vantage point surveys.

1.3.3.4 Estuarine Surveys

AQUAFACT International Services Ltd. (part of the APEM Group) undertook a biological assessment of the estuarine environment in the vicinity of the discharge from Limerick WWTP. Full details of the methods and results of the surveys are found in the Estuarine Ecological Survey Report, Appendix 2.

Subtidal Surveys:

A subtidal benthic assessment of the area was undertaken by sampling a total of 6 stations on the 18th January 2024 from AQUAFACT's 6.8m Lencraft RIB. The weather on both days was clear and frosty. There was a force 1 north-westerly wind blowing. High water was at 12pm (5.32m) at Limerick Docks. The locations of all subtidal stations sampled can be seen in Figure 2.1 and Table 2.1 of the Estuarine Ecological Survey Report, Appendix 2.

Intertidal Surveys:

AQUAFACT carried out 3 intertidal transects on the 18th of January 2024. Transect 1 was upstream of the WWTP outfall and Transects 2 and 3 were downstream of the outfall on opposite banks of the river. Figure 2.1 of the Estuarine Ecological Survey Report illustrates their locations. The weather on both days was clear and frosty. There was a force 1 north-westerly wind blowing. High water was at 12pm (5.32m) at Limerick Docks. A grab survey was necessary to carry out the intertidal survey as the substrate was fine soft mud and it was not possible or safe to stand on the substrate at low water. Instead, the same procedure used for the subtidal benthic survey was employed.

Full technical details of the methods used for sample collection and data analysis is provided in the Estuarine Ecological Survey Report in Appendix 2.

1.3.3.5 Survey Limitations

All ecological surveys were undertaken within the appropriate time of year for ecological surveys, including habitat and flora surveys (Smith et al. 2011), bat surveys, mammal surveys and wintering bird surveys. No significant access issues which hindered the assessment were encountered. A full and comprehensive survey was achieved.

2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 Site Location

The existing WWTP is located west of Limerick City Centre, along the southern bank of the Shannon Estuary (Grid Ref.: R 54655 55569). The Ballinacurra Creek/Ballynaclogh watercourse, a tributary of the Shannon, meets with the Shannon Estuary approximately 460m north of the existing WWTP. This section of the Shannon and the lowermost section of the Ballinacurra creek adjacent to the WWTP comprise the River Shannon and Fergus Estuaries SPA [004077] and the Lower River Shannon SAC [002165]. The site location is shown in Figure 2-1.

The Limerick WWTP is serviced by the Ballykeele road which connects the WWTP to the N18 Dock Road. To the west of the WWTP, a thin section of arable land separates the site from Bunlicky Lake to the west, which forms part of the River Shannon and Fergus Estuaries SPA.

Corcanree Pump Station (PS) is the main pumping station on the Limerick Main Drainage network, and it accounts for c. 90% of the flows to the WWTP. It is located approx. 700m to the east of the WWTP (grid ref: R 55421 56184).

Treated effluent from the WWTP is discharged via a 1.1km long outfall pipe into the Shannon Estuary, located approx. 760m northwest of Limerick WWTP (grid ref: R 53952 56266).

2.2 Characteristics of the Proposed Development

2.2.1 The Existing Wastewater Treatment Plant

Limerick Wastewater Treatment Plant has been providing service to the area since the early 2000s. Biosolids are the bioresource output from the process. Biogas is the other output. The existing plant was last upgraded in 2017 and currently already treats sludge produced at the plant itself and imports from smaller plants in Limerick, Clare and Tipperary.

Uisce Éireann has identified that the Limerick Wastewater Treatment Plant is currently reaching capacity and an upgrade is required to ensure continued environmental compliance, and to support both the existing and future growth and development of Limerick City into the future.

The continuation of appropriate wastewater treatment will be vital to protect both human health and the local environment, as population grows and industry continues to expand in Limerick City.

Limerick Wastewater Treatment Plant has also been selected as the preferred location in the Southern Region for the development of a Regional Bioresource Centre, accepting sludge imports from smaller plants in Counties Limerick, Clare and Tipperary. This forms part of the National Wastewater Sludge Management Plan which aims to deliver a sustainable and standardised approach for wastewater sludge management.

The existing Emission Limit Values (ELVs) as per the existing discharge licence for Limerick WWTP is shown in the table below.

Table 2-1 Limerick WWTP Discharge Licence ELVs

Parameter	Emission Limit Value	
pH	6 - 9	
	mg/l	kg/day
BOD	25	750
COD	125	-
Suspended Solids	35	-
Orthophosphates (as P)	6.5	-

2.2.1.1 Existing WWTP Outfall Arrangement

The Limerick Sewage outfall is located in the upper section of the Shannon Estuary with specific licenced details as follows:

- Primary Discharge Point Code: DP1
- Location: 153944E 156252N
- WFD Code: IE-SH-060-0900

The treated effluent travels 1.1 km from the main plant to the outfall point via a 1,200 mm diameter HDPE pipe. It is transported by gravity flow during low tide, and pumped during high tide. The discharge is released via a submerged diffuser chamber located at the headwall of the outfall structure. It then flows along a gabion mattress that extends a further 20 meters into the main river channel.

2.2.1.2 Existing Stormwater Storage Capacity

The existing 7,500m^3 stormwater storage tank at the WWTP does not have sufficient capacity to handle excess storm flows from the drainage network in accordance with surface water regulations. Based on Stage 3 Drainage Area Plan (DAP) modelling and verified through TSR simulations undertaken by Egis, indicates an average of approximately 213 spill events per year from the stormwater overflows (SWOs) associated with the WWTP. This spill frequency is in breach of the Urban Wastewater Treatment Directive (UWWTD) and Uisce Éireann Technical Standards. Additional stormwater storage will be provided as part of the upgrade project to reduce the rate of uncontrolled spills and bring the agglomeration into compliance with legislation.

2.2.2 Description of the Proposed Development

The Proposed Development pertains to the construction of upgrades to the wastewater treatment plant and bioresource centre, as well as the addition of a new stormwater storage tank. These upgrades will be implemented across the existing Limerick WWTP site and Corcanree PS site. The constituent elements are outlined below.

2.2.2.1 Wastewater Treatment Capacity Upgrade

The proposed upgrade works will support growth demands in the agglomeration by improving the treatment processes at Limerick WWTP. The WWTP capacity upgrade element of the project will cater for the 10-year growth projections, extending the existing WWTP from 130,000PE to 285,000 PE. Additional capacity will be provided by a new Aerobic Granular Sludge (AGS) process stream with a capacity of up to 157,000PE. The new process stream will operate in parallel with the existing CAS system. The additional treatment capacity will facilitate domestic, commercial, and industrial future projected loadings, and it will ensure compliance with the requirements of UWWTD, WWDL and Uisce Éireann policies. The following elements are proposed:

- Construct a new 157,000 PE inlet works and AGS process stream to operate in parallel with the existing WWTP arrangement.
- Divert 1 no. rising main from Corcanree PS to the new process stream, allowing a 50:50 flow split between the new and existing works.
- Retain Mungret pumping arrangement through existing works.
- Retain the existing 1.1km outfall pipe to the Shannon Estuary.

2.2.2.2 Proposed Stormwater Storage (Corcanree PS)

The proposed stormwater storage tank is a large piece of infrastructure that must cater for the long-term 25-year expansion. Total storage volume for the long term projected 325,000 PE is calculated to be c. 20,000m^3 in accordance with UWWTD stormwater storage requirements. The existing stormwater holding tank at the WWTP can accommodate 7,500m^3, therefore a minimum storage volume of 12,500m^3 must now be provided. The proposed location for the stormwater tank is a greenfield site adjacent and north of Corcanree PS. Space is limited at the main WWTP site, so locating it at Corcanree leaves sufficient room at the WWTP for the other elements of the upgrade works, and for any future upgrades that may be required. The following elements are included:

- Construct new 12,500m3 stormwater storage tank with gravity overflow to existing Corcanree outfall chamber.
- Upgrade Foul Pumps Rates at Corcanree from 1,250l/s to 1,989l/s.

2.2.2.3 Regional Bioresource Centre

The proposed Regional Bioresource Centre (RBC) will be designed to treat indigenous sludge and imported sludges from Counties Limerick, Clare and Tipperary to the required Code of Good Practice standard for reuse of Biosolids in Agriculture, in alignment with the National Wastewater Sludge Management Plan (NWSMP). The current national strategy is to regionalise sludge treatment and achieve a Class A Biosolid through a combination of Anaerobic Digestion (AD) and heat treatment. Through Anaerobic Digestion, the plant can generate biogas, a source of renewable energy, which will be used to generate electrical power for use on site and to produce heat which is required for the AD process. There will be liquor treatment plant for centrate returns from the RBC to the main treatment process works, so there will be minimal risk to ammonia overloading in the main treatment process. The following elements are included:

- Retain existing imported cake sludge reception facility.
- Construct a new dewatered sludge cake reception facility.
- Retain & refurbish existing 2. No digester feed tanks as pre -THP dewatering feed tanks.
- New odour control system to cater for overall sludge hub installation.
- New dewatered sludge cake silo for blending and storage of cake imports.
- New Thermal Hydrolysis plant (THP).
- New 3rd Anaerobic Digestion tank to allow operational flexibility.
- Provide additional gas storage to facilitate increased biogas production.
- CHP and Biomethane production options.
- New digested sludge dewatering installation to cater for full digested sludge.
- Treated biosolid export storage silo.
- Upgraded wash water system with added UV treatment.

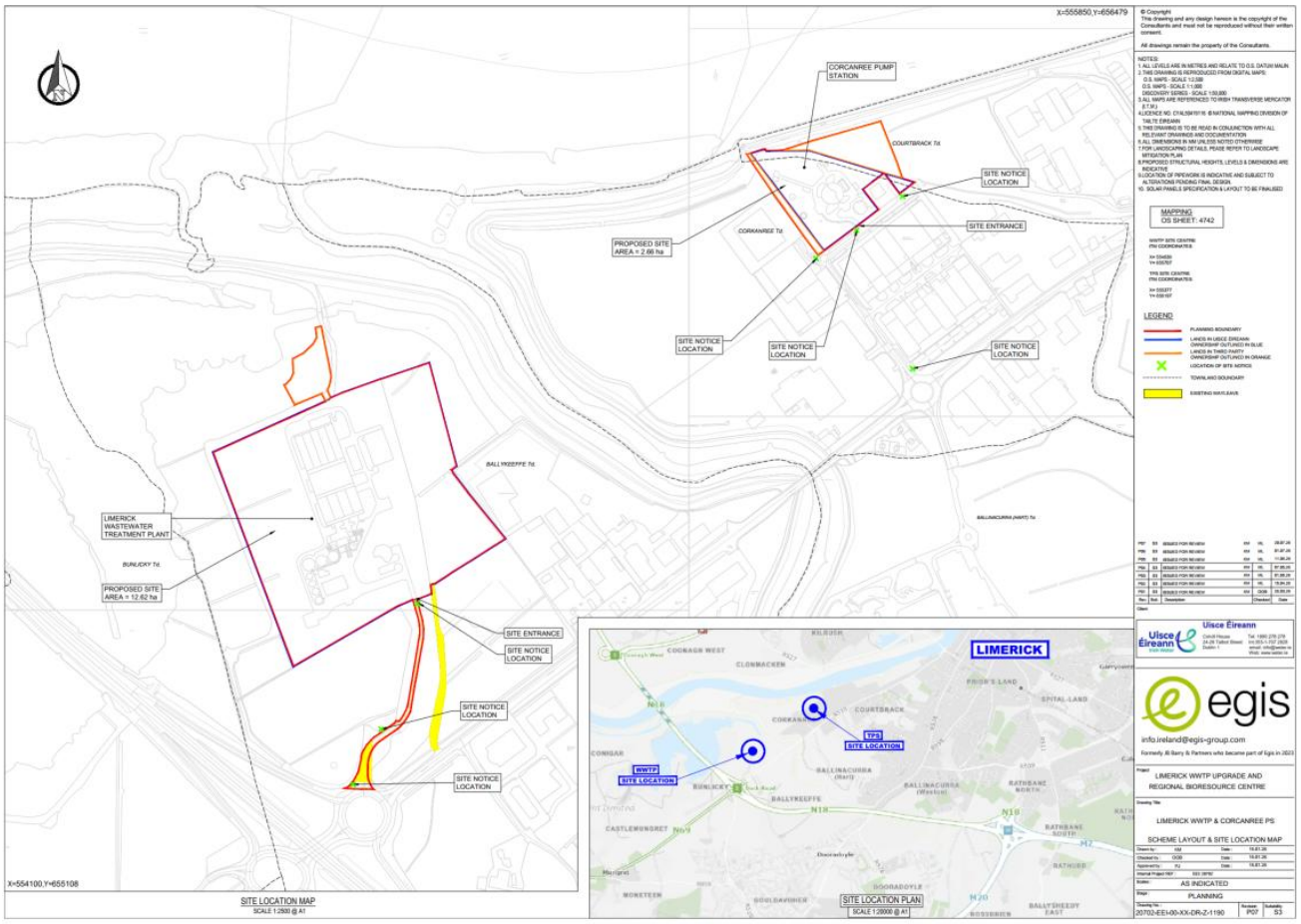


Figure 2-1 Site Location Map



Figure 2-2 Proposed Site Layout - Limerick WWTP



Figure 2-3 Proposed Site Layout - Limerick WWTP (B)

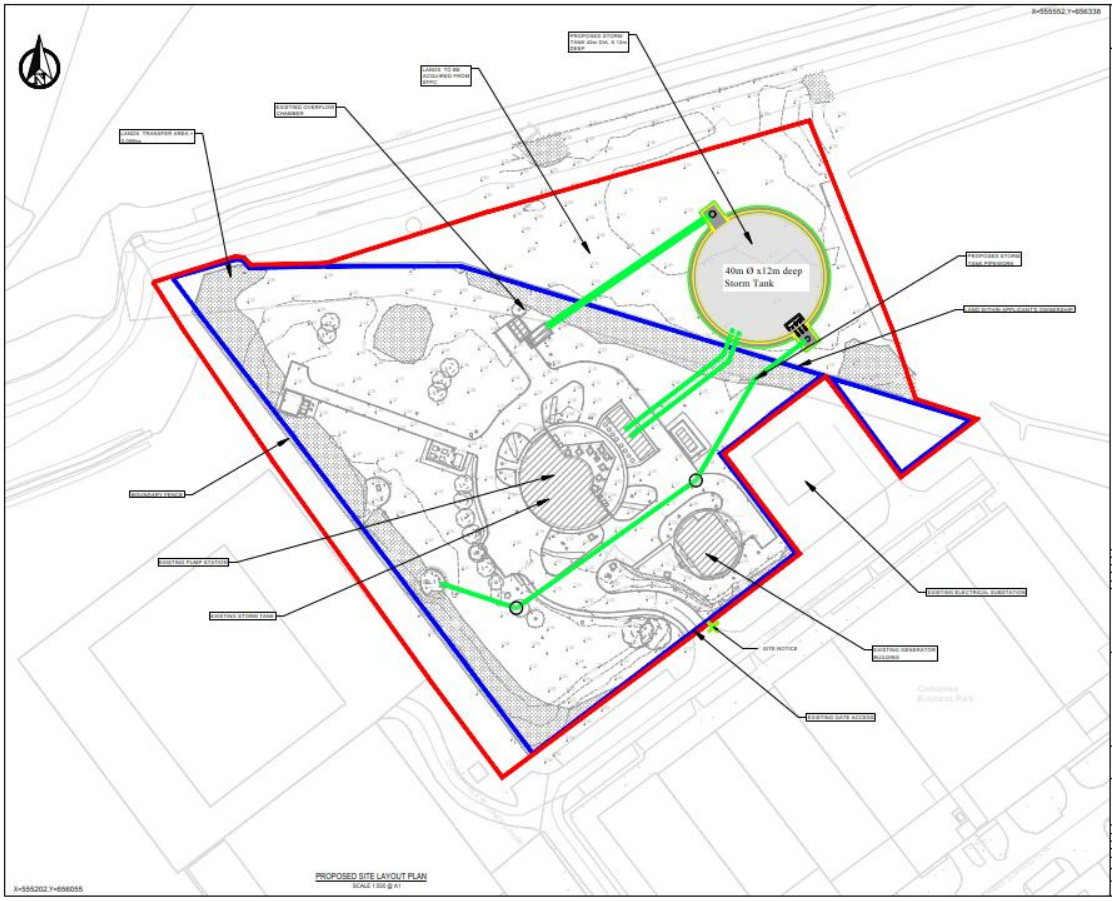


Figure 2-4 Proposed Site Layout - Corcanree Pump Station

3. CHARACTERISTICS OF THE RECEIVING ENVIRONMENT

3.1 Hydrological Desk Study

3.1.1 Existing Water Quality Data

The Limerick Sewage outfall is located in the upper section of the Shannon Estuary with specific licenced details as follows:

- Primary Discharge Point Code: DP1
- Location: 153944E 156252N
- WFD Code: IE-SH-060-0900

The treated effluent travels 1.1 km from the main plant to the outfall point via a 1,200 mm diameter HDPE pipe. It is transported by gravity flow during low tide and pumped during high tide. The discharge is released via a submerged diffuser chamber located at the headwall of the outfall structure. It then flows along a gabion mattress that extends a further 20 meters into the main river channel.

Information obtained from Uisce Éireann Annual Environmental Reports (AERs) indicate the WWTP has a design organic capacity of 186,233 PE and a peak hydraulic capacity of 88,500 m^3/day. Peak weekly organic loads (~141,439 PE) remain within design capacity, but annual maximum hydraulic loadings (~85,606 m^3/day) approach or exceed peak design flows, occasionally resulting in operational pressure. Compliance with Emission Limit Values (ELVs) has historically included exceedances for COD, BOD, Suspended Solids, and nutrients, with the plant recording around 10–12 EPA-reportable incidents per year since 2020. The most recent report indicates that final effluent compliance was achieved throughout 2024, although hydraulic loading remains a limiting factor.

With regard to stormwater storage capacity, the existing 7,500m3 stormwater storage tank at the WWTP has limited capacity to manage excess flows from the drainage network during periods of heavy rainfall. Drainage Area Plan (DAP) modelling and TSR simulation/verification undertaken by Egis indicate an average of approximately 213 spill events per year from the stormwater overflows (SWOs) associated with the WWTP. These spills consist of screened storm flows discharged to the Shannon Estuary. The current frequency of spill events does not meet performance standards set out in the Urban Wastewater Treatment Directive (UWWTD) and Uisce Éireann Technical Standards, ensuing the need for additional storage capacity.

Existing water quality data is provided below.

WFD Waterbody Status

The Limerick WWTP discharges into the transitional waterbody Limerick Dock. The main contribution of river water from upstream comes from the Shannon River, which is the WFD Shannon lower river. Downstream of Limerick WWTP are the Upper Shannon Estuary (approx. 1km downstream) and the Maigue Estuary (approx. 10km downstream).

Limerick Dock and the Upper Shannon Estuary are of 'Poor Status.' The WFD assessment looks at a wide range of conditions (fish, phytoplankton, invertebrates, chemical conditions, etc.) to assess the current status. For the Upper Shannon estuary, the aquatic flora is insufficiently present (angiosperms).

Table 3-1 Shannon Estuary WFD Waterbody Status Attributes

WFD Waterbody Status Limerick Dock	
Transitional Waterbody Code	IE_SH_060_0900
Protected Area	Yes
WFD Risk (3rd cycle)	At Risk
WFD Status (2019-2024)	Poor
Sub catchment	Ballynaclogh_SC_010
Pressures	Hydromorphology pressures
WFD Waterbody Status Upper Shannon Estuary	
Transitional Waterbody Code	IE_SH_060_0800
Protected Area	Yes
WFD Risk (3rd cycle)	At Risk
WFD Status (2019-2024)	Poor
Sub catchment	Ballynaclogh_SC_010
Pressures	Agriculture

3.1.2 Flood Risk

A Flood Risk Assessment was carried out which indicates that both sites are located within Flood Zone A, representing a high risk of flooding. However, they are also located within an area benefitting from existing arterial drainage and embankment defences.

The lands within Corcanree PS are partially impacted during a 0.1% coastal flood extent. In the absence of defences, flood waters would encroach on the northwest corner of the site. This area is only required for temporary works during the construction period, and flood waters do not reach the area of the site where the proposed storm tank will be situated.

3.1.3 Inland Fisheries Ireland Data

Inland Fisheries Ireland carried out fish stock surveys of the Shannon Estuary, Fergus Estuary and Limerick Docks in 2014 (Kelly et al. 2014). The Limerick Docks sampling site is approx. 7.5km downstream of Castletroy WwTP. A total of six beach seines, six fyke nets and six beam trawls were deployed in Limerick Docks water body in October 2014.

Limerick Docks

A total of 13 fish species were recorded in Limerick Docks. Flounder was the most abundant species, followed by smelt. In a similar trend to many of the other transitional water surveys, flounder was widespread, being recorded using all three netting methods.

A number of species were newly recorded in the 2014 survey, including lamprey sp., plaice, sand goby, smelt, sprat and thick-lipped grey mullet. Dace, an invasive species to this country, was also newly recorded in 2014. Common goby, pike and salmon were previously caught in 2008 but not captured in the 2014 survey of the Limerick Docks. European eel was also recorded during this survey.

Fish were recorded in the following order of decreasing frequency: Flounder (*Platichthys flesus*), Smelt (*Osmerus eperlanus*), Three-spined stickleback *(Gasterosteus aculeatus),* Roach (*Rutilus rutilus)*, European eel (*Anguilla Anguilla*), Sprat (*Sprattus sprattus*), Dace (*Leuciscus leucisus)* Perch (*Perca fluvialtilis*), Sand goby (*Pomatoschistus minutus*), Brown trout (*Salmo trutta*), Lamprey sp., Plaice (*Pleuronectes platessa*), Thick-lipped grey mullet (*Chelon labrosus*).

Upper Shannon Estuary

A total of 22 fish species were recorded in the Upper Shannon Estuary in October 2014. Flounder was the most abundant species, followed by sprat and sand goby. Flounder was widely distributed throughout the water body, being captured using all three netting methods, while other species such as sand goby were more localised, only recorded in the shallow marginal areas using beach seines. A number of species were newly recorded in 2014, including Atlantic horse mackerel/scad, bib, brill, coalfish/saithe, fifteen-spined stickleback, pogge and grey gurnard. Long-spined sea scorpion, perch, poor cod and short-spined sea scorpion were previously caught in 2008 but not captured in the 2014 survey. European eel was also recorded during this survey.

Lower Shannon Estuary

A total of 29 fish species were recorded in the Lower Shannon Estuary in October 2014. Sprat was the most abundant fish species, followed by sand goby, thick-lipped mullet and sand smelt. Flounder was well distributed throughout this water body, being captured using all three netting methods. A number of species were newly recorded in 2014, including bib, coalfish/saithe, grey gurnard, mackerel and sand sole. A number of species were previously caught in 2008 but not captured in the 2014 survey, including black goby, cod, European sea bass and European eel. This was the only water body surveyed during 2014 in which thornback ray was recorded.

The report concludes that plaice, smelt, flounder, sand goby, and sprat were among the most abundant and widespread species recorded between Limerick Docks and the Lower Shannon Estuary.

3.2 Results of Baseline Ecological Surveys

3.2.1 Terrestrial Habitats

3.2.1.1 Limerick Wastewater Treatment Plant

A habitat map of the Limerick WWTP is provided in **Error! Reference source not found.**. The majority of the site within the boundary of the WWTP comprises industrial buildings, WWTP infrastructure, areas of hardstanding, carparks and footpaths which are classified as buildings and artificial surfaces (BL3). Ornamental planting is also present categorised as flower beds and borders (BC4). Ornamentally planted trees within the site include 14 no. ash (*Fraxinus excelsior),* and 4 no. beech (*Fagus sylvatica)* planted to the south of the site. To the southwest of the site there are 4 no. beech, 1 no. ash and 4 no. Norway maple (*Acer platanoides).*

A thick treeline which is best classified as a linear woodland (WD1) surrounds the site and comprises ash, alder (*Alnus glutinosa),* hawthorn (*Crataegus monogyna),* goat willow (*Salix caprea),* grey willow (*Salix cinera)* and basket willow (*Salix viminalis)* (Plate 3-2).

Maintained and regularly mowed lawns within the site are classified as amenity grassland (GA2). These occur along the edges of footpaths and around infrastructure. Species include perennial rye grass (*Lolium perenne),* with common daisy (*Bellis perennis),* creeping buttercup (*Ranunculus repens),* white clover (*Trifolium repens)* and mouse ear chickweed (*Cerastium fontanum).*

Dry meadow/grassy verge habitat (GS2) occurs to the southwest of the site, adjacent to the anaerobic digestors. This comprises false oat grass (*Arrhenatherum elatius),* creeping thistle (*Cirsium arvense),* nettles (*Urtica dioica),* cocks foot (*Dactylis glomerata),* Yorkshire fog (*Holcus lanatus)* and great willowherb (*Epilobium hirsutum).* This grassland is of a high sward and is encroached with hedge bindweed (*Calystegia sepium).* This grassland slopes downwards towards the western trees.

Wet grassland (GS4) occurs to the south of the site and comprises cocks foot, Yorkshire fog, red fescue (*Festuca rubra),* birds foot trefoil (*Lotus corniculatus),* hard rush (*Juncus inflexus),* great willowherb, couch grass (*Elymus repens),* purple loosestrife (*Lythrum salicaria),* creeping buttercup, marsh thistle (*Cirsium palustre).* Meadowsweet (*Filipendula ulmaria),* soft rush (*Juncus effusus)* and knapweed (*Centaurea nigra)* are occasional. Alder saplings (*Alnus glutinosa)* are also present (Plate 3-3).

Within the west of the site, the grasslands are within a depressed area relative to adjacent surfaced areas. The southern extent of this area is classified as reed and large sedge swamp (FS1) interspersed with species more typical of grassy verge (GS2). The area is species poor and dominated by false oat grass, reed canary grass (*Phalaris arundinaceae),* creeping thistle (*Cirsium arvense),* field bindweed (*Convolvulus arvensis)* and lesser pond sedge (*Carex acutiformis).* The northern area of the grassland is dominated by hard rush (*Juncus inflexus)* with soft rush (*Juncus effusus)* and is classified as wet grassland (GS4). Also present are patches of common reed (*Phragmites australis)* and birds foot trefoil (*Lotus corniculatus).*

Narrow, short strips of wet woodland (WN6) run along the southern boundary and bisect the centre of the above-described grassland habitats. These woodlands are within wet depressions and comprise basket willow, grey willow, and alder. These habitats do not conform to the Annex I habitat type given their small size, context and lack of understory indicators. As outlined in Irish Wildlife Manual (IWM) 146- *The Monitoring and Assessment of four EU Habitats Directive Annex I Woodland Habitats*[2]*:*

'Strips which are short, narrow and discontinuous and surrounded by open habitat should not be assigned to 91E0, if they cannot be considered to be functioning woodlands. '

[2] *https://www.npws.ie/sites/default/files/publications/pdf/IWM146.pdf*

Within the northeast of the site is a high sward grassland classified as dry meadow/grassy verge (GS2), dominated by perennial rye grass, broad leaved dock (*Rumex obtusifolius),* spear thistle (*Cirsium vulgare)* and ragwort (*Senecio jacobaea). A*lso frequent are birds foot (*Lotus corniculatus),* meadow vetchling (*Lathyrus pratensis),* creeping buttercup (*Ranunculus repens)* and occasional purple loosestrife. To the east of the site is a wet grassland (GS4) comprising hard rush (*Juncus inflexus),* sedges (*Carex sp.),* birds foot and creeping thistle.

Some small areas of broadleaved woodland (WD1) are present within the southeast of the site and consist of birch (*Betula pubescens),* ash, alder, elm (*Ulmus sp.)* and sycamore (*Acer pseudoplatanus).*

Outside of the boundary of the WWTP to the north is an existing compound area used for storage of materials, categorised as recolonising bare ground (ED3). East of this area is an agricultural grassland (GA1) located adjacent to an unmapped watercourse, categorised as a lowland depositing river (FW2), which is connected to Bunlicky Lake.

To the northeast, outside of the WWTP site boundary, is a riparian woodland (WN5) which is approx. 20 years old (Plate 3-4). The woodland is dominated by willows (*Salix cinerea, Salix viminalis, Salix caprea)* and occasional hawthorn, with an understorey of reed canary grass (*Phalaris arundinaceae),* nettle, and occasional purple loosestrife (*Lythrum salicaria*), remote sedge (*Carex remota),* cleavers (*Galium aparine),* creeping thistle, meadowsweet, wood avens (*Geum urbanum),* creeping buttercup, pendulous sedge (*Carex pendula)* and rarely, hemlock water dropwort (*Oenanthe crocata). Kindbergia praelonga* is found growing on some trees. This habitat is a young, establishing riparian woodland and conforms with the Annex I habitat type Alluvial Woodland (91E0). As outlined in Irish Wildlife Manual (IWM) 146-*The Monitoring and Assessment of four EU Habitats Directive Annex I Woodland Habitats*[2]*:*

'… gallery forests of tall willows (Salicion albae) occur alongside river channels and occasionally on river islands, where the tree roots are almost continuously submerged, and are also referable to 91E0. These very distinctive woodlands are dominated by Salix triandra, S. x fragilis, S. alba and S. viminalis, sometimes with S. cinerea, but Alnus glutinosa is relatively rare. There is a luxuriant herb layer of species such as Phalaris arundinacea, Urtica dioica and Filipendula ulmaria.'

A dense, inaccessible woodland is located south of this area. A wide drainage ditch (FW4) separates the wet woodland from the southernmost woodland which is located on higher ground.

The potential temporary construction compound to the south of the WWTP is located within improved agricultural grassland (GA1) to the south of the WWTP site (Plate 3-5, see also Habitat Map Figure 3-1). The proposed internal construction compound to the north of the WWTP is within an existing hardstand area evidently used for past storage and compound facilities, categorised as recolonising bare ground (ED3) (Plate 3-6).

To the west of the WWTP boundary are agricultural fields (GA1) and an access road. To the west of this again is Bunlicky Lake, which is within the boundary of River Shannon and River Fergus Estuaries SPA. While the red line boundary for the Proposed Development is adjacent to the SAC boundary, the Shannon Estuary itself is approx. 400m north of the WWTP boundary. The Ballinacurra Creek which is within the SAC boundary, is approx. 80m north of the red line boundary and separates the WWTP from the estuary. The River Fergus and River Shannon Estuaries SPA boundary is adjacent to the northern boundary of the WWTP site.



Plate 3-1 Amenity grassland and roads within Limerick WWTP



Plate 3-2 Linear woodland along the western boundary of Limerick WWTP



Plate 3-3 Scrub, wet grassland and wet woodland in the west of Limerick WWTP



Plate 3-4 Riparian woodland (WN5) located northeast of limerick WWTP



Plate 3-5 Improved agricultural grassland (GA1) to the south of limerick WWTP, the footprint of the potential construction compound



Plate 3-6 Proposed internal construction compound to the north of the WWTP



Figure 3-1 Habitat Map of Limerick WWTP

3.2.1.2 Corcanree Pump Station

A habitat map of Corcanree Pump Station is shown in Figure 3-2. Corcanree Pump Station (Plate 3-7) consists of the pump building, generator building and associated hard standings and access road, categorised as buildings and artificial surfaces (BL3). Ornamental planting within the site comprises beech hedging (*Fagus sylvatica),* bramble and *Escalonia.*

The site is surrounded by linear woodland (WD1), approx. 20 years old, consisting of pedunculate oak (*Quercus robur),* ash, silver birch (*Betula pendula),* hawthorn, hazel (*Coryllus avellana),* willows (*Salix spp.)* and field maple (*Acer campestre).*

Highly managed and regularly mown grasslands are categorised as amenity grassland (GA2). A grassland area within the northwest of the pump station site boundary has been managed for biodiversity, categorised as dry meadow (GS2) and consists of a higher sward and richer biodiversity with species including false oat, knapweed (*Centaurea nigra),* Yorkshire fog (*Holcus lanatus),* creeping bent (*Agrostis stolonifera),* meadow vetchling (*Lathyrus pratensis),* creeping buttercup, bush vetch (*Vicia sepium),* field horsetail (*Equisetum arvense),* tufted vetch (*Vicia cracca),* purple loosestrife, birds foot trefoil, ox-eye daisy (*Leucanthemum vulgare),* and common fleabane (*Pulicaria dysenterica).* A cluster of trees and scrub are present within this area and include pedunculate oak, silver birch and dogwood (*Cornus sanguinea).* A number of standalone immatures to semi-mature trees are present within the north of the site including lime (*Tilia cordata),* sycamore, and hornbeam (*Carpinus betulus).*

The footprint of the proposed new storm tank is located to the north of the existing pump station (Plate 3-8). The area comprises a wet grassland (GS4) with abundant Yorkshire fog, field horsetail, frequent meadow buttercup, willowherb (*Epilobium sp.),* occasional creeping thistle, brown sedge (*Carex disticha),* meadowsweet, hard rush, meadow foxtail (*Alopecurus pratensis),* and *Calliergonella cuspidata.* Also rarely present are knapweed, dandelion, cowslip (*Primula veris),* glaucous sedge (*Carex flacca),* daisy and small willow shrubs (*Salix cinerea).*

To the north of the grassland an earth embankment with treeline separates the site from the Shannon Estuary (Plate 3-9). Trees include sycamore, horse chestnut (*Aesculus hippocastanum*), basket willow, ash and hawthorn.

A drainage ditch (FW4) is present along the northern boundary of the land to the east of the Proposed Development boundary. This is an OPW maintained channel and is completely outside of the Proposed Development boundary.

The existing access track to the footprint area, which will be used as construction access, runs along the western boundary of Corcanree Pump Station and comprises a track categorised as recolonising bare ground (ED3) which is lined by the linear woodland boundary of the pump station site and a treeline (WL2) (Plate 3-10).

While the red line boundary for the Proposed Development is adjacent to the SAC and SPA boundary, the Shannon Estuary itself is approx. 400m north of the WWTP boundary and 30m north of the proposed pump station location at Corcanree PS.



Plate 3-7 Amenity grassland (GA2) and linear woodland (WD1) within Corcanree PS



Plate 3-8 Wet grassland to the north of Corcanree PS, within the footprint of the proposed storm tank



Plate 3-9 Embankment to the north of Corcanree PS along the shore of the Shannon Estuary



Plate 3-10 Access track to the storm tank footprint which will be used during construction



Figure 3-2 Habitat Map of Corcanree PS

3.2.2 Terrestrial Fauna

3.2.2.1 Otter

During the dedicated otter surveys undertaken, no evidence of holts was found within or in adjacent areas of Limerick WWTP and Corcanree Pump Station. However, a number of direct observations of otter were recorded during multi-disciplinary surveys and wintering bird surveys at Limerick WWTP. One individual otter was recorded foraging in and around Bunlicky Lake on a number of occasions.

In addition, a number of mammal trails within grass were noted in the vicinity of walking tracks around Bunlicky Lake, and through wet grassland to the north of Corcanree Pump Station, in the vicinity of the footprint of the proposed storm tank.



Plate 3-11 Mammal Trail north of Corcanree PS

3.2.2.2 Wintering Bird Surveys

Wintering bird surveys were undertaken in the vicinity of Limerick WWTP and Corcanree PS for the Proposed Development during the wintering seasons 2020/2021, 2022/2023 and 2024/2025. The full Winter Bird Survey Reports are provided in Appendix 1 and the results are summarised here.

Only one SCI species of River Shannon and River Fergus Estuaries SPA (located adjacent to the Proposed Development boundary) was recorded roosting or feeding within the Proposed Development, within Limerick WWTP, across all survey years. Black-headed gulls were recorded roosting on wastewater treatment plant infrastructure during the majority of the surveys carried out. The size of flocks ranged between 4 and 50 in 2024/2025, between 1 and 204 in 2022/2023 (average of 67 individuals) and between 24 and 118 in 2020/2021 (average of 71 individuals). The birds were recorded roosting on the storm tank, aeration tanks and settlement tanks of Limerick WWTP. Black-headed gulls appear to be habituated to the activities within the WWTP and undisturbed by human activity and noise generated by the plant. The Site Synopsis for the SPA states that there are nationally important numbers of black-headed gull (2,681) – this figure is five years mean peak count for the period 1995/96 to 1999/2000. According to *The status and distribution of wintering waterbirds in*

Ireland in 2023: results from the Irish Wetland Bird Survey (IWeBS) (Irish Wildlife Manuals 162[3]), based on I-WeBS counts of the 'Shannon and Fergus Estuary' between 2018/2019 and 2022/2023, black-headed gulls were recorded in peak numbers of 1930 and a Mean of 865 (caveated as a low quality count/estimate).

Cormorant, also a listed SCI species of the nearby River Shannon and River Fergus Estuaries SPA, were recorded on several occasions in flight over the Proposed Development sites at Limerick WWTP and Corcanree PS across all survey years. This species was not recorded using the habitats within the Proposed Development site boundaries during any of the surveys undertaken. A well-known breeding colony of this species for which the SPA is designated uses trees on the adjacent Bunlicky Lake (west of Limerick WWTP) for breeding and roosting. High numbers of cormorants (between 19 and 150 in 2024/2025 and between 6 and 200 in 2022/2023) were recorded roosting on the island on Bunlicky Lake throughout the surveys.

Two red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Gilbert et, al., 2021) were recorded from within the Proposed Development sites at Limerick WWTP and at the Corcanree PS. Snipe (*Gallinago gallinago)* were recorded on several occasions across all survey years, flushed from wet grassland in the western grasslands of Limerick WWTP and once on one occasion from the grassland in the north-east of the Corcanree PS. Two Grey wagtails (*Motacilla cinerea)* were recorded utilising trees and other vegetation at Limerick WWTP during the 2024/2025 and 2022/2023 surveys.

In addition, though not recorded using the sites for roosting or nesting, Red-listed Kestrel were recorded hunting overhead of the sites during all survey years.

A number of listed SCI species of River Shannon and River Fergus Estuaries SPA were recorded using habitats adjacent to or in the wider area of the Limerick WWTP and Corcanree PS throughout all survey years.

The remaining target species recorded in the wider area using habitats including wet grasslands, Bunlicky Lake, the Ballinacurra Creek Stream and mudflats of the Shannon Estuary included mute swans (*Cygnus olor)*, Greylag geese (*Anser anser),* Mallards (*Anas platyrhynchos*), Coot (*Fulica atra),* moorhen (*Gallinula chloropus),* Grey heron (*Ardea cinerea)* and little egret (*Egretta garzetta*).

The number of black-headed gulls (SCI species) recorded roosting within the WwTP site ranged between 4 and 50 in 2024/2025, between 1 and 204 in 2022/2023 (average of 67 individuals) and between 24 and 118 in 2020/2021 (average of 71 individuals). The wintering population estimate for this species within the River Shannon and River Fergus Estuaries SPA is 2,681[4] and is classified as a nationally important flock. When comparing the SPA population estimate to the average species count recorded roosting on the infrastructure within the WwTP, the habitats within the site boundary do not appear to support an important bird assemblage of Black-headed gulls. These gulls appear to be habituated to the activity within the WwTP and were not disturbed by human activity and noise generated by the plant. Black-headed gulls were also recorded utilising several habitats adjacent to the site boundaries such as, mudflats and sandflats, the Ballinacurra stream and Bunlicky Lake.

Based on the wintering bird assemblages recorded over three wintering survey seasons, it can be concluded that neither Limerick WwTP or Corcanree Pumping Station support important assemblages of wintering wildfowl, waders, or SCI species for which the River Shannon and River Fergus estuaries SPA has been designated. There is no potential for significant loss of supporting habitat for the SCI species of River Shannon and River Fergus Estuaries SPA. According to the site-specific conservation objectives document of the River Shannon and River Fergus Estuaries SPA, the SCI populations are primarily associated with intertidal sheltered and shallow subtidal, sand and mud flats habitats. These

[3] *https://www.npws.ie/sites/default/files/publications/pdf/irish-wildlife-manual-162.pdf*
[4] *https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004077.pdf*

habitats are located within the vicinity of the project area, however, they do not occur within the Proposed Development boundary.

3.2.3 Estuarine Surveys

The Shannon in the vicinity of the development site is a tidal river (CW2) and Annex I habitat, i.e. estuary (1130). The annex I habitat 'mudflats and sandflats not covered by sea water at low tide (1140)' is also present along the margins of the river.

Full details of the results and analysis of benthic surveys undertaken by AQUAFACT are provided in Appendix 2.

The taxonomic identification of benthic fauna across all 6 subtidal benthic stations and 9 intertidal transect stations yielded a total count of 23 taxa ascribed to 4 phyla.

Subtidal community

Analysis of fauna from the subtidal grab stations indicates that these stations can be classified as belonging to one of the seven common benthic community habitat types occurring within the QI habitat 'Estuaries [1130]' within the Lower Shannon Estuary SAC (NPWS, 2012) namely the habitat 'Estuarine subtidal muddy sand to mixed sediment with gammarids community complex'. This community complex occurs at the eastern extreme of the SAC site from Cock Rock to Scarlet Reach in water depths between 2.5 and 7m. The sediment of this community complex is that of muddy sand (silt-clay ranging from 50.7% to 34.4% and very fine sand from 29.3% to 11.2%) with patches of gravel (ranging from 24.1% to 0.5%). This fauna community complex consists of Gammaridae amphipods with *Bathyporeia* sp. *Bathyporeia pelagica*, *Leptocheirus* sp., *Gammarus* sp. and *Gammarus zaddachi* all recorded in low abundances here.

Intertidal community

Analysis of the fauna from the intertidal grab stations indicates that these stations cannot be assigned to one of the seven common benthic community habitat types occurring within the Estuaries Qualifying Interest [1130] within the Lower Shannon Estuary SAC (NPWS, 2012). All intertidal stations can be classified as belonging to the JNCC biotope 'SS.SMu.SMuVS.LhofTtub – *Limnodrilus hoffmeisteri, Tubifex tubifex* and *Gammarus* spp. in low salinty infralittoral muddy sediment' (EUNIS code A5.327). This community is found in upper estuary muddy sediments with very low fluctuating salinity, characterized by the oligochaetes *Limnodrilus hoffmeisteri* and *Tubifex tubifex.* Other taxa may include *Marenzellaria* spp. *Gammarus zaddachi, Paranais litoralis* and *Baltidrilus costatus.* The biotope contains elements of both freshwater and brackish communities. It is found in the transitional zone between the freshwater and brackish environments where the tidal currents are sufficiently reduced to allow the deposition of fine silt and the establishment of an infaunal community (Tillin *et al.,* 2023).

Summary

The location of estuary where the existing outfall is located is known as the Limerick Docks and is a freshwater tidal environment with salinity ranging from 0.833 psu to 3.2 psu. The fauna of such areas in upper estuaries is that of a tidal freshwater zone, which leads to a stressed freshwater-seawater interface. Such areas have a reduced faunal composition compared to rivers or the higher salinity upper reaches of an estuary.

Multivariate analysis of the fauna identified two distinct biological communities in the study area, as discussed above. *Limnodrilus* spp. and *Tubifex tubifex* were the two most dominant taxa in both the subtidal and intertidal stations, accounting for over 90% of the faunal abundance. *Limnodrilus* spp. has a wide ecological range and inhabits cohesive muds in all types of waters including polluted, but it cannot tolerate oxygen deficiency. Although it is a freshwater species it is found further seaward than

any other freshwater aquatic oligochaete species and is found in habitats likely to be exposed to very low salinity, *e.g.,* upper estuaries where interstitial salinity is less than 5 psu (Budd, 2003). *Tubifex tubifex* inhabits cohesive muds in a variety of habitats and is tolerant of oxygen deficiency. It is especially abundant in polluted sediments and marginal habitats not occupied by many other species, *e.g.,* upper estuaries where interstitial salinity is less than 5 psu.

The Estuarine subtidal muddy sand to mixed sediment with gammarids community complex is a species poor biotope reflective of its location in the upper estuary with a freshwater tidal influence. In the Limerick Docks area in the vicinity of the Limerick WWTP outfall there is a slighter higher diversity than recorded for this biotope for the Lower Shannon SAC (AQUAFACT, 2011a) and this is due to the presence of freshwater species of oligochaetes that may not be present further downstream. Changes in water quality by the Limerick WWTP upgrade are unlikely to have a negative effect on the biotope at this location.

The intertidal biotope SS.SMu.SMuVS.LhofTtub – *Limnodrilus hoffmeisteri, Tubifex tubifex* and *Gammarus* spp. in low salinity infralittoral muddy sediment present in the survey area is dominated by the oligochaetes *Limnodrilus* spp. and *Tubifex tubifex.* This biotope is not negatively affected by changes in nutrient or organic enrichment; however the population density may decrease with reduction in organic enrichment.

4. APPROPRIATE ASSESSMENT SCREENING

4.1 Identification of Relevant European Sites

The following methodology was used to establish any European Sites upon which there is a potential for a likely significant effect to occur either individually or in combination with other plans and projects as a result of the proposed development:

- Initially the most up to date GIS spatial datasets for European designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie).
- All European Sites that could potentially be affected were identified using a source-pathway - receptor model. To provide context for the assessment, European Sites surrounding the Proposed Development are shown on Figure 4-1. Information on these sites according to the site-specific conservation objectives is provided in Table 4-1.
- The catchment mapping was used to establish or discount potential hydrological connectivity between the site of the proposed development and any European Sites. The hydrological catchments are also shown in Figure 4-1.
- In relation to Special Protection Areas, in the absence of any specific European or Irish guidance in relation to such sites, the Scottish Natural Heritage (SNH) Guidance, '*Assessing Connectivity with Special Protection Areas* (SPA)' (2016) was consulted. This document provides guidance in relation to the identification of connectivity between proposed developments and Special Protection Areas. The guidance takes into consideration the distances species may travel beyond the boundary of their SPAs and provides information on dispersal and foraging ranges of bird species which are frequently encountered when considering plans and projects.
- Table 4-1 provides details of all relevant European Sites as identified in the preceding steps and assesses the potential for likely significant effects on each.
- The assessment considers any likely direct or indirect impacts of the Proposed Development, both alone and in combination with other plans and projects, on European Sites by virtue of criteria including the following: size and scale, land-take, distance from the European Site or key features of the site, resource requirements, emissions, excavation requirements, transportation requirements and duration of construction, operation and decommissioning were considered in this assessment.
- The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report.
- Where potential pathways for Likely Significant Effect are identified, the site is included within the Likely Zone of Influence and further assessment is required within the NIS.
- The potential for the Proposed Development to result in cumulative impacts on any European Sites in combination with other plans and projects was considered in the assessment that is presented in Table 4-1. Plans and projects considered include those that are listed in Appendix 3.

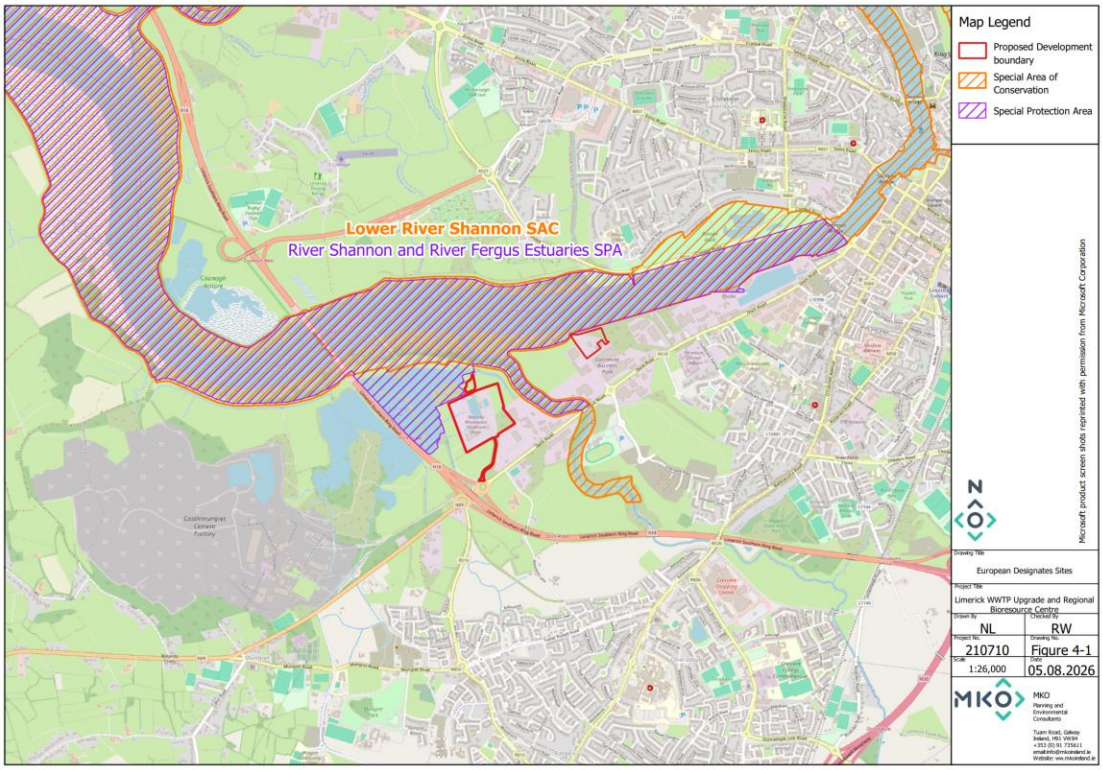


Figure 4-1 European Designated Sites

Table 4-1 Identification of European Sites within the Likely Zone of Influence

European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Likely Zone of Influence Determination	Potential for Likely Significant Effect?
Special Areas of Conservation (SAC)				
Lower River Shannon SAC [002165] **Distance:** The SAC boundary is located 30m north of the Limerick WWTP boundary. The SAC boundary is adjacent to the Corcanree PS boundary.	› [1029] Freshwater Pearl Mussel *Margaritifera margaritifera* › [1095] Sea Lamprey *Petromyzon marinus* › [1096] Brook Lamprey *Lampetra planeri* › [1099] River Lamprey *Lampetra fluviatilis* › [1106] Atlantic Salmon *Salmo salar* (only in fresh water) › [1110] Sandbanks which are slightly covered by sea water all the time › [1130] Estuaries › [1140] Mudflats and sandflats not covered by seawater at low tide › [1150] *Coastal lagoons › [1160] Large shallow inlets and bays › [1170] Reefs › [1220] Perennial vegetation of stony banks › [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts › [1310] *Salicornia* and other annuals colonizing mud and sand › [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)* › [1349] Bottlenose Dolphin *Tursiops truncatus*	Detailed conservation objectives for this site, dated August 2012, were reviewed as part of the assessment and are available at www.npws.ie	The Proposed Development site is located outside of the SAC boundary. None of the QI listed habitats are present within the Proposed Development sites and there will be no works within any of the listed habitats. Therefore, there is no potential for direct effects on the SAC. As described in Section 3.1.2, the proposed upgrades will accommodate future loadings to the Plant and ensure that the effluent is treated efficiently. The resulting effluent will remain within Environmental Quality Standards (EQS's) for surface water. There will be improved stormwater storage and treatment at the plant as a result of the upgrades. The Proposed Development will not impede the Shannon Estuary from achieving its water quality objectives under the Surface Water Regulations or the Water Framework Directive. However, the potential for the operation of the Proposed Development to result in significant effect on the SAC requires further assessment. Potential hydrological connectivity was identified between the Corcanree PS site and the SAC via an OPW managed drain. Potential, indirect hydrological connectivity was identified between the WWTP and the SAC via Bunlicky Lake. A potential pathway for likely significant indirect effect was identified in the form of deterioration in water quality via discharge/run off of pollutants to surface water	Yes

European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Likely Zone of Influence Determination	Potential for Likely Significant Effect?
	› [1355] Otter *Lutra lutra* › [1410] Mediterranean salt meadows (*Juncetalia maritimi*) › [3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation › [6410] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) › [91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae)*		drains, groundwater pathways, and flood risk during construction of the Proposed Development. No otter holts were identified within 150m of the Proposed Development sites during dedicated surveys undertaken. However, following the precautionary principle, given the presence of suitable foraging habitat for otter and known presence, a pathway for indirect effect was identified via disturbance of otter as a result of construction activities. **A complete source-pathway-receptor chain was identified and in the absence of mitigation, there is potential for the Proposed Development to result in likely significant effects on this European Site. The European Site is considered to be within the Likely Zone of Influence of the Proposed Development and further assessment is required.**	
Tory Hill SAC [000439] **Distance:** approx. 11.2km	› 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) › 7210 Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae › 7230 Alkaline fens	Detailed conservation objectives for this site, dated August 2018, were reviewed as part of the assessment and are available at www.npws.ie.	There will be no direct effects as the proposed development is located entirely outside the designated site. This European Site is located 11.2km to the south of the Proposed Development site and within a separate groundwater body. Due to the terrestrial nature of the QI habitat and the distance between the Proposed Development site and the SAC, there is no potential for indirect effects on this SAC. **No pathway for likely significant effect on this European Site was identified, when considered in the absence of**	No

European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Likely Zone of Influence Determination	Potential for Likely Significant Effect?
			any mitigation, individually or cumulatively with other plans or projects. This site is not within the Likely Zone of Influence of the Proposed Development. Therefore, it is not considered further in this assessment.	
Askeaton Fen Complex SAC **Distance:** 11.7km	› 7210 Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae › 7230 Alkaline fens	Detailed conservation objectives for this site, dated May 2018, were reviewed as part of the assessment and are available at www.npws.ie.	There will be no direct effects as the proposed development is located entirely outside the designated site. This European Site is located 11.7km to the southwest of the development site. The SAC and the Proposed Development site are located within separate groundwater bodies and there is no hydrological connectivity from the Proposed Development site to the SAC. Therefore, there is no potential for indirect effects on this SAC. **No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. This site is not within the Likely Zone of Influence of the Proposed Development. Therefore, it is not considered further in this assessment.**	No
Glenomra Wood SAC [001013]	› [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	Detailed conservation objectives for this site, dated June 2018, were	There will be no direct effects as the proposed development is located entirely outside the designated site.	No

European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Likely Zone of Influence Determination	Potential for Likely Significant Effect?
Distance: 12km		reviewed as part of the assessment and are available at www.npws.ie.	This European Site is located 12km to the north of the development site. Due to the terrestrial nature of the QI habitat and the distance between the Proposed Development site and the SAC, there is no potential for indirect effects on this SAC. **No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. This site is not within the Likely Zone of Influence of the Proposed Development. Therefore, it is not considered further in this assessment.**	
Curraghchase Woods SAC **Distance:** 14km	› 1016 Desmoulin's Whorl Snail *Vertigo moulinsiana* › 1303 Lesser Horseshoe Bat *Rhinolophus hipposideros* › 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) › 91J0 *Taxus baccata* woods of the British Isles	Detailed conservation objectives for this site, dated January 2023, were reviewed as part of the assessment and are available at www.npws.ie.	There will be no direct effects as the proposed development is located entirely outside the designated site. This European Site is located 14km to the southwest of the Proposed Development site. Due to the terrestrial nature of the listed QI yew woodlands, and the distance between the Proposed Development site and the SAC, there is no potential for Likely Significant Effect on this QI. The Proposed Development site is located completely outside of the 2.5km foraging range of the Lesser Horseshoe Bat roost for which the SAC is designated, therefore there is no potential for Likely Significant Effect on this QI species.	No

European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Likely Zone of Influence Determination	Potential for Likely Significant Effect?
			There is no potential for Likely Significant Effect on the aquatic dependent QI habitat, or species dependent on wetland habitat including whorl snail, given that there is no downstream hydrological connectivity from the Proposed Development site to the SAC. **No pathway for likely significant effect on this European Site was identified, when considered in the absence of any mitigation, individually or cumulatively with other plans or projects. This site is not within the Likely Zone of Influence of the Proposed Development. Therefore, it is not considered further in this assessment.**	
Special Protection Area (SPA)				
River Shannon and River Fergus Estuaries SPA [004077] **Distance:** The SPA boundary is directly adjacent to the northern boundary of the Limerick WWTP. The SPA boundary is approx. 10m north of the	› [A017] Cormorant *Phalacrocorax carbo* › [A038] Whooper Swan *Cygnus cygnus* › [A046] Light-bellied Brent Goose *Branta bernicla hrota* › [A048] Shelduck *Tadorna tadorna* › [A050] Wigeon *Anas penelope* › [A052] Teal *Anas crecca* › [A054] Pintail *Anas acuta* › [A056] Shoveler *Anas clypeata* › [A062] Scaup *Aythya marila* › [A137] Ringed Plover *Charadrius hiaticula* › [A140] Golden Plover *Pluvialis apricaria*	Detailed conservation objectives for this site, dated September 2012, were reviewed as part of the assessment and are available at www.npws.ie	The Proposed Development sites are located outside of the SPA boundary, which is adjacent to the northern boundary of the Limerick WWTP and 10m from the Corcanree PS boundary. No significantly suitable SCI supporting habitats are present within the Proposed Development sites and there will be no works within SCI supporting habitats. Therefore, there is no potential for direct effects on the SPA. As described in Section 3.1.2, the proposed upgrades will accommodate future loadings to the Plant and ensure that the effluent is treated efficiently. The resulting effluent will remain within Environmental Quality Standards (EQS's) for surface water. There will be improved stormwater storage and treatment at the plant as a result of the upgrades. The	Yes

European Sites and distance from Proposed Development	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie)	Conservation Objectives	Likely Zone of Influence Determination	Potential for Likely Significant Effect?
boundary of Corcanree PS.	› [A141] Grey Plover *Pluvialis squatarola* › [A142] Lapwing *Vanellus vanellus* › [A143] Knot *Calidris canutus* › [A149] Dunlin *Calidris alpina* › [A156] Black-tailed Godwit *Limosa limosa* › [A157] Bar-tailed Godwit *Limosa lapponica* › [A160] Curlew *Numenius arquata* › [A162] Redshank *Tringa totanus* › [A164] Greenshank *Tringa nebularia* › [A179] Black-headed Gull *Chroicocephalus ridibundus* › [A999] Wetlands and waterbirds		Proposed Development will not impede the Shannon Estuary achieving its water quality objectives under the Surface Water Regulations or the Water Framework Directive. However, the potential for the operation of the Proposed Development to result in significant effect on the SPA as a result of water quality deterioration requires further assessment. Potential hydrological connectivity was identified between the Corcanree PS site and the SPA via an OPW managed drain. Hydrological connectivity was identified between the WWTP and Bunlicky Lake which is located within the SPA. A potential pathway for likely significant indirect effect was identified in the form of deterioration in water quality via discharge/run off of pollutants to surface water drains, groundwater pathways, and flood risk during construction of the Proposed Development. In addition, a potential for likely significant effect on SCI bird species via disturbance due to construction works was identified and requires further assessment. **A complete source-pathway-receptor chain was identified and in the absence of mitigation, there is potential for the Proposed Development to result in likely significant effects on this European Site. The European Site is considered to be within the Likely Zone of Influence of the Proposed Development and further assessment is required.**	

4.2 Appropriate Assessment Screening Conclusion

It cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the Proposed Development, individually or in combination with other plans and projects, would be likely to have a significant effect on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

As a result, an Appropriate Assessment (AA) of the Proposed Development is required. Information to enable the Competent Authority to carry out an AA of the Proposed Development is presented in Sections 5 – 9 of this report.

5. INFORMATION TO INFORM APPROPRIATE ASSESSMENT

The potential for likely significant effects on the following European Sites in the absence of any mitigation, individually or cumulatively with other plans or projects, was identified in the preceding section:

- Lower River Shannon SAC
- River Shannon and River Fergus Estuaries SPA

The following sections consider each European Site individually to:

1. Determine which individual qualifying features have the potential to be adversely affected by the Proposed Development.
2. Provide information with regard to the Conservation Objectives and site-specific pressures and threats for those qualifying features that have the potential to be adversely affected.

5.1 Identification of relevant Qualifying Features and Desk Study

5.1.1 Lower River Shannon SAC

The Proposed Development site is located outside of the SAC boundary. None of the QI listed habitats are present within the Proposed Development sites and there will be no works within any of the listed habitats. Therefore, there is no potential for direct effects on the SAC. The potential for impacts on this SAC was identified in Section 4.1 above. The identified pathways for effect include the following:

- Water quality deterioration - Potential hydrological connectivity was identified between the Corcanree PS site and the SAC via an OPW managed drain. Potential, indirect hydrological connectivity was identified between the WWTP and the SAC via Bunlicky Lake. A potential pathway for likely significant indirect effect was identified in the form of deterioration in water quality via run off of pollutants and discharge to surface water drains, groundwater pathways, and flood risk during construction of the Proposed Development.
- The discharge from Limerick WWTP is located within the SAC and the potential for water quality deterioration during operation of the Proposed Development requires further assessment.
- Following the precautionary principle, a pathway for indirect effect was identified via disturbance of otter as a result of construction activities.

Table 5-1 below lists the qualifying features of this European Site and determines, in light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

5.1.1.1 Identification of Individual Qualifying Features with the Potential to be Affected

Table 5-1 Assessment of Qualifying features potentially affected

Qualifying feature	Conservation Objective (NPWS, Version 1, August 2012),	Rationale	Potential for Adverse Effects Y/N
1029 Freshwater Pearl Mussel Margaritifera *margaritifera*	To restore the favourable conservation condition of Freshwater Pearl Mussel in the Lower River Shannon SAC	According to Map 15 of the Site-specific conservation objectives (SSCO's) document, the distribution of Freshwater Pearl Mussel within this SAC is located in the Cloon catchment in Co. Clare which is not hydrologically connected to the Proposed Development. No complete source- pathway- receptor chain for any effect on this habitat as a result of the proposed development was identified. No further assessment is required.	No
1096 Brook Lamprey Lampetra *planeri*	To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC	This species is found only in freshwater and is not within the Likely Zone of Influence of the Proposed Development. No complete source-pathway receptor chain was identified and there is no potential for adverse effect on this QI.	No
1099 River Lamprey Lampetra *fluviatilis*	To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC	These two QI species have potential to occur within the Lower River Shannon within the zone of influence of the Proposed Development. There is potential for indirect adverse effect to these QI species via water quality deterioration during construction and operation of the Proposed Development. A complete source-pathway-receptor chain for adverse effects on these species was identified and is assessed further in this NIS.	Yes
1095 Sea Lamprey Petromyzon *marinus*	To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC		Yes
1106 Atlantic Salmon Salmo *salar* (only in fresh water)	To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC	This QI species has potential to occur within the Lower River Shannon within the zone of influence of the Proposed Development. There is potential for indirect adverse effect to the QI species via water quality deterioration during construction and operation of the Proposed Development. A complete source-pathway-receptor chain for adverse effects on this species was identified and it is assessed further in this NIS.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, August 2012),	Rationale	Potential for Adverse Effects Y/N
1110 Sandbanks which are slightly covered by sea water all the time	To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC	This habitat, at its nearest point, is over 60km (hydrologically) west of the Proposed Development. At this location, close to the mouth of the River Shannon, the sandbanks [1110] habitat is subject to the full force of the prevailing westerly wind, tide and swell. Given the distance of the existing outfall, the high level of dilution and dispersion due to wave and swell, taken together with the proposed upgrades and effluent treatment standards, it is considered that there is no potential for adverse effect on this habitat as a result of the Proposed Development.	No
1130 Estuaries	To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC	The existing outfall is located within this habitat. Potential hydrological connectivity was identified between the Corcanree PS site and this habitat via an OPW managed drain. Potential, indirect hydrological connectivity was identified between the WWTP and this habitat via Bunlicky Lake. A potential pathway for adverse effect was identified in the form of deterioration in water quality via run off of pollutants and/or discharge to surface water drains, groundwater pathways, and flood risk during construction of the Proposed Development. There is potential for indirect adverse effect to this QI via water quality deterioration during construction and operation of the Proposed Development. A complete source-pathway-receptor chain for adverse effects on this habitat was identified, and it is assessed further in this NIS.	Yes
1140 Mudflats and sandflats not covered by seawater at low tide	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC	According to Map 5 of the site-specific conservation objectives, this habitat is located within the estuary adjacent to the Proposed Development and in the vicinity of the existing outfall. Potential hydrological connectivity was identified between the Corcanree PS site and this habitat via an OPW managed drain. Potential, indirect hydrological connectivity was identified between the WWTP and this habitat via Bunlicky Lake. A potential pathway for adverse effect was identified in the form of deterioration in water quality via run-off of pollutants and/or discharge to surface water drains, groundwater pathways, and flood risk during construction of the Proposed Development.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, August 2012),	Rationale	Potential for Adverse Effects Y/N
		There is potential for indirect adverse effect to this QI via water quality deterioration during construction and operation of the Proposed Development. A complete source-pathway-receptor chain for adverse effects on this habitat was identified, and it is assessed further in this NIS.	
1150 *Coastal lagoons	To restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon SAC	According to Map 6 of the site-specific conservation objectives, this habitat is present at four discrete locations within the Lower River Shannon SAC, the closest of which is approx. 20km downstream of the Proposed Development. Given the hydrological nature of this habitat and the distance from the Proposed Development, it is considered that the hydrological link to the lagoon habitat is too weak for any potential interaction as a result of the Proposed Development. Therefore, no potential for adverse effect on this QI habitat has been identified.	No
1160 Large shallow inlets and bays	To maintain the favourable conservation condition of Large shallow inlets and bays in the Lower River Shannon SAC	This habitat, at its nearest point, is over 60km (hydrologically) west of the Proposed Development. At this location, close to the mouth of the River Shannon, the habitat is subject to the full force of the prevailing westerly wind, tide and swell. Given the distance of the existing outfall, the high level of dilution and dispersion due to wave and swell, taken together with the proposed upgrades and effluent treatment standards, it is considered that there is no potential for adverse effect on this habitat as a result of the Proposed Development.	No
1170 Reefs	To maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC	According to Map 8 of the site-specific conservation objectives, this habitat occurs approx. 12km downstream of the Proposed Development. Taking a precautionary approach, there is potential for indirect adverse effect to this QI via water quality deterioration during construction and operation of the Proposed Development. A complete source-pathway-receptor chain for adverse effects on this habitat was identified, and it is assessed further in this NIS.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, August 2012),	Rationale	Potential for Adverse Effects Y/N
1220 Perennial vegetation of stony banks	To maintain the favourable conservation condition of Perennial vegetation of stony banks in the Lower River Shannon SAC	No connection between the site of proposed development and the QI was identified. Due to the terrestrial nature of the QI, no complete source-pathway receptor chain was identified.	No
1230 Vegetated Sea cliffs of the Atlantic and Baltic coasts	To maintain the favourable conservation condition of Vegetated Sea cliffs in the Lower River Shannon SAC	No connection between the site of proposed development and the QI was identified. Due to the terrestrial nature of the QI, no complete source-pathway receptor chain was identified.	No
1310 *Salicornia* and other annuals colonizing mud and sand	To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the Lower River Shannon SAC	Atlantic salt meadows, mediterranean salt meadows and *Salicornia* habitats are grouped together in this assessment due to their close association with one another. According to Map 12 of the site-specific conservation objectives, these habitats have potential to occur approx. 4km downstream of the Proposed Development. Taking a precautionary approach, there is potential for indirect adverse effect to these QI habitats via water quality deterioration during construction and operation of the Proposed Development. A complete source-pathway-receptor chain for adverse effects on these habitats was identified and is assessed further in this NIS.	Yes
1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	To restore the favourable conservation condition of Atlantic salt meadows (Glauco-Puccinellietalia maritimae) in the Lower River Shannon SAC		Yes
1410 Mediterranean salt meadows (Juncetalia maritimi)	To restore the favourable conservation condition of Mediterranean salt meadows (Juncetalia maritimi) in the Lower River Shannon SAC		Yes
1349 Bottlenose Dolphin Tursiops *truncatus*	To maintain the favourable conservation condition of Bottlenose	Taking a precautionary approach, there is potential for indirect adverse effect to this QI species via water quality deterioration during construction and operation of the Proposed Development and localised impacts on prey biomass for the species. A complete source-	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, August 2012),	Rationale	Potential for Adverse Effects Y/N
	Dolphin in the Lower River Shannon SAC	pathway-receptor chain for adverse effect on this species was identified and it is assessed further in this NIS.	
1355 Otter Lutra *lutra*	To restore the favourable conservation condition of Otter in the Lower River Shannon SAC	No otter holts were found within the study area during the dedicated otter surveys undertaken, although otters were observed using Bunlicky Lake in the vicinity of Limerick WWTP on occasion. Taking a precautionary approach a potential for disturbance of this species within its commuting/foraging range was identified as a result of construction works associated with the Proposed Development. There is potential for indirect adverse effect to this QI species via water quality deterioration during construction and operation of the Proposed Development and localised impacts on prey biomass for the species. A complete source-pathway-receptor chain for adverse effect on this species was identified, and it is assessed further in this NIS.	Yes
3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the Lower River Shannon SAC	This habitat where it occurs within the SAC is located within upgradient, freshwater habitats. This habitat does not occur in the vicinity of or downstream of the proposed development. Therefore, no potential for adverse effect on this QI habitat has been identified.	No
6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	To maintain the favourable conservation condition of Molinia meadows on calcareous, peaty or clayey-silt laden soils (Molinion caeruleae) in the Lower River Shannon SAC	No connectivity between the site of proposed development and the QI was identified. Due to the terrestrial nature of the QI, no complete source-pathway receptor chain was identified.	No

Qualifying feature	Conservation Objective (NPWS, Version 1, August 2012),	Rationale	Potential for Adverse Effects Y/N
91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae*, *Salicion albae*) in the Lower River Shannon SAC	Although this habitat is not mapped downstream of the Proposed Development within the site-specific conservation objectives, taking a precautionary approach there is potential for this habitat to occur downstream of the Proposed Development. Therefore, there is potential for indirect adverse effect to this QI via water quality deterioration during construction and operation of the Proposed Development. A complete source-pathway-receptor chain for adverse effects on this habitat was identified, and it is assessed further in this NIS.	Yes

5.1.1.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to impact on the European Site were reviewed and considered in relation to the Proposed Development. These are provided in Table 5-2.

Table 5-2 Site-specific threats, pressures and activities (December 2024)

Negative Impacts			
Rank	**Threats and Pressures**		**Inside/Outside**
Medium	E01	Urbanised areas, human habitation	Outside
Medium	K02.03	Eutrophication (natural)	Outside
Medium	J02.01.01	Polderisation	Inside
Medium	J02.01.02	Reclamation of land from sea, estuary or marsh	Both
Medium	E03	Discharges	Both
Medium	H04	Air pollution, air-borne pollutants	Outside
Medium	A04	Grazing	Inside
Medium	A08	Fertilisation	Both
Low	F01	Marine and freshwater aquaculture	Inside
Low	C01.01.02	Removal of beach materials	Inside
Low	J02.10	Management of aquatic and bank vegetation for drainage purposes	Inside
Low	F03.01	Hunting	Inside
Low	B	Sylviculture, forestry	Inside
Low	J02.12.01	Sea defense or coast protection works, tidal barrages	Inside
Low	G01.01	Nautical sports	Inside
Low	D01.01	Paths, tracks, cycling tracks	Inside
Low	C01.03.01	Hand cutting of peat	Inside
Low	I01	Invasive non-native species	Inside

A potential for effect with regard to site-specific threats, pressures and activities has been identified with regard to 'E03 Discharges'. The potential for the Proposed Development to result in an adverse effect on the SAC in this regard is assessed in Section 6 of this NIS.

5.1.1.3 QI Specific Information

5.1.1.3.1 *Sea Lamprey*

The attributes and targets for Sea Lamprey as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-3 below. The sea lamprey is listed in the most recent Irish Red Data Book as Near Threatened. Barriers to upstream migration (e.g. weirs), which limit access to spawning beds and juvenile habitat, are considered the major impediment to good conservation status for sea lamprey. According to the Article 17 Report (NPWS 2025), the conservation status for Sea Lamprey has been assessed as 'Bad' and the conservation trend as 'Deteriorating'.

Table 5-3 Targets and attributes associated with nominated site-specific conservation objectives for Sea Lamprey (Petromyzon marinus) [1095].

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary	There are no instream works required as part of the Proposed Development. There will be no effect on extent of anadromy.
Population structure of juveniles	At least three age/size groups present	There are no instream works required as part of the Proposed Development and there is therefore no potential for direct effect on juvenile lamprey or supporting habitat. A potential for indirect adverse effect on the species and supporting habitat as a result of deterioration of water quality as a result of the Proposed Development has been identified.
Juvenile density in fine sediment	Juvenile density at least 1/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	More than 50% of sample sites positive	

5.1.1.3.2 *River Lamprey*

The attributes and targets for River Lamprey as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-4 below. According to the Article 17 Report (NPWS 2025), the conservation status for River Lamprey has been assessed as 'Inadequate' while the conservation trend is unknown.

Table 5-4 Targets and attributes associated with nominated site-specific conservation objectives for River Lamprey.

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Distribution	Access to all watercourses down to first order streams	There are no instream works required as part of the Proposed Development. There will be no effect on movement of lamprey.

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population structure of juveniles	At least three age/size groups of brook/river lamprey present	There are no instream works required as part of the Proposed Development and there is therefore no potential for direct effect on juvenile lamprey or supporting habitat. A potential for indirect adverse effect on the species and supporting habitat as a result of deterioration of water quality as a result of the Proposed Development has been identified.
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 2/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	
Availability of juvenile habitat	More than 50% of sample sites positive	

5.1.1.3.3 *Atlantic Salmon [1106]*

The attributes and targets for Atlantic Salmon as per the Site-Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-5 below. According to the Article 17 Report (NPWS 2025), the conservation status for Atlantic Salmon has been assessed as 'Bad' and the conservation trend as 'Deteriorating'.

Table 5-5 Targets and attributes associated with nominated site-specific conservation objectives for Salmon (Salmo salar) [1106].

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Distribution: extent of anadromy	100% of river channels down to second order accessible from estuary	There are no instream works required as part of the Proposed Development. There will be no effect on extent of anadromy.
Adult spawning fish	Conservation Limit (CL) for each system consistently exceeded	There are no instream works required as part of the Proposed Development and there is therefore no potential for direct effect on Atlantic salmon or supporting habitat. A potential for indirect adverse effect on the species and supporting habitat as a result of deterioration of water quality as a result of the Proposed Development has been identified.
Salmon fry abundance	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	
Out-migrating smolt abundance	No significant decline	
Number and distribution of redds	No decline in number and distribution of spawning redds due to anthropogenic causes	

Water quality	At least Q4 at all sites sampled by EPA	A potential for indirect adverse effect on the water quality within The Shannon Estuary as a result of the Proposed Development has been identified.

5.1.1.3.4 *Otter [1355]*

The attributes and targets for Otter as per the Site-Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in *Table 5-6* below. There were no otter holts found within 150m of the Proposed Development sites during surveys, although otter were observed using Bunlicky Lake on occasion. According to the Article 17 Report (NPWS 2025), the conservation status has been assessed as 'Favourable' and the conservation trend as 'Stable'.

Table 5-6 Targets and attributes associated with nominated site-specific conservation objectives for Otter (Lutra lutra).

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Distribution	No significant decline	During the dedicated surveys undertaken, no otter holts were found within the study area. Otter are known to use the habitats in the vicinity of the Proposed Development including Bunlicky Lake. A potential for indirect adverse effect on the species and supporting habitat due to deterioration of water quality as a result of the Proposed Development has been identified. A potential for indirect adverse effect on the species distribution due to disturbance as a result of construction of the Proposed Development has also been identified.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along riverbanks/ around ponds	There will be no reduction to the terrestrial habitat extent. There will be no effects on riparian or any other suitable otter habitat as a result of the works.
Extent of marine habitat	No significant decline. Area mapped and calculated as 4,461.6ha	There will be no reduction to the marine habitat extent. A potential for indirect adverse effect on the species and supporting habitat (estuarine) due to deterioration of water quality as a result of the Proposed Development has been identified.
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 500.1km	There will be no reduction to the freshwater (river) habitat extent There is no potential for adverse effect on freshwater habitats upon which the species relies as these habitats are located upstream of the Proposed Development.

Extent of freshwater (lake/lagoon) habitat	No significant decline. Area mapped and calculated as 125.6ha	There will be no reduction or alteration to the freshwater (lake) habitat extent as a result of the proposed works. There is no potential for direct adverse effect on freshwater lake/lagoon habitats upon which the species relies. A potential for indirect adverse effect on water quality within Bunlicky Lake was identified however as a result of construction of the Proposed Development.
Couching sites and holts	No significant decline.	There will be no reduction in holt or couching sites as a result of the Proposed Development. No couching sites or holts were found within 150m of the Proposed Development during dedicated otter surveys.
Fish biomass available	No significant decline	A potential for indirect adverse effect on fish prey biomass availability due to deterioration of water quality as a result of the Proposed Development has been identified.
Barriers to connectivity	No significant increase.	There is no potential for creation of barriers to connectivity between commuting and foraging areas for otter as a result of the Proposed Development.

5.1.1.3.5 *Bottlenose Dolphin [1349]*

The attributes and targets for Bottlenose dolphin as per the Site-Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-7 below. According to the Article 17 Report (NPWS 2025), the conservation status has been assessed as 'Favourable' and the conservation trend as 'Stable'.

Table 5-7 Targets and attributes associated with nominated site-specific conservation objectives for Bottlenose Dolphin.

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Access to suitable habitat	Species range within the site should not be restricted by artificial barriers to site use. See map 16 of the SSCO document for suitable habitat	There will be no barriers to access to suitable habitat for bottlenose dolphin created as a result of the Proposed Development.
Habitat use: critical areas	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition.	There will be no reduction in habitat use of critical areas by Bottlenose Dolphin as a result of the Proposed Development. A potential for indirect adverse effect on supporting habitat and prey availability for the species due to deterioration of water quality as a result of the Proposed Development has been identified on a highly precautionary basis.

Disturbance	Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site.	There is no potential for disturbance to Bottlenose Dolphin as a result of the Proposed Development. The Proposed Development is located upstream of important dolphin areas and there are no instream works required.

5.1.1.3.6 *Estuaries [1130]*

The attributes and targets for Estuaries as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-8 below. According to the Article 17 Report (NPWS 2025), the conservation status has been assessed as 'Bad' and the conservation trend as 'Stable'.

Table 5-8 Targets and attributes associated with nominated site-specific conservation objectives for Estuaries.

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat Area	The permanent habitat area is stable or increasing, subject to natural processes.	There will be no direct loss of estuarine habitat area as a result of the Proposed Development. No instream works are required. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Community distribution	Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal muddy sand to mixed sediment with gammarids community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys* spp. community complex; Fucoid-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; and Anemone-dominated subtidal reef community.	There will be no direct loss of estuarine communities as a result of the Proposed Development. No instream works are required. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.

5.1.1.3.7 *Mudflats and sandflats not covered by seawater at low tide [1140]*

The attributes and targets for Mudflats and sandflats not covered by seawater at low tide [1140] as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets

for the species is provided in Table 5-9 below. The overall Conservation Status for this habitat is 'Inadequate' and the overall Conservation Trend is 'Stable' (NPWS 2025).

Table 5-9 Targets and attributes associated with nominated site-specific conservation objectives for Mudflats and sandflats not covered by seawater at low tide [1140]

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat Area	The permanent habitat area is stable or increasing, subject to natural processes.	There will be no direct loss of mudflat or sandflat habitat area as a result of the Proposed Development. No instream works are required. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Community distribution	Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.	

5.1.1.3.8 *Mediterranean salt meadows (Juncetalia maritimi) [1410]*

The attributes and targets for Mediterranean salt meadows *(Juncetalia maritimi* as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-10 below. The overall Conservation Status for this habitat is 'Inadequate' and the overall Conservation Trend is 'Deteriorating' (NPWS 2025).

Table 5-10 Targets and attributes associated with nominated site-specific conservation objectives for Mediterranean salt meadows (Juncetalia maritimi) [1410].

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat area	Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 4.193ha; Barrigone, Aughinish- 2.407ha; Bunratty- 0.865ha; Inishdea, Owenshere- 11.609ha; Killadysert, Inishcorker- 0.705ha; Knock- 0.143ha, Querin- 0.008ha; Rinevilla Bay- 2.449ha.	There will be no direct loss of saltmarsh habitat area as a result of the Proposed Development. There are no works proposed in or adjacent to this habitat in the SAC.

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat distribution	No decline, or change in habitat distribution, subject to natural processes.	A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Physical structure: sediment supply	Restore natural circulation of sediments and organic matter, without any physical obstructions.	There will be no direct alteration to the physical structure of the habitat as a result of the Proposed Development.
Physical structure: creeks and pans	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	
Physical structure: flooding regime	Maintain natural tidal regime.	
Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	There will be no direct alteration to the vegetation zonation, vegetation height or vegetation cover. There will be no change to the vegetation composition of the typical species and subcommunities or introduction of negative indicator species as a result of the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Vegetation structure: vegetation height	Maintain structural variation within sward	
Vegetation structure: vegetation cover	Maintain more than 90% of area outside creeks vegetated	
Vegetation composition: typical species	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species - *Spartina anglica*	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	

5.1.1.3.9 *Atlantic salt meadows (Glauco-Puccinellietalia maririmae) [1330]*

The attributes and targets for Atlantic salt meadows (Glauco-Puccinellietalia maririmae) as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-11 below. The overall Conservation Status for this habitat is 'Bad' and the overall Conservation Trend is 'Stable' (NPWS 2025).

Table 5-11 Targets and attributes associated with nominated site-specific conservation objectives for Atlantic salt meadows (Glauco-Puccinellietalia maririmae) [1330]

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 6.774ha; Barrigone, Aughinish- 10.288ha; Beagh- 0.517ha; Bunratty- 26.939ha; Shepperton, Fergus Estuary- 37.925ha; Inishdea, Owenshere- 18.127ha; Killadysert, Inishcorker- 2.604ha; Knock- 0.576ha; Querin- 3.726ha; Rinevilla Bay- 11.883ha.	There will be no direct loss of saltmarsh habitat area as a result of the Proposed Development. There are no works proposed in or adjacent to this habitat in the SAC. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Habitat distribution	No decline or change in habitat distribution, subject to natural processes.	
Physical structure: sediment supply	Restore natural circulation of sediments and organic matter, without any physical obstructions.	There will be no alteration to the physical structure of the habitat as a result of the Proposed Development.
Physical structure: creeks and pans	Maintain creek and pan structure, subject to natural processes, including erosion and succession	
Physical structure: flooding regime	Maintain natural tidal regime.	
Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	There will be no direct alteration to the vegetation zonation, vegetation height or vegetation cover. There will be no change to the vegetation composition of the typical species and subcommunities or introduction of negative indicator species as a result of the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Vegetation structure: vegetation height	Maintain structural variation within sward	
Vegetation structure: vegetation cover	Maintain more than 90% of the saltmarsh area vegetated	
Vegetation composition: typical species and sub-communities	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species - *Spartina anglica*	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	

5.1.1.3.10 *Salicornia and other annuals colonising mud and sand [1310]*

The attributes and targets for *Salicornia* and other annuals colonising mud and sand as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-12 below.

Table 5-12 Targets and attributes associated with nominated site-specific conservation objectives for Salicornia and other annuals colonising mud and sand [1310]

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat area	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle - 0.005ha; Inishdea, Owenshere - 0.003ha; Knock - 0.029ha; Querin - 0.185ha; Rinevilla Bay - 0.001ha.	There will be no direct decline in habitat area or distribution associated with the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Habitat distribution	No decline, or change in habitat distribution, subject to natural processes	
Physical structure: sediment supply	Maintain natural circulation of sediments and organic matter, without any physical obstructions	There will be no impact on sediment supply, creeks and pans, flooding regime or zonation as a result of the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Physical structure: creeks and pans	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	
Physical structure: flooding regime	Maintain natural tidal regime	
Vegetation structure: zonation	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	
Vegetation structure: vegetation height	Maintain structural variation within sward	There will be no alteration to the vegetation structure or composition. There will be no change to the vegetation composition of the typical species and subcommunities or introduction of negative indicator species as a result of the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Vegetation structure: vegetation cover	Maintain more than 90% of area outside creeks vegetated	
Vegetation composition: typical species and subcommunities	Maintain the presence of species-poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species - *Spartina anglica*	No significant expansion of common cordgrass (*Spartina anglica),* with an annual spread of less than 1%	

5.1.1.3.11 *Reefs [1170]*

The attributes and targets for Reefs [1170] as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in *Table 5-13* below. The overall Conservation Status for this species is 'Bad' and the overall Conservation Trend is 'Stable' (NPWS 2025).

Table 5-13 Targets and attributes associated with nominated site-specific conservation objectives for Reefs [1170].

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat Distribution	The distribution of Reefs is stable, subject to natural processes	There will be no direct decline in habitat area or distribution associated with the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Habitat area	The permanent habitat area is stable, subject to natural processes.	
Community distribution	Conserve the following reef community types in a natural condition: Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone-dominated subtidal reef community; and *Laminaria*-dominated community complex.	A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.

5.1.1.3.12 *Alluvial Forests*

The attributes and targets for Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) as per the Site Specific Conservation Objectives (SSCOs) for Lower River Shannon SAC (NPWS Version 1.0, 2012) and an assessment of the proposed development against the nominated attributes and targets for the species is provided in Table 5-14 below. The overall Conservation Status for this species is 'Bad' and the overall Conservation Trend is 'Deteriorating' (NPWS 2025).

Table 5-14 Targets and attributes associated with nominated site-specific conservation objectives for Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Habitat area	Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed.	There will be no direct decline in habitat area or distribution associated with the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Habitat distribution	No decline. Surveyed locations shown on map 14	

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Woodland size	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	There will be no alteration to woodland size or structure associated with this habitat as a result of the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi- mature trees and shrubs; and well-developed herb layer	
Woodland structure: community diversity and extent	Maintain diversity and extent of community types	
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	
Hydrological regime: flooding depth/height of water table	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	There will be no alteration to flooding depth or height of water table as a result of the Proposed Development.
Woodland structure: dead wood	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	There will be no alteration to woodland structure or vegetation composition associated with this habitat as a result of the Proposed Development. A potential for indirect adverse effect on the habitat due to deterioration of water quality as a result of the Proposed Development has been identified.
Woodland structure: veteran trees	No decline	
Woodland structure: indicators of local disctinctiveness	No decline	
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%	
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix spp*) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*)	
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control	

5.1.2 River Shannon and River Fergus Estuaries SPA

The potential for likely significant effects on this SPA were identified in Section 4.1 above. The identified pathways for effect include the following:

- Water quality deterioration - Potential hydrological connectivity was identified between the Corcanree PS site and the SPA via an OPW managed drain. Hydrological connectivity was also identified between the WWTP and Bunlicky Lake which is located within the SPA. A potential pathway for likely adverse indirect effect was identified in the form of deterioration in water quality via discharge/run off of pollutants to surface water drains, groundwater pathways, and flood risk during construction of the Proposed Development.
- The discharge from Limerick WWTP is located within the SPA and the potential for water quality deterioration during operation of the Proposed Development requires further assessment.
- Following the precautionary principle, a pathway for indirect effect was identified via disturbance of SCI bird species as a result of construction activities.

The table below lists the qualifying features of this European Site and determines, in the light of their Conservation Objectives, whether there is any complete source-pathway-receptor chain, by which adverse effects may occur.

Table 5-15 Assessment of Special Conservation Interests potentially affected

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
[A017] Cormorant (*Phalacrocorax carbo*)	To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting wetland habitat, has been identified. In addition, the potential for adverse effect as result of disturbance of wintering populations during construction of the Proposed Development requires further assessment. A breeding colony of cormorant is present within Bunlicky Lake in the vicinity of Limerick WWTP. The potential for adverse effect as result of disturbance of breeding cormorant during construction of the Proposed Development also requires further assessment.	Yes

[5] *NPWS (2012) 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.*

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
		During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by cormorant within the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to cormorant as a result of habitat loss.	
[A038] Whooper Swan (*Cygnus cygnus*)	To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage by whooper swan of habitats within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to whooper swan as a result of habitat loss or disturbance.	Yes
[A046] Light-bellied Brent Goose (*Branta bernicla hrota*)	To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by light-bellied brent goose within or directly adjacent to the Proposed Development was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to brent geese as a result of habitat loss or disturbance.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
[A048] Shelduck (*Tadorna tadorna*)	To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by shelduck within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to shelduck as a result of habitat loss or disturbance.	Yes
[A050] Wigeon (*Anas penelope*)	To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by wigeon within or directly adjacent to the proposed development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to wigeon as a result of habitat loss or disturbance.	Yes
[A052] Teal (*Anas crecca*)	To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
		of habitats by teal within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to teal as a result of habitat loss or disturbance.	
[A054] Pintail (*Anas acuta*)	To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by pintail within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to pintail as a result of habitat loss or disturbance.	Yes
[A056] Shoveler (*Anas clypeata*)	To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by shoveler within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to shoveller as a result of habitat loss or disturbance.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
[A062] Scaup (*Aythya marila*)	To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by scaup within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to scaup as a result of habitat loss or disturbance.	Yes
[A137] Ringed Plover (*Charadrius hiaticula*)	To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by ringed plover within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to ringed plover as a result of habitat loss or disturbance.	Yes
[A140] Golden Plover (*Pluvialis apricaria*)	To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
		significant usage of habitats by golden plover within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to waterbirds as a result of habitat loss.	
[A141] Grey Plover (*Pluvialis squatarola*)	To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by grey plover within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to grey plover as a result of habitat loss or disturbance.	Yes
[A142] Lapwing (*Vanellus vanellus*)	To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by lapwing within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to lapwing as a result of habitat loss or disturbance.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
[A143] Knot (*Calidris canutus*)	To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by knot within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to knot as a result of habitat loss or disturbance.	Yes
[A149] Dunlin (*Calidris alpina*)	To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by dunlin within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to dunlin as a result of habitat loss or disturbance.	Yes
[A156] Black-tailed Godwit (*Limosa limosa*)	To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
		of habitats by black-tailed godwit within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to black-tailed godwit as a result of habitat loss or disturbance.	
[A157] Bar-tailed Godwit (*Limosa lapponica*)	To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by bar-tailed godwit within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to bar-tailed godwit as a result of habitat loss or disturbance.	Yes
[A160] Curlew (*Numenius arquata*)	To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by curlew within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to curlew as a result of habitat loss or disturbance.	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
[A162] Redshank (*Tringa totanus*)	To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by redshank within or directly adjacent to the Proposed Development sites was recorded. The species was recorded using the Lower River Shannon in the wider area. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to redshank as a result of habitat loss or disturbance.	Yes
[A164] Greenshank (*Tringa nebularia*)	To maintain the favourable conservation condition of Greenshank it in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), no usage of habitats by greenshank within or directly adjacent to the Proposed Development sites was recorded. There will be no loss of supporting habitat for waterbirds in the wider area including those which are designated as SCI species of River Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to greenshank as a result of habitat loss or disturbance.	Yes
[A179] Black-headed Gull (*Chroicocephalus ridibundus*)	To maintain the favourable conservation condition of Black-headed Gull it in the River Shannon and River Fergus Estuaries SPA	A potential for adverse effect on this SCI species as a result of deterioration of water quality during construction and operation of the Proposed Development, affecting water quality of the SCI supporting habitat, has been identified. During the dedicated wintering bird surveys undertaken of the Proposed Development over three wintering seasons at both Limerick WWTP and Corcanree PS (Section 3.2.2.2), black-	Yes

Qualifying feature	Conservation Objective (NPWS, Version 1, September 2012[5]),	Rationale	Potential for Adverse Effects Y/N
		headed gull were recorded within Limerick WWTP. The size of flocks ranged between 4 and 50 in 2024/2025, between 1 and 204 in 2022/2023 (average of 67 individuals) and between 24 and 118 in 2020/2021 (average of 71 individuals). The birds were recorded roosting on the storm tank, aeration tanks and settlement tanks of Limerick WWTP. Black-headed gulls appear to be habituated to the activities within the WWTP and undisturbed by human activity and noise generated by the plant. This infrastructure will be retained. There will be no loss of supporting habitat for the species within the Proposed Development site nor in the wider area of the Shannon and River Fergus Estuaries SPA. There is no potential for adverse effect to the species as a result of habitat loss. However, the potential for adverse effect as result of disturbance of wintering populations during construction of the Proposed Development requires further assessment.	
[A999] Wetland and Waterbirds	To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.	A potential for adverse effect on SCI supporting habitat as a result of deterioration of water quality during construction and operation of the Proposed Development has been identified.	Yes

5.1.2.1 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to effect on the SPA were reviewed and considered in relation to the proposed works. These are provided in Table 5-16.

Table 5-16 Site-specific Pressures and Threats (December 2024).

Rank	Code	Threats and pressures	Inside/outside/both
M	G01.01	Nautical sports	i
M	D.03.02	Shipping lanes	i
H	E03	Discharges	i
H	E01	Urbanised areas, human habitation	o
H	A08	Fertilisation	o
H	E02	Industrial or commercial areas	o
M	F01	Marine and freshwater aquaculture	i

Rank: H = high, M = medium, L = low. i = inside, o = outside, b = both

A potential for effect with regard to site-specific threats, pressures and activities has been identified with regard to 'E03 Discharges'. The potential for the Proposed Development to result in an adverse effect on the SPA in this regard is assessed in Section 6 of this NIS.

5.1.2.2 Special Conservation Interest Specific Information

5.1.2.2.1 *Wetland and Waterbirds*

The wetland habitats contained within the River Shannon and River Fergus Estuaries SPA are identified to be of conservation importance for non-breeding (wintering) migratory waterbirds. According to the site-specific conservation objectives, the wetland habitat area was estimated as 32,261ha**.**

Table 5-17 Targets and attributes associated with the conservation objective for [A999] Wetlands and waterbirds

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Wetland habitat area	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation	There is no potential for direct effects to the SCI supporting habitat, given that no works are proposed within SCI supporting wetland habitat. However, a potential for indirect adverse effect on SCI supporting habitat was identified as a result of the potential for run-off of pollutants to Bunlicky Lake and the Shannon Estuary during construction of the Proposed Development. The potential for indirect water quality impacts on wetland habitat due to the operational discharge was also identified.

5.1.2.2.2 *Cormorant (Phalacrocorax carbo)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 245 individuals. Recent data indicates that numbers have decreased within the SPA to 237 individuals (2006/07 – 2010/11).

Table 5-18 Targets and attributes associated with the conservation objective for Cormorant

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Breeding population abundance: apparently occupied nests (AONs)	No significant decline	Breeding cormorant utilise treelines within Bunlicky Lake over 200m from Limerick WWTP. Taking a precautionary approach a potential for indirect effect on cormorant breeding success was identified as a result of disturbance due to construction of the Proposed Development (at Limerick WWTP).
Productivity rate	No significant decline	
Distribution: breeding colonies	No significant decline	
Prey biomass available	No significant decline	A potential for impact on prey biomass available (i.e fish species) was identified due to water quality deterioration as a result of construction and operation of the Proposed Development.
Barriers to connectivity	No significant increase	There will be no barriers to connectivity as a result of the Proposed Development.
Disturbance at the breeding site	Human activities should occur at levels that do not adversely affect the breeding cormorant population	Breeding cormorant utilise treelines within Bunlicky Lake over 200m from Limerick WWTP. Taking a precautionary approach a potential for indirect effect on cormorant breeding success was identified as a result of disturbance due to construction of the Proposed Development (at Limerick WWTP).
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by cormorant other than that occurring from natural patterns of variation	Breeding cormorant utilise treelines within Bunlicky Lake over 200m from Limerick WWTP. Taking a precautionary approach a potential for indirect effect on cormorant distribution was identified as a result of disturbance due to construction of the

		Proposed Development (at Limerick WWTP).

5.1.2.2.3 *Whooper Swan (Cygnus cygnus)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Whooper Swan (*Cygnus cygnus).* The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 118 individuals. Recent data indicates that numbers have increased within the SPA to 269 individuals (2006/07 – 2010/11).

Table 5-19 Targets and attributes associated with the conservation objectives for Whooper Swan

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by whooper swan other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.4 *Light-bellied Brent Goose (Branta bernicla hrota)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta bernicla hrota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 494 individuals. Recent data indicates that numbers have decreased within the SPA to 176 individuals (2006/07 – 2010/11).

Table 5-20 Targets and attributes associated with the conservation objective for Light-bellied Brent Goose

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no

		potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by light-bellied brent goose other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.5 *Shelduck (Tadorna tadorna)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,025 individuals. Recent data indicates that numbers have decreased within the SPA to 291 individuals (2006/07 – 2010/11).

Table 5-21 Targets and attributes associated with the conservation objective for Shelduck

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by shelduck other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.6 *Wigeon (Anas Penelope)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,761 individuals. Recent data indicates that numbers have decreased within the SPA to 1,821 individuals (2006/07 – 2010/11).

Table 5-22 Targets and attributes associated with the conservation objective for Wigeon

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation

Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by wigeon other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.7 *Teal (Anas crecca)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,260 individuals. Recent data indicates that numbers have decreased within the SPA to 812 individuals (2006/07 – 2010/11).

Table 5-23 Targets and attributes associated with the conservation objective for Teal

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by teal other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.8 *Pintail (Anas acuta)*

As per the conservation objectives supporting document for the SPA, Pintail (*Anas acuta*) was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00), at 62 individuals. Recent data indicates that numbers have decreased within the SPA to 30 individuals (2006/07 – 2010/11).

Table 5-24 Targets and attributes associated with the conservation objective for Pintail

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by pintail other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.9 *Shoveler (Anas clypeata)*

As per the conservation objectives supporting document for the SPA, Shoveler (*Anas clypeata*) was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00), at 107 individuals. Recent data indicates that numbers have decreased within the SPA to 45 individuals (2006/07 – 2010/11).

Table 5-25 Targets and attributes associated with the conservation objective for Shoveler

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by shoveler other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.10 *Scaup (Aythya marila)*

As per the conservation objectives supporting document for the SPA, Scaup (*Aythya marila*) was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00), at 102

individuals. Recent data indicates that numbers have decreased within the SPA to 24 individuals (2006/07 – 2010/11).

Table 5-26 Targets and attributes associated with the conservation objective for Scaup

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by scaup other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.11 *Ringed Plover (Charadrius hiaticula)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1 % or more of the all-Ireland population of Ringed Plover (*Charadrius hiaticula*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 223 individuals. Recent data indicates that numbers have decreased within the SPA to 92 individuals (2006/07 – 2010/11).

Table 5-27 Targets and attributes associated with the conservation objective for Ringed Plover

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by ringed plover other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.12 *Golden Plover (Pluvialis apricaria)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Golden Plover (*Pluvialis apricaria*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 5,664 individuals. Recent data indicates that numbers have decreased within the SPA to 1,929 individuals (2006/07 – 2010/11).

Table 5-28 Targets and attributes associated with the conservation objective for Golden Plover

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by golden plover other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.13 *Grey Plover (Pluvialis squatarola)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 558 individuals. Recent data indicates that numbers have decreased within the SPA to 69 individuals (2006/07 – 2010/11).

Table 5-29 Targets and attributes associated with the conservation objective for Grey Plover

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by grey plover other than that	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of

	occurring from natural patterns of variation	disturbance due to construction of the Proposed Development.

5.1.2.2.14 *Lapwing (Vanellus vanellus)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,126 individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-30 Targets and attributes associated with the conservation objective for Lapwing

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by lapwing other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.15 *Knot (Calidris canutus)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Knot (*Calidris canutus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,015individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-31 Targets and attributes associated with the conservation objective for Knot

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population

		impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by knot other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.16 *Dunlin (Calidris alpina)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the biogeographic population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,131 individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-32 Targets and attributes associated with the conservation objective for Dunlin

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by dunlin other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.17 *Black-tailed Godwit (Limosa limosa)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,035 individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-33 Targets and attributes associated with the conservation objective for Black-tailed Godwit

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term

		population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by black-tailed godwit other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.18 *Bar-tailed Godwit (Limosa lapponica)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 460 individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-34 Targets and attributes associated with the conservation objective for Bar-tailed Godwit

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.19 *Curlew (Numenius arquata)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,396 individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-35 Targets and attributes associated with the conservation objective for Curlew

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by curlew other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.20 *Redshank (Tringa totanus)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,645 individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-36 Targets and attributes associated with the conservation objective for Redshank

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by redshank other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.21 *Greenshank (Tringa nebularia)*

As per the conservation objectives supporting document for the SPA, during winter the site regularly supports 1% or more of the all-Ireland population of Greenshank (*Tringa nebularia*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 61 individuals. Recent data indicates that numbers have decreased within the SPA to 2,012 individuals (2006/07 – 2010/11).

Table 5-37 Targets and attributes associated with the conservation objective for Greenshank

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by greenshank other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

5.1.2.2.22 *Black-headed Gull (Chroicocephalus ridibundus)*

As per the conservation objectives supporting document for the SPA, Black-headed Gull (*Chroicocephalus ridibundus*) was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00), at 2,681 individuals. Recent data indicates that numbers have decreased within the SPA to 1,303 individuals (2006/07 – 2010/11).

Table 5-38 Targets and attributes associated with the conservation objective for Black-headed Gull

Attribute	Target	Potential for Proposed Development to Undermine Conservation Objective Target in the Absence of Mitigation
Population trend	Long term population trend stable or increasing	Taking a precautionary approach there is potential for impacts on long term population trends as a result of deterioration in water quality which requires further assessment. Given the short-term of the construction activities, no potential for long term population impacts as a result of disturbance was identified.
Distribution	There should be no significant decrease in the range, timing or intensity of use of areas by black-headed gull other than that occurring from natural patterns of variation	Taking a precautionary approach a potential for indirect effect on SCI distribution was identified as a result of disturbance due to construction of the Proposed Development.

6. ASSESSMENT OF POTENTIAL EFFECTS & ASSOCIATED MITIGATION

This section of the NIS assesses the potential effects of the Proposed Development on the identified relevant Qualifying Interests/Special Conservation Interests. This assessment is undertaken in the absence of any mitigation and in respect of the conservation objectives of the European Sites. The Conservation Objectives for each of the European Sites assessed were reviewed on the 30th of April 2026. The Conservation Objectives for these sites are available at the following locations:

Lower River Shannon SAC:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf

River Shannon and River Fergus Estuaries SPA:
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf

Following the initial impact assessment, mitigation is prescribed where necessary to avoid adverse effects on the Conservation Objectives of the relevant QIs/SCIs.

6.1 Potential for Direct Effects on the European Sites

There are no construction works required within the boundary of any European Site, therefore, there is no potential for direct effects. Impacts from the construction and operational phases of the Proposed Development are limited to indirect effects and are set out below.

6.2 Potential for Indirect Effects on the European Sites

6.2.1 Water Quality Deterioration

6.2.1.1 Construction Phase

The construction of the Proposed Development carries a risk of silt/sediment run-off and run-off of pollutant materials including cement and hydrocarbons.

6.2.1.1.1 *Construction Works at Limerick WWTP*

The construction footprint within Limerick WWTP includes wet channels with potential connectivity through agricultural fields to Bunlicky Lake in the west. The lake is located within River Shannon and River Fergus Estuaries SPA. There is therefore potential for impacts on the lake via these conduits.

Construction activities at Limerick WWTP have the potential to generate short-term impacts on receiving waters, primarily through the network of drains that discharge to Bunlicky Lake. These drains could convey sediment, suspended solids, or accidental spills arising from excavation, earthworks, material handling, and vehicle movements. Without appropriate controls, such pollutants could enter Bunlicky Lake and temporarily affect water quality. Ground investigations indicate the presence of a high water table across the site, therefore excavations will intersect groundwater, generating the need for controlled dewatering. If unmanaged, dewatering arisings could become a pathway for suspended solids to enter the drainage network. In addition to potential runoff impacts, certain construction activities, particularly piling, compaction, and heavy vehicle movement, can give rise to localised ground vibration. In soft ground conditions, such vibration can mobilise fine sediments

within drains or waterlogged soils, temporarily increasing turbidity if these materials enter the drainage network.

Ballinacurra Creek, located approximately 200 m from the site, presents a low potential for indirect connectivity. The Shannon Estuary is approximately 0.5 km away and is not expected to experience any adverse effects due to intervening land, distance, and the nature of the works.

Note that the scenario where the potential temporary construction compound to the south of the WWTP is used during construction of the Proposed Development has been fully assessed (the potential compound area is depicted in the Habitat Map, Figure 3-1).

6.2.1.1.2 *Construction Works at Corcanree PS*

The construction footprint for the proposed storm tank at Corcanree PS is completely buffered from the Shannon Estuary in terms of run-off via an existing flood embankment. However, an OPW drainage channel with likely connectivity to the Shannon is present completely outside of the Proposed Development boundary but is located approx. 60m to the north east of the site.

Deep excavations are required for the proposed storm water tank and as such there is also a risk of groundwater contamination, which can also result in infiltration to surface water bodies. In addition, there is a need for surface management of groundwaters requiring pumping from the excavation.

According to the flood risk assessment, there is a moderate risk of a coastal flood event within the Corcanree PS, as such with potential to impact temporary working areas/compound associated with the construction of the storm tank. The footprint of the proposed storm tank itself is not at risk at flooding. Therefore, on a precautionary basis there is a risk of flood and surface run-off from the compound area.

6.2.1.1.3 *Impact Pathways on QI and SCI Habitats and Species*

The Shannon Estuary in the vicinity of the development site is a wide, deep, estuarine waterbody. Previous IFI surveys (Section 0) have identified that the Lower River Shannon, from Limerick Docks to the lower estuary, is dominated by coarse fish species such as plaice, smelt, flounder, sand goby, and sprat. Salmon were not recorded at the Limerick Docks in 2014. The deterioration of the aquatic environment has a potential to affect aquatic species which use it, as significant sedimentation can result in smothering or oxygen starvation for species. Increased sedimentation can impact on fish species by clogging gills, reducing visibility when foraging, and clogging spawning gravels for salmonids and lamprey. The release of certain materials, such as hydrocarbons or cement products, would be toxic to fish life. In turn, as mentioned above, potential fish-kills would result in indirect impacts to otter via reduced fish biomass for foraging.

A potential for adverse effect on surface water quality of the Shannon Estuary, deterioration in groundwater quality and deterioration in estuarine habitats thus affecting aquatic fauna and habitats as a result of the construction phase of the development was identified.

6.2.1.1.4 *Mitigation Measures*

Mitigations include use of silt fencing to prevent run-off to perimeter drainage ditches, management of excavation dewatering and deep excavations, and management of spoil, concrete and hydrocarbons.

Limerick WWTP

A layout depicting the locations of proposed mitigation measures at Limerick WWTP is shown in Figure 6.1.

Dewatering and Surface Water Management

- All surface water, construction runoff, and excavation groundwater shall be fully contained and managed in a controlled system. No uncontrolled discharge to ground, drainage channels, or the receiving environment is permitted.
- Excavation groundwater and surface water runoff shall be collected in lined sumps and pumped to mobile settlement tanks or equivalent treatment systems to allow suspended solids to settle prior to discharge.
- Temporary surface drains and bunds shall be lined to prevent infiltration and interaction with groundwater.
- Pumping and treatment systems shall be sized to manage combined excavation groundwater and surface runoff, including rainfall events up to the 1-in-30-year return period intensity, and maintained to prevent overtopping or system failure.
- Dewatering shall be undertaken in a controlled manner to manage groundwater drawdown to minimise hydraulic gradients, sediment mobilisation, or instability within the excavation.
- Groundwater levels shall be monitored during dewatering using standpipe piezometers (or other suitable methods), to verify that drawdown remains localised to the excavation area and does not adversely affect surrounding soils or structures.
- Water quality monitoring of key parameters (e.g. pH, turbidity, and suspended solids) shall be undertaken at the treatment system outlet, with daily visual inspections and routine sampling using calibrated field equipment and standard grab sampling methods, as agreed with the Project Supervisor and ECoW and in accordance with the CEMP and applicable discharge licence conditions.
- Final treated water shall meet a Suspended Solids limit of <35 mg/L prior to discharge.
- Treated water shall be discharged to the existing WWTP final effluent chamber and subsequently to the Shannon Estuary.
- All dewatering infrastructure (sumps, pumps, pipework, tanks) shall be inspected weekly and following significant rainfall events, with records maintained.

Monitoring & Inspection

The Project Supervisor shall inspect containment structures, pumps, and temporary controls weekly. The ECoW will inspect water quality daily and verify compliance using visual assessments and field monitoring equipment. The frequency and scope of monitoring shall be defined in the CEMP and may be adjusted by the ECoW based on monitoring results and site conditions.

The ECoW has the authority to suspend pumping immediately if suspended solids limits are exceeded or if any control measure fails, and all inspections, monitoring results (including field measurements and any laboratory analysis), maintenance, and corrective actions shall be fully documented in site environmental records and retained for compliance and audit purposes.

Drainage Protection and Sediment Control

- The contractor shall identify and map all existing drainage features prior to works commencing and protect them with temporary fencing and targeted silt control measures where they interface with construction areas.
- Silt fences shall be supported by timber posts and geotextile buried in an ‘L’ configuration to a minimum depth of 250 mm.
- Targeted silt fencing and sediment control measures shall be installed at locations where sediment mobilisation risk is identified during weekly or post-rainfall (>10 mm) inspections. Continuous perimeter fencing is not required due to full containment of surface water and the protected nature of drainage features.
- Construction works shall be sequenced to minimise exposed soil, ensuring no disturbed area remains uncovered for more than 7 days. Exposed areas where works are paused or completed shall be stabilised or covered to prevent sediment mobilisation.
- Temporary stockpiles shall be located within the active construction footprint, at least 20 m from drainage features, and managed with bunding, covers, or perimeter silt fencing to prevent erosion and runoff into drainage pathways.

- Drainage protection and sediment controls shall be inspected weekly by the Project Supervisor, and within 24 hours after rainfall events exceeding 10 mm, with any damaged or ineffective controls repaired or replaced within 48 hours.
- Where reasonably possible, bulk earthworks shall be scheduled during drier months (April–September) to reduce sediment generation.

Monitoring & Inspection: The Project Supervisor and ECoW will oversee weekly inspections, review corrective actions, and verify compliance with sediment control measures.

Pollution and Spill Prevention

- Designated bunded areas shall be provided for refuelling, plant maintenance, and fuel/chemical storage, located at least 10 m from drainage features.
- Oils and fuels shall be stored in bunded tanks providing 110% retention capacity.
- No refuelling shall occur within 10 m of the excavation perimeter or drains, and vehicles must not be left unattended during refuelling.
- Spill kits, absorbent materials, and oil containment booms shall be available on-site, proportionate to the volume of materials stored, with staff trained in their correct use.
- Cementitious and hazardous materials shall be handled in designated areas at least 5 m from drainage features or the excavation, with controlled washout procedures to prevent discharge.
- An Emergency Spill Response Plan shall be implemented and maintained, including contact details for relevant statutory bodies, and made accessible to all site personnel.
- All spill response equipment shall be maintained in fully operational condition at all times.

Monitoring & Inspection: Project Supervisor shall inspect bunded areas, fuel/chemical storage, and spill kits weekly; ECoW to verify compliance and respond to any spills or breaches of handling protocols.

Piling and Groundwater Controls

- Excavation and piling for the AGS tank shall use low-vibration methods, with no hard rock expected, to minimise disturbance to saturated soils and surrounding groundwater.
- Temporary drainage protection measures (silt fences, sediment traps) shall be inspected and maintained to ensure any vibration-mobilised sediments are captured at source.
- Inspection and monitoring of drainage features shall be undertaken during piling through regular visual inspections of on-site drains to ensure that any mobilisation of sediments or changes in local groundwater conditions remain localised and controlled, and that no silt-laden runoff enters the drainage network or downstream lake.

Monitoring & Inspection: Project Supervisor to verify vibration-sensitive areas are protected during piling or heavy compaction; ECoW to monitor ground vibration at sensitive drainage locations and ensure drainage protection measures remain effective.

Corcanree PS

A layout depicting the locations of proposed mitigation measures at Corcanree PS is shown in Figure 6-2.

Dewatering and Surface Water Management

- All excavation groundwater and surface water runoff shall be fully contained and managed in a controlled system. No uncontrolled discharge to ground, drainage features, or the receiving environment shall occur.

- Groundwater abstracted during excavation shall be collected in lined sumps and pumped to mobile settlement tanks or equivalent treatment systems to remove suspended solids prior to discharge.
- Pumping and treatment systems shall be sized at detailed design stage to manage combined groundwater inflows and surface runoff, including rainfall events up to the 1-in-30-year return period intensity, and shall be maintained to prevent overtopping or system failure.
- Dewatering shall be undertaken in a staged and controlled manner to manage groundwater drawdown, minimise excessive hydraulic gradients, and reduce the risk of sediment mobilisation or instability within the excavation.
- Groundwater levels shall be monitored during dewatering using standpipe piezometers (or other suitable methods), to verify that drawdown remains localised to the excavation area and does not adversely affect surrounding soils or structures.
- Water quality monitoring of key parameters (e.g. pH, turbidity, and suspended solids) shall be undertaken at the treatment system outlet, with daily visual inspections and routine sampling using calibrated field equipment and standard grab sampling methods, as agreed with the Project Supervisor and ECoW and in accordance with the CEMP and applicable discharge licence conditions.
- Final treated water shall meet a Suspended Solids limit of <35 mg/L prior to discharge.
- Treated water shall be discharged to the storm overflow chamber and subsequently to the Shannon Estuary via the existing controlled outfall.
- All dewatering infrastructure (sumps, pumps, pipework, tanks) shall be inspected weekly and following significant rainfall events, with records maintained.

Monitoring & Inspection: All containment structures, sumps, pumps, and temporary controls shall be inspected weekly by the Project Supervisor, with daily water quality checks by the ECoW. The ECoW has the authority to suspend pumping immediately if suspended solids limits are exceeded or if any control measure fails, and all inspections, maintenance, and corrective actions shall be fully documented.

Drainage and Sediment Control

- All existing drainage features, including the OPW drain located approximately 50 m north-west of the excavation area, shall be identified and clearly demarcated prior to commencement of works.
- Temporary protective fencing shall be installed along the eastern and northern site boundaries to prevent encroachment, trafficking, or accidental discharge toward the OPW drain.
- Localised silt fencing and sediment control measures shall be installed at points where construction activities interface with drainage pathways or where there is a risk of sediment migration. Continuous perimeter buffering is not required given the site layout and flood defence embankments.
- Exposed soils shall be minimised through sequencing of works. Areas not actively under construction shall be stabilised as soon as practicable.
- Stockpiles shall be located within the active construction footprint, at least 15 m from any watercourse, and managed to prevent erosion, including bunding, covering, or temporary stabilisation during heavy rainfall.
- Sediment control measures shall be inspected weekly by the Project Supervisor, with daily checks by the EcOW in high-risk areas such as near drainage features, steep benches, or stockpiles. Any ineffective controls shall be repaired immediately, and all inspections and corrective actions documented.

Monitoring and inspection; All sediment control measures shall be checked weekly by the Project Supervisor, with daily checks by the EcOW for high-risk areas (adjacent to the watercourse, steep benches, or stockpiles). Any damaged or ineffective controls shall be repaired or replaced immediately, and records of inspections, maintenance, and corrective actions maintained.

Pollution Prevention and Spill Management

- Refuelling, plant maintenance, and fuel/chemical storage shall take place within designated bunded areas located at least 10 m from drainage features and outside the mapped flood zone.
- Oils and fuels shall be stored in bunded tanks providing 110% retention capacity.
- No refuelling shall occur within 10 m of the excavation perimeter or drains, and vehicles must not be left unattended during refuelling.
- Spill kits and absorbent materials shall be available on-site at all times, proportionate to the volume of materials stored, with staff trained in their correct use.
- Cementitious and hazardous materials shall be handled in designated areas at least 5 m from drainage features or the excavation, with controlled washout procedures to prevent discharge.
- An Emergency Spill Response Plan shall be implemented and maintained for the duration of the works, including contact details for relevant statutory bodies.
- All spill response equipment shall be maintained in fully operational condition at all times.

Monitoring & Inspection: The Project Supervisor shall inspect bunded areas, fuel and chemical storage, and spill kits weekly, with the ECoW verifying compliance, ensuring all handling protocols are followed, and responding immediately to any spills or breaches; records of inspections, maintenance, and corrective actions shall be maintained.

Piling and Groundwater Controls

- Excavation and sheet pile installation for the storm tank shall use low-vibration methods to minimise disturbance to saturated soils and surrounding groundwater conditions.
- Sumps and sediment traps shall be inspected and secured prior to piling works and maintained throughout construction to ensure any mobilised sediment is captured at source.

Monitoring & Inspection: The Project Supervisor shall verify that vibration-sensitive areas and drainage features are protected, with the EcOW conducting inspections and reviewing monitoring data to confirm that drainage controls remain effective; any failures shall be corrected immediately and documented.

Flood Risk Management

- Stockpiles, plant and hazardous materials will be managed and stored in designated areas to minimise the risk of flood-related damage or pollution.
- Deployable measures such as portable bunds, sandbags, or silt fencing shall be installed if weather forecasts or river level monitoring indicate potential flooding.
- Drains, sumps, and pumping systems shall be maintained to ensure that any incidental water does not cause uncontrolled release or damage.

Monitoring & Inspection: The Project Supervisor shall monitor weather and river levels daily during the construction stage; the ECoW shall review flood mitigation measures where the area is in use. Any observed risk or breaches shall be managed immediately and recorded.

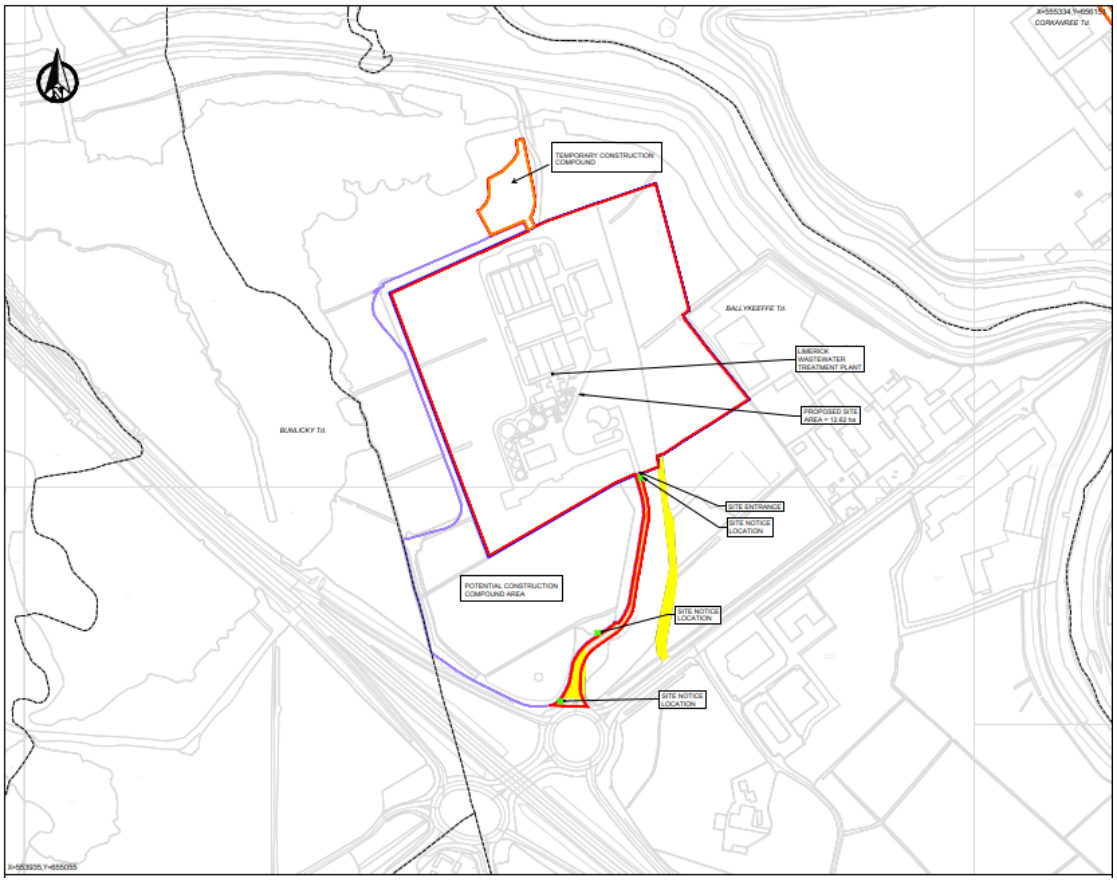


Figure 6-1 Proposed Mitigation Measures at Limerick WWTP

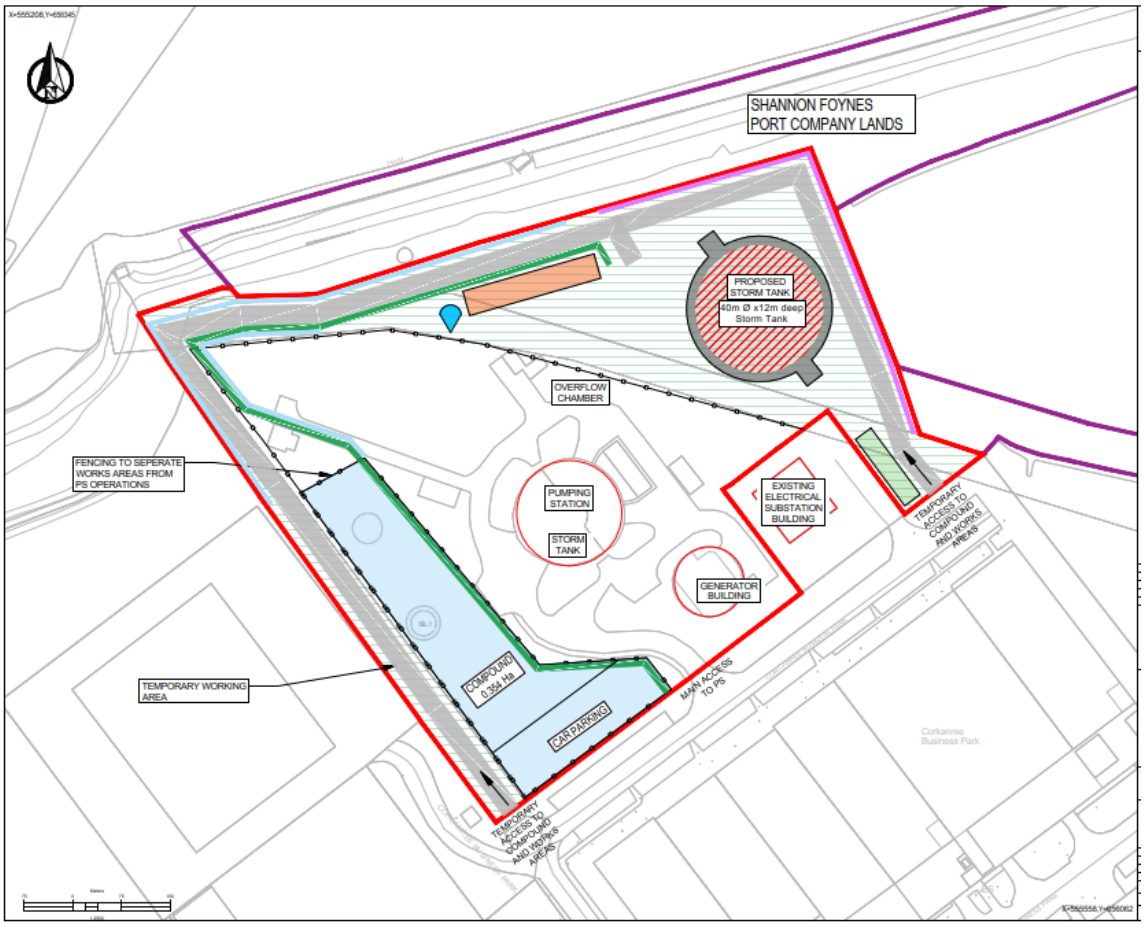


Figure 6-2 Proposed Mitigation Measures at Corcanree PS

6.2.1.2 Operational Phase

6.2.1.2.1 *Future Water Quality Impacts due to Ongoing Discharge*

The main impacts of the Proposed Development in the context of operational water quality are as follows:

- The WWTP treatment capacity will increase, therefore the treated effluent outflow volume will increase.
- Site drainage and SuDS measures will be implemented.
- The quality of the treated effluent will improve with the reduced pressure on the existing system and with the new process stream in place.
- The additional 12,500m^3 stormwater storage capacity will greatly reduce uncontrolled spills to the Shannon Estuary.

A detailed population assessment was carried out to establish the domestic, non-domestic and industrial contributions to the WWTP. This included a detailed review of load sources to the WWTP, annual growth rates, and headroom for future WWTP inflows. The WWTP upgrade will be implemented in 2 no. phases, the 10 year and 25-year design outlooks. Characteristics of proposed future WWTP discharges are outlined in

Table 6-1 below and distinguished between the 10-year design outlook and the 25-year design outlook.

Table 6-1 Future Design and Modelled Effluent Concentrations for the 10-Year Design outlook and 25-year Design Outlook

Modelled Effluent Concentrations (at DWF)			285,000PE / 10 Yr Design	325,000PE / 25 Yr Design
BOD (mg/l)	**MRP (mg/l)**	**DIN (mg/l)**	**DWF * 1.5 [m3/day]**	**DWF * 1.5 [m3/day]**
20	1	30	99,164	101,560

EQS Compliance:

Modelling was carried out of future concentrations of Biochemical Oxygen Demand (BOD), Molybdate Reactive Phosphorous (MRP) and Dissolved Inorganic Nitrogen (DIN). Modelling was carried out for the 25-year population design horizon of 325,000PE. The modelling included inputs from Castletroy WWTP and Shannon Town WWTP with their respective proposed upgraded design PE included. Given the channel width of 160m, 'Good Status' Environmental Quality Standards (EQS), as set out in the Water Framework Directive (WFD) must be achieved within 1km downstream of the outfall location.

Modelling scenarios referenced in the paragraphs below are identified via a series of codes as defined in the below points:

- **A:** Existing situation: baseline with current discharges and ELV concentrations;
- **C:** Upgraded treatment with existing outfall: increased PE with current and ELVs concentrations as stated below.
- **s:** summer
- **w:** winter
- **01:** Existing situation with a 130,000 PE and current ELV concentrations.
- **02:** Upgrade of Limerick WWTP to 285,000 PE and current ELV concentrations;
- **03:** Upgrade of Limerick WWTP to 325,000 PE and current ELV concentrations;
- **04:** Combined upgrade of Limerick WWTP to 285,000 PE, Shannon Town WWTP to 21,000 PE and Castletroy WWTP to 81,000 PE within 25-year growth and current ELV concentrations
- **05:** Combined upgrade of Limerick WWTP to 325,000 PE, Shannon Town WWTP to 21,000 PE Castletroy WWTP to 81,000 PE within 25-year growth and current ELV concentrations.

- **06:** Combined upgrade of Limerick WWTP to 325,000 PE, Shannon Town WWTP to 21,000 PE Castletroy WWTP to 81,000 PE within 25-year growth and lowered ELV concentrations for BOD and MRP.

BOD: In the Limerick WWTP upgrade scenarios (C02s–C05s), the ambient BOD concentration in the estuary (i.e. concentrations not influenced by the Limerick WWTP) increases by approximately 0.7 mg/l across all scenarios, while remaining within 'High' EQS status. An increase in BOD concentration of more than 2.5 mg/l is observed only near the WWTP outfall, which leads to the increase in the extent of the zone with 'Moderate' indicative water quality to 120 m.

The streamwise extent of the 'Good' indicative water quality zone also increases from 110 m in the existing situation to 270-290 m in the upgrade scenarios.

In the combined upgrade scenario (C06s), which includes improvements at multiple WWTPs and reduced BOD concentrations at the outfall, conditions are comparatively improved. The increase in background BOD concentrations is lower (approximately 0.5 mg/l), and the extent of the 'Good' indicative water quality zone is reduced relative to C05, extending to approximately 170 m in the downstream direction compared to approximately 290 m in the C05 scenario.

The predicted mixing zone is therefore limited in extent for this waterbody. When considered in the context of the receiving environment, the mixing zone represents only a very small proportion of the 160 m channel width and overall extent of the Shannon Estuary.

Model results indicate that elevated BOD concentrations are confined to the immediate vicinity of the outfall and remain localised under tidal conditions, without significant upstream or downstream propagation. Background BOD levels remain at 'High' status in the wider estuary and are not impacted by the localised increase in concentrations within the mixing zone.

Table 6-2 Mixing Zone Assessment for BOD

Model scenario	Mixing Zone Length		Relative to total length Shannon Estuary (~100km)	
	'Good' status	'Moderate' status	'Good' status	'Moderate' status
A01s (Existing)	110 m	70 m	0.1%	0.1%
C06s (Future)	170 m	120 m	0.2%	0.1%

DIN: In the upgrade scenarios for Limerick WWTP (C02s–C05s), DIN concentrations in the immediate vicinity of the outfall exceed the non-regulatory DIN EQS threshold for 'Good' status of 2.6 mg/l at 0 psu. However, the extent of the resulting 'Moderate' status mixing zone is limited, extending approximately 50–80 m from the outfall depending on the scenario.

Further from the outfall, DIN concentrations increase by approximately 0.35–0.55 mg/l. The spatial extent of 'Good' indicative water quality in all upgrade scenarios increases to approximately 8–10 km downstream of the outfall, indicating an overall improvement in water quality conditions away from the immediate discharge area.

The predicted mixing zone is therefore highly localised. In the context of the receiving environment, the area of 'Moderate' status is confined to a very limited zone immediately adjacent to the outfall and represents a negligible proportion of the 160 m channel width and the overall extent of the Shannon Estuary.

Model results indicate that elevated DIN concentrations are confined to the immediate vicinity of the outfall and remain localised under tidal conditions, without significant upstream or downstream propagation. Background DIN levels remain at 'Good' status in the wider estuary and are not impacted by the localised increase in concentrations within the mixing zone.

Table 6-3 Mixing Zone Assessment for DIN

Model scenario	Mixing zone length		Relative to total length Shannon Estuary (~100km)	
	'Good' status	'Moderate' status	'Good' status	'Moderate' status
A01s (Existing)	>8 km	-	8.0%	-
C05s - Future scenario	>10 km	80 m	10.0%	0.1%

MRP: In the future C06s scenario, with the combined upgrade of the WWTPs, there is a significant reduction in MRP concentrations associated with the improved ELVs applied at the WWTP. Concentrations in the vicinity of the outfall decrease from approximately 0.16 mg/l in the existing situation to approximately 0.07 mg/l. The extent of the area corresponding to 'Moderate' status is substantially reduced from approximately 16 km in the existing scenario to a localised mixing zone of approximately 510 m.

The predicted mixing zone is therefore significantly reduced in extent. When considered in the context of the receiving environment, the area of 'Moderate' status is confined to a localised zone adjacent to the outfall extending approximately 510 m from the outfall, while most of the Shannon Estuary remains within 'Good' EQS status.

Model results indicate that elevated MRP concentrations are confined to the immediate vicinity of the outfall and remain localised under tidal conditions, without significant upstream or downstream propagation. The extent of 'Good' status within the wider estuary remains largely unchanged, reflecting background concentrations in the receiving water.

Table 6-4 Mixing Zone Assessment for MRP

Model scenario	Mixing zone length (Modelled extent achieving)		Relative to extent Shannon Estuary (~100km) achieving	
	'Good' status	'Moderate' status	'Good' status	'Moderate' status
A01s (Existing)	25.5 km	16 km	25.5%	16.0%
C06s (Future)	25.2 km	510 m	25.2%	0.5%

6.2.1.2.2 *Stormwater Storage Improvements*

The Proposed Development includes the construction of a stormwater storage tank at Corcanree PS. The tank will be approximately 40m in diameter and 10–15m deep and will provide the additional stormwater storage capacity required to support the projected 25-year expansion to c. 325,000 PE, in accordance with UWWTD stormwater storage requirements. The total long-term storage requirement is calculated to be approximately 20,000m³. As the existing stormwater holding tank at the WWTP provides 7,500m³ of storage, the Proposed Development will deliver an additional minimum storage volume of 12,500m³ at Corcanree PS.

During storm events, excess flows will be directed to the storage tank and retained until flows subside, then stormwater will be returned to the network at a controlled rate of 1 DWF for onward treatment at the WWTP. Any spills will pass through screening prior to discharge to the Shannon Estuary via the existing SWO chamber.

The Drainage Area Plan (DAP) modelling was run with stormwater flows included. It is predicted that there will be a reduction in total annual stormwater spills as outlined in the table below. Both the stormwater overflow (SWO) from the WWTP and the SWO from the Corcanree PS will be compliant with the Urban Wastewater Treatment Directive (UWWTD).

Table 6-5: Model Outputs - Current V's Future Scenario (Significant Spill≥50m³)

Model Scenario	Location	Spills per Annum	Spill Volume (m3/Annum)	Spill Volume (% of DWF)	Compliance with UWWTD
Current Baseline	Corcanree PS	68	725,637	5.60%	Non-compliant
	Limerick WWTP	145	1,730,913	11.10%	Non-compliant
Committed Works Model (Day 1 of operation)	Corcanree PS	5	101,576	1.0	Compliant
	Limerick WWTP	26	122,000	0.8	Compliant
Stage 4 Upgrades	Corcanree PS	16	295,725	1.4	Compliant
	Limerick WWTP	0	0	0.0	Compliant

6.2.1.2.3 *Proposed Regional Bioresource Centre*

The proposed Regional Bioresource Centre will be designed to treat indigenous sludge and imported sludges from Counties Limerick, Clare and Tipperary to the required Code of Good Practice standard for reuse of Biosolids in Agriculture, in alignment with the National Wastewater Sludge Management Plan (NWSMP). The current national strategy is to regionalise sludge treatment and achieve a Class A Biosolid through a combination of Anaerobic Digestion (AD) and heat treatment. Through Anaerobic Digestion, the plant can generate biogas, a source of renewable energy, which will be used to generate electrical power for use on site and to produce heat which is required for the AD process. There will be a liquor treatment plant for centrate returns from the RBC to the main treatment process works, so there will be minimal risk to ammonia overloading in the main treatment process. There will therefore be no potential for additional impacts to water quality as a result of this element of the development. There is a chance of low-level methane leaks associated with anaerobic digestion (AD) and biogas infrastructure however, the AD and biogas pipework process is ATEX rated. In addition, the process is fully enclosed, and any releases are expected to be minimal to negligible, with no uncontrolled discharge of biogas to the atmosphere.

6.2.1.2.4 *Conclusion on impact from wastewater treatment processes*

The modelling results indicate that operational discharges from the upgraded WWTP will lead to small and highly localised increases in nutrients and BOD concentrations relative to the existing baseline, with mixing zones restricted to the immediate vicinity of the outfall and no material deterioration of estuary-wide water quality or EQS status. Improved treatment standards further reduce the spatial extent and magnitude of water quality change near the outfall. Based on the modelling/calculations summarised above, the Proposed Development will improve the existing wastewater treatment processes and will not inhibit the Shannon Estuary meeting its objectives as per the Surface Water

Regulations (European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019) and the Water Framework Directive.

Benthic monitoring data indicate that the existing communities downstream of the discharge point are dominated by opportunistic oligochaete taxa such as *Limnodrilus spp.* and *Tubifex tubifex*, which are tolerant of high organic content and low oxygen conditions. Hydrodynamic and water quality modelling for the upgraded WWTP indicates that future changes in BOD and nutrient concentrations will be small and spatially restricted to the immediate mixing zone, with no wider deterioration in estuary-scale water quality (HaskoningDHV, 2026). While local reductions in organic loading may support a gradual shift towards more diverse and sensitive benthic assemblages close to the outfall, the extent of measurable change is likely to remain limited by the prevailing freshwater tidal conditions, background estuarine variability, and substantial upstream nutrient inputs. In addition, no material temperature differential is expected between treated effluent and receiving waters, and thermal effects are therefore considered to be negligible.

Given the limited and localised extent of the predicted mixing zone, there is no potential for residual adverse effect on the aquatic QI and SCI habitats and speies of Lower River SAC and River Shannon and River Fergus Estuaries SPA.

6.2.1.2.5 *Surface Water Management*

The Sustainable Urban Drainage (SuDS) strategy for surface water management at the Limerick WWTP and Regional Bioresource Centre has been informed by a site visit and topographical survey, and has been developed in accordance with the principles of the The SuDS Manual (C753) published by CIRIA, as well as the Limerick Development Plan 2022–2028.

The site is generally flat and located within an established industrial/commercial area, with ground levels falling gently towards the north-western boundary. It lies in proximity to the Shannon Estuary and is hydraulically connected to Bunlicky Lake via existing land drains. Soakaway testing undertaken in accordance with BRE Digest 365 confirmed that infiltration rates are insufficient to support infiltration-based SuDS features. Accordingly, a surface water management strategy based on attenuation and treatment, rather than infiltration, has been adopted. Surface water runoff will be managed through a treatment system as follows:

- Permeable paving to hardstanding areas surrounding the new tanks and access routes, providing source control and initial treatment.
- Petrol interceptor to remove hydrocarbons from runoff prior to further conveyance.
- Dry swale to provide attenuation, filtration and additional water quality treatment before discharge to the pump sump.

Treated surface water will discharge via the existing storm sewer network to the final effluent chamber, prior to final discharge to the Shannon Estuary.

The proposed AGS tank intersects an existing surface water drain, resulting in a storage loss of approximately 140 m^3. This loss is not expected to affect the local flood regime, the surrounding catchment, or the existing wetland, which will remain unaltered.

Therefore, there is no potential for adverse effect via flooding or receiving water quality deterioration due to surface water run-off during the operational phase.

6.2.2 Disturbance of Fauna

6.2.2.1 SCI Bird Species

Impacts on Wintering Populations

Based on the noise monitoring surveys undertaken to inform the baseline assessment, as included in Chapter 10 of the accompanying EIAR and assessed within this NIS, existing noise levels recorded at the inlet works and secondary treatment tank locations within the Limerick WWTP indicate existing background noise levels of approximately 65 - 75 dB LAeq, which are dominated by pumps & their associated motors and wastewater movement. Generally, the worst-case scenario sound levels likely to occur within 10m of works in the west of Limerick WWTP will be approx. 79 to 87dB, associated with clearing works, distribution of materials and mixing/pumping concrete. Continuous flight auger piling at the AGS tank location is likely to take 6 to 7 weeks and emit approx. 71dB of continuous noise at 50m. Sheet piling is likely to take approx. 10 days and emit 71dB (vibratory hammer) or 81dB (worst case scenario impact hammer) at 50m (Table 6-1).

The potential for adverse disturbance effects to waterbirds as a result of construction of the Proposed Development was considered. As discussed in Section 3.2.2.2, flocks of black-headed gull were recorded roosting on infrastructure at Limerick WWTP. These roosts were recorded on infrastructure within the east of the Limerick WWTP. The noisiest construction works will occur to the west of the WWTP. The birds were notably accustomed to the day-to-day activities within the WWTP site during the wintering bird surveys.

Given the distance between the works at point source and the locations of roosting areas within the WWTP (approx. 50m), the existing disturbance levels at the WWTP, the noise buffering capacity of existing infrastructure and the temporary nature of the noisiest works (with only 10 days required for sheet piling), no potential for adverse disturbance of the roosting black-headed gull flock within Limerick WWTP is predicted. However, mitigation measures to further reduce any potential effect as a result of disturbance are outlined in Section 6.2.2.1.1.

The potential for disturbance effects on other wintering waterbirds using habitats within Bunlicky Lake was considered. The lake edge is located approx. 150m from the main works areas/excavation area within the WWTP, with construction access required within approx. 80m of the lake. However, the WWTP site is well screened from the lake by existing linear woodland along the western boundary of the site. It is further buffered and screened by agricultural grasslands and lakeshore wooded areas.

According to the TIDE Waterbird Disturbance and Mitigation Toolkit[6], for auditory disturbance to qualify as high level, it must constitute a sudden noise event of over 60dB (at the bird, not the source), or a more prolonged noise of over 72dB. Moderate noise level effects comprise occasional noise events above 55dB, regular noise 60 -72dB or long-term regular noise above 72dB. Low noise effects are those less than 55dB which are likely to be masked by background inputs. Noise between 55-72dB in some highly disturbed areas (industrial or urban areas, areas adjacent to roads) may feature a low level of disturbance provided the noise level was regular, as birds will often habituate to a constant noise level. The Waterbird Disturbance Toolkit provides a matrix table illustrating the standard distance decay rates for noise (Plate 6-1). According to this, if the point source of noisiest general construction activity is 87dB (outlined above), then at a distance of minimum 85.33m (as per table in Plate 6-1), the perceived noise level is well within 'acceptable' receptor dose of approx. 48dB. Therefore, based on the noise/distance decay rate and existing background noise levels in the wider area, the general construction works are unlikely to result in adverse disturbance impacts to breeding or wintering SCI species on Bunlicky Lake.

With regard to proposed piling works required at Limerick WWTP, continuous flight auger piling at the AGS tank location is likely to take 6 to 7 weeks and emit approx. 61.5dB of continuous noise at 150m (Table 6-1). Sheet piling is likely to take approx. 10 days and emit 61.5dB (vibratory hammer) or 71.5dB (worst case scenario impact hammer) at 150m. Given this, the existing noise levels at the lake, and the short duration of the piling works required, the potential for adverse disturbance effects to wintering bird species using Bunlicky Lake as a result of piling works is unlikely, however mitigation measures to further reduce any potential effect are outlined in Section 6.2.2.1.1.

[6] *https://www.tide-toolbox.eu/tidetools/waterbird_disturbance_mitigation_toolkit/*

Similarly, the construction area for the proposed storm tank adjacent to Corcanree PS is heavily screened by existing treelines, scrub and riparian treeline of the Shannon Estuary. No significant waterbird roosting areas were identified within the PS site, within the proposed storm tank footprint nor on the adjacent section of the Shannon Estuary (Section 3.2.2.2).

No blasting is proposed as part of the construction phase.

Impacts on Breeding Cormorant

The lake treelines which are used by cormorants for breeding are located adjacent to the N18 Limerick Southern Ring Road and are approx. 230m from the works area within Limerick WWTP. The Limerick Agglomeration Strategic Noise Maps[7] indicate that background road traffic noise from the N18 is significant in the vicinity of Bunlicky Lake and is within the scale of 65 to 69dB. Therefore, birds using these habitats will be accustomed to levels of noise associated with a busy trafficked road.

General construction noise levels likely to occur within 10m of works in the west of Limerick WWTP will be approx. 79 to 87dB, associated with clearing works, distribution of materials and mixing/pumping concrete. At a distance of approximately 230m from the works area at Limerick WWTP and according to noise decay rates, general construction noise emissions from the works at the breeding colony are likely to be significantly reduced (Plate 6-1), and are not likely to result in a cumulative noise level out of character with existing noise levels at the colony.

Continuous flight auger piling at the AGS tank location at Limerick WWTP is likely to take 6 to 7 weeks and emit approx. 59dB of continuous noise at 200m (Table 6-1). The location of the breeding cormorant colony is approx. 230m from the piling area at Limerick WWTP. At this distance, the noise emission from CFA is expected to be further reduced and below 59dB, particularly with consideration of existing buffering woodland and vegetation which will provide screening. Therefore, no potential for adverse disturbance effects on the breeding colony as a result of CFA piling is predicted.

Sheet piling is expected to take approx. 10 days. At 200m, noise emissions from sheet piling are expected to be in the range of 59dB (vibratory hammer) or 69dB (worst case scenario, impact hammer) (Table 6-1). As outlined above the existing noise levels at Bunlicky Lake are in the range of 65 to 69dB due to traffic noise from the N18. Given the existing background noise levels at the lake, the predicted noise level from vibratory hammer piling, occurring 230m away from the breeding colony, is not likely to be out of character with the existing environment and as such the potential for adverse effects on SCI species is unlikely. However, on a precautionary basis, given the sudden nature and predicted noise level of impact hammer piling, it is considered that there is a potential for adverse effect via disturbance during the sensitive breeding period for cormorant during 1st March to 30th June as a result of this method. Mitigation is therefore provided in Section 6.2.2.1.1 below.

Vibration Impacts

The maximum likely vibration level from the Proposed Development site at the nearest sensitive location has been predicted based on the relevant information available in BS 5228-2:2009 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

Ground borne vibration levels from CFA piling vary significantly depending on the type of ground (as set out in BS 5228:2009[8]). However, even on firm ground, ground borne vibration at 20m is only 0.3mm/s PPV, which is around the onset of perceptibility in a typical residential property. Ground borne vibration levels from driven sheet steel piling at a distance of 35m ranges from 0.5 – 3.0 mm/s

[7] *https://www.limerick.ie/council/services/environment-and-climate-action/environmental-control/strategic-noise-maps-limerick*
[8] *British Standards Institution (BSI) (2014). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise & Part 2 Vibration.*

PPV. At the distance between the excavation site to Bunlicky Lake and the edge of the main estuary channel, the ground borne vibration levels will be <0.1mm/s PPV.

The proposed closest location of low-impact vibratory piling method, such as CFA piling to the Shannon Estuary is 50m from the Corcanree Storm Tank. Therefore, based on interpolation of the ground borne vibration levels, the maximum ground borne vibration levels from the CFA piling at 50m will be <0.1 mm/s PPV.

Based on the low predicted impact of vibration associated with piling, as well as the short-term duration of these works, there is no potential for adverse effect via disturbance of bird species.

Metres from Source	dB(A)										
0.67	120	110	100	95	90	85	80	75	70	65	60
1.33	114	104	94	89	84	79	74	69	64	59	54
2.67	108	98	88	83	78	73	68	63	58	53	48
5.33	102	92	82	77	72	67	62	57	52	47	42
10.67	96	86	76	71	66	61	56	51	46	41	36
20.67	90	80	70	65	60	55	50	45	40	35	30
42.67	84	74	64	59	54	49	44	39	34	29	24
85.33	78	68	58	53	48	43	38	33	28	23	
170.67	72	62	52	47	42	37	32	27	22		
341.33	66	56	46	41	36	31	26	21			
682.66	60	50	40	35	30	25	20				
1365.32	54	44	34	49	24						

Plate 6-1 Matrix Table Demonstrating Standard Distance Decay Rates for Noise – Source: Waterbird Disturbance Toolkit **Error! Bookmark not defined.**

Table 6-6 Predicted piling noise levels with distance attenuation (free-field spherical spreading with no screening or reflections, i.e. worst-case noise propagation conditions). Source: Chapter 10 'Noise and Vibration' of the accompanying EIAR.

Piling Method	$L_{Aeq,T}$ @ 10 m	$L_{Aeq,T}$ @ 50 m	$L_{Aeq,T}$ @ 100 m	$L_{Aeq,T}$ @ 150 m	$L_{Aeq,T}$ @ 200 m	$L_{Aeq,T}$ @ 250 m
Driven Sheet Piles (Impact Hammer)	95 dB	81 dB	75 dB	71.5 dB	69 dB	67 dB
Driven Sheet Piles (Vibratory Hammer)	85 dB	71 dB	65 dB	61.5 dB	59 dB	57 dB
CFA piling	85 dB	71 dB	65 dB	61.5 dB	59 dB	57 dB

6.2.2.1.1 *Disturbance Mitigation Measures*

- Construction activities will be restricted to daytime hours as outlined:
  - Monday to Friday: 07:00 hours – 19:00 hours;
  - Saturday: 08:00 hours – 14:00 hours.
- An on-site speed limit will be enforced for all traffic;
- Noise emissions and will comply with the g recommendations of BS 5228;
- Machines will be operated at low speeds and will be shut down when not in use;

- Mechanical plant used on site will be fitted with effective exhaust silencers. Vehicle reverse alarms will be silenced appropriately to minimise noise breakout from the site while still maintaining their effectiveness;
- Compressors will be of the "noise reduced" variety and fitted with properly lined and sealed acoustic covers;
- In all cases, engine and/or machinery covers will be closed whenever the machines or engines are in use;
- All pneumatic percussive tools will be fitted with mufflers or silencers. Mechanical static plant will be enclosed by acoustic sheds or screens;
- For sheet piling, vibration hammer will be used, with impact hammer used only when vibration hammer is unable to complete the drive due to high ground resistance.
- Furthermore, for sheet piling, an acoustic screen will be used, enclosing the hammer head and the top of the pile, which will reduce noise by 5 to 10dB (BS5228 2009-2014).
- The use of the impact hammer sheet piling method, if needed, will be avoided at Limerick WWTP during the cormorant breeding period 1st March to 30th June.
- Employees working on the site will be informed about the requirement to minimise noise and undergo training on the following aspects:
    - The proper use and maintenance of tools and equipment
    - The positioning of machinery on-site to reduce the emission of noise
    - Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment
    - The use and maintenance of sound reduction equipment fitted to power pressure tools and machines.

6.2.2.2 Otter

The potential for disturbance of otter was considered. During the dedicated otter surveys undertaken, no signs of otter resting or breeding places were found within 150m of the Proposed Development, including along the Shannon Estuary, Ballincurra Creek or Bunlicky Lake. However, otter were recorded foraging in Bunlicky Lake and suitable habitat for them exists in the wider areas around Limerick WWTP and Corcanree PS (Section 3.2.2.1). Precautionarily, a potential for adverse effect via disturbance to otter was identified, as a result of noise from construction and due to the potential for establishment of a holt in the interim between baseline otter surveys and commencement of construction.

6.2.2.2.1 *Mitigation*

- A pre-commencement survey for Otter will be carried out prior to any works commencing. Should Otter holts be recorded within 150m of the proposed works at Limerick WWTP or Corcanree PS and a potential for disturbance identified thereon, a derogation license will be obtained from NPWS and works carried out in accordance with NRA (2006) *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*. The otter survey will be carried out no more than 10 months in advance of commencement. The survey will be supplemented with an additional inspection immediately prior to commencement.

The requirement for a pre-commencement survey does not present a lacuna in the survey assessment but is fully in line with best practice guidance. The purpose of the pre-commencement survey will be to assess any changes in the baseline conditions of the site since the time of carrying out the baseline surveys. Should an otter holt be identified during this pre-commencement survey, and if it is deemed that the construction works have the potential to significantly disturb otter, a derogation licence will be obtained from NPWS and further mitigation prescribed by a suitably qualified ecologist prior to commencement of works.

7. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

The potential for residual adverse effects on each of the individual relevant Qualifying Features of the Screened In European Sites following the implementation of mitigation, is assessed in this section of the report.

Based on the above, in view of best scientific knowledge, on the basis of objective information, there is no potential for adverse effect on the identified QIs/SCIs and their associated targets and attributes, or on any European Site. Potential pathways for effect have been robustly blocked through measures to avoid impacts and the incorporation of best practice/mitigation measures into the project design.

Taking cognisance of measures to avoid impacts and best practice/mitigation measures incorporated into the project design which are considered in the preceding section, the Proposed Development will not have an adverse effect on the integrity of any European Site.

The Proposed Development will not prevent the QIs/SCIs of European Sites from achieving/maintaining favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive.

A definition of Favourable Conservation Status for habitats is provided below:

'conservation status of a natural habitat means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within the territory referred to in Article 2; The conservation status of a natural habitat will be taken as 'favourable' when:

- Its natural range and areas it covers within that range are stable or increasing, and
- The specific structures and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable as defined below.

A definition of Favourable Conservation Status for species is provided below:

> *'conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2; The conservation status will be taken as 'favourable' when:*

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.'

Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the Proposed Development will not adversely affect the Qualifying Interests/Special Conservation Interests associated with any European Site.

8. ASSESSMENT OF CUMULATIVE EFFECTS

A search and review in relation to plans and projects that may have the potential to result in cumulative and/or in-combination impacts on European Sites was conducted. This assessment focuses on the potential for cumulative in-combination effects on the European Sites where potential for adverse effects was identified in Section 4 of this report. This included a review of online Planning Registers, Development Plans and other available information and served to identify past and future plans and projects, their activities and their predicted environmental effects. A list of the plans and projects considered is provided in Appendix 3.

8.1 Plans

The following Plans have been reviewed and taken into consideration as part of this assessment:

- Limerick Development Plan 2022-2028
- Limerick Biodiversity Action Plan 2025-2030
- National Biodiversity Action Plan 2023-2030

A review of the objectives of the Plans relating to European Designated Sites has been carried out and is provided in the Appendix 3. No potential for cumulative effects when considered in-combination with the Proposed Development has been identified, and the Proposed Development is in compliance with the relevant objectives of the Plan.

In addition, the Appropriate Assessment carried out for this Plan has been reviewed. The relevant Natura Impact Report (NIR) is found on the Limerick City and County Council website at the following link:

< https://www.limerick.ie/sites/default/files/media/documents/2022-07/Appropriate-Assessment-Natura-Impact-Statement.pdf>

The Appropriate Assessment carried out for the Development Plan has concluded that there is no potential for Residual Adverse Effect as a result of implementation of the Plan. Therefore, there is no potential for cumulative effect as a result of the Proposed Development in-combination with the Plan.

8.2 Projects

Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the Proposed Development. The material was gathered through a search of relevant online Planning Registers, reviews of relevant documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts. All relevant projects were considered in relation to the potential for in-combination effects. All relevant data was reviewed (e.g. individual EISs/EIARs, NISs, layouts, drawings etc.) for all relevant projects where available.

8.2.1 Other WWTP Discharges and Proposed Upgrades

The potential for cumulative water quality impacts to occur, resulting in an adverse effect on aquatic QI habitats and species, has been considered. The following projects in the wider area have been considered in the assessment.

Castletroy WWTP is located approximately 10 km upstream of Limerick WWTP. It currently treats a collected organic load of c. 35,000 PE with a design DWF of 6,050 m^3/day. Because Castletroy WWTP is located upstream of Limerick WWTP, the effluent release may affect the concentrations around the Limerick WWTP outfall location.

The proposed upgrade of Castletroy WWTP will be required to cater for 81,000 PE. In addition, it is proposed to construct a new c. 3,750 m^3 stormwater storage tank to limit the no. of annual overflow events. The proposed upgrade works will make provision for a new stormwater storage tank, increased aeration capacity by retrofitting the existing aeration tanks IFAS process, increased capacity of the existing Salsnes filter units with 2 no. additional units incl. forward feed pump arrangement and additional sludge storage capacity. The existing primary discharge point will be retained. This project has been granted and is currently in its construction phase.

The Shannon Town WWTP is located at Tradaree Point approximately 3.8 km south east of Shannon Town and has a primary discharge outfall about 200 m south of the shoreline. It has a domestic capacity of 12,500 PE and a total capacity, including industrial water, of 22,043 PE. The WWTP provides secondary treatment before the effluent is released into the Shannon Estuary. In early 2020, the next phase of the upgrades to the WWTP commenced which will improve the wastewater treatment performance, increase the capacity at the plant and ensure compliance with the Wastewater Treatment Regulations. The Shannon Town WWTP capacity will be upgraded to 28,000 PE.

The above projects will ensure sufficient treatment of effluent entering the River Shannon into the future along with project population growth. The Proposed Development similarly will result in improved and sufficient treatment of effluent entering the River Shannon into the future. There is no potential for adverse cumulative effect as a result of these projects in-combination.

8.2.2 Other projects considered in the wider area

8.2.2.1 Limerick City Flood Relief Scheme

The existing information on the proposed Limerick City Flood Relief Scheme (FRS) was reviewed[9]. However, the project is in early design stages and public consultations. The scheme may include the extent of the Shannon Estuary in the vicinity of the Proposed Development, as well as the Ballinacurra Creek Stream. The FRS is likely to comprise riverbank defence works and will require environmental assessments and associated mitigation measures. In consideration of this, and the prescribed mitigations associated with the Proposed Development as set out in this report to avoid residual adverse effects, adverse cumulative effects are not anticipated.

8.2.2.2 Other Projects

8.2.2.2.1 *In the vicinity of Limerick WWTP:*

- Planning Reference 2561339 – For a retention application for alterations to an existing Waste Transfer Station permitted by Limerick City and County Council Planning Reference 16/642. Permission for retention is being sought for: a) The existing warehouse building and adjacent storage tank which represents a building of reduced scale to that previously permitted by 16/642; b) 3 no. ancillary sheds and tent structure; c) Construction Office, and Office and WC; d) Retention and relocation of 2 no. existing modular office buildings; and e) All ancillary hardstanding, roads and parking areas. Planning permission is being sought for: a) The construction of a proposed new access road from the adjacent Bunlicky Waste Water Treatment Plant Road which will result in the closure of the existing temporary vehicular

[9] *https://www.floodinfo.ie/frs/en/limerick/home/*

access from the Dock Road and creation of a pedestrian access only. b) Construction of an ESB Substation and all ancillary landscaping and site development works. The application relates to development which is for the purposes of an activity requiring a waste licence.

The AA Screening Report submitted as part of the above application was reviewed online[10]. With the mitigations prescribed as part of this planning application, there is no potential for cumulative adverse effect on any European site.

- Planning Reference 16642 - A 10 year permission is sought to construct the development of a waste transfer facility in two phases. The facility is intended to handle up to 90,000 tonnes of waste per annum. Phase I shall comprise: (i) 1,180sqm administration building; (ii) five bay 898sqm fleet vehicle maintenance and repair garage; (iii) Civic Amenity Area and associated office; (iv) Lean to roofed bin storage / cleaning area; (v) skip compactor storage and hook storage/set down area; (vi) bin management office; (vii) C&D segregation, crusher and storage area; (viii) dedicated timber bay; (ix) 3 no. open, covered glass bay storage areas; (x) truck wheel wash; (xi) 2 no. weighbridges and associated kiosk; (xii) on site car parking, truck parking and a bicycle store; and (xiii) automatic truck wash; (xiv) all associated site works including (a) Class I by-pass fuel/oil interceptors, (b) rainwater harvest system, (c) underground attenuation system; (d) 3 no. underground storage tanks (e) connection into the Bunlicky Wastewater Treatment Plant, (f) internal site security fencing; (g) perimeter fencing; (h) landscaping, (i) 2 no. gantry signs; and (j) building signage. Phase II shall comprise: (i) a modular waste transfer building with a maximum floor area of 5,102sqm; (ii) external concrete apron for the turning and parking of articulated vehicles with associated service and circulation areas; (iii) 4 no. rooms to house mechanical structures and to facilitate a switch room, generator, substation and a bunded oil storage facility; (iv) carbon filtration system to the rear of the building; (v) 1 no. open, covered storage bay to accommodate wrapped, bailed waste; (vi) truck wheel wash (vii) temporary construction access located at the south western corner of the site and (viii) all associated site works (This development will be subject to a separate application for a Waste Licence to the Environmental Protection Agency. An Environmental Impact Statement (EIS) will be submitted to the planning authority with the application)
- Planning Reference 19672 -The installation of roof mounted solar panels to existing materials recovery facility and all ancillary works and services.

No potential for adverse cumulative effects with regard to the above listed projects, in-combination with the Proposed Development, was identified.

8.2.2.2.2 *In the vicinity of Corcanree Pump Station:*

The following permitted development adjacent to the Corcanree PS was considered during this assessment:

- Planning Reference 221280 - a 7-year planning permission for demolition of 3 no. commercial buildings and removal/demolition of a number of sheds/outbuildings, refurbishment of Block B an existing warehouse building (1,140sqm), provision of 3 no. retail warehouse units (total 2,593sqm) in Block D fronting onto Dock Road, provision of 2 no. logistics warehouse units in Block H (2,790sqm) with an optional mezzanine floor which has the potential to increase floorspace by 350sqm, provision of 34 no. commercial/enterprise units delivered in 5 no. blocks (A, B1, E, F & G) with a total floor area of 9547sqm and an optional mezzanine floor area which has the potential to increase the overall floor area by 1,870sqm, if constructed, totem and building signage and all associated site works including provision of an ESB substation, pumping station and emergency storage, PV panels, mechanical ventilation mounting plant and external condenser units. Primary access to the site will be through the Corcanree Business Park via the Greenpark Roundabout. The existing access serving the site from Dock Road will be restricted to a left in left out junction.

[10] *https://www.eplanning.ie/LimerickCCC/AppFileRefDetails/2561339/0*

The EIAR and NIS for this development were reviewed online[11]. The Proposed Development is permitted and is located directly adjacent to the proposed storm tank area at Corcanree Pump Station. The planning permission includes for surface water quality mitigation including silt fencing along the OPW drainage channel to the north of the site and other water quality control measures.

Once the mitigations outlined for both water quality and disturbance impacts are applied for both developments, it is anticipated that there is no potential for adverse cumulative effects to Lower River Shannon SAC or River Shannon and River Fergus Estuaries SPA.

The following development was also considered during this cumulative impact assessment, however no potential for significant cumulative effects was identified:

- Planning Reference 20687 - Construction of an extension to the north-east side of the existing raw material store building, the recladding of existing asbestos cladding of this building with plastisol coated metal cladding and associated site works

The following application at Irish Cement Ltd was reviewed, however, no potential for adverse cumulative effects in combination with the Proposed Development was identified:

Planning Reference 16345 - Application for 10 year permission for development to allow for the replacement of fossil fuels through the introduction of lower carbon alternative fuels and to allow for the use of alternative raw materials in their Limerick Cement Factory. To facilitate the on-site handling, storage, and introduction of the alternative fuels and alternative raw materials it is proposed to construct: a tyre storage area with tyre handling/separation area, and associated conveyor kiln 6 with fire water retention tank; a proposed pumpable fluids storage tank which is located within a concrete bund area with associated uploading station all within a 2.4m high security fencing; a proposed fine solids handling building with 2 no. associated truck unloading areas & associated feed conveyors; associated switch room building & associated conveyor from screening building to dosing building at front end of kiln 6, as well as a fine solids transfer building, associated conveyor connecting to a proposed fine solids dosing building to back end of kiln 6 and associated fore-water retention tank; a proposed alternative raw materials storage building with concrete path surround; 3 no. proposed silos for the introduction of free-flowing solids; a proposed by-pass filter comprising a bag filter and a cooling tower with concrete path surround and 1 no. fire-water retention tank. The works include for the demolition of 4 no. steel and metal clad covered car park bay structures. The works also include for associated mechanical equipment and ancillary works, including provision of short sections of internal roadway, pavement, fencing and landscape works. In reducing the quantity of fossil fuel use, the proposed development seeks to introduce a range of alternative fuels up to a maximum of 90,000 tonnes per annum. The use of alternative raw materials is contained within this proposed overall quantity. The application area extends to 10.52 hectares within Limerick Cement Factory (this application relates to an activity for which an Industrial Emissions Licence applies under the Environmental Protected Act 1992, as amended (Industrial Emission Licence Register Number P0029-03. An Environmental Impact Statement accompanies this planning application).

[11] *https://eplanning.ie/LimerickCCC/AppFileRefDetails/221280/0*

8.3 Conclusion of Assessment of Cumulative Effects

Following the detailed assessment provided in the preceding sections, it is concluded that, the Proposed Development will not result in any residual adverse effects on any of the European Sites, their integrity or their conservation objectives when considered on its own. There is no potential for the Proposed Development to contribute to any cumulative adverse effects on any European Site when considered in-combination with other plans and projects.

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the Proposed Development.

Taking into consideration the reported residual impacts from other plans and projects in the area and the predicted impacts with the current proposal, no residual cumulative adverse effects have been identified with regard to any European Site.

9. CONCLUDING STATEMENT

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites. It has also assessed the potential for in-combination effects on European site with other plans and projects.

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the Proposed Development does not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the Proposed Development, individually or in-combination with other plans or projects, will not adversely affect the integrity of any European Site.

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APPENDIX 1

Planning and Environmental Consultants

Winter Bird Survey Report

Bunlicky Wastewater Treatment Plant Upgrade Project, Co. Limerick



DOCUMENT DETAILS

Client:	**Egis**
Project Title:	**Bunlicky Wastewater Treatment Plant Upgrade Project, Co. Limerick**
Project Number:	**210710**
Document Title:	**Winter Bird Survey Report**
Document File Name:	**BSR F – 2025.07.07 - 210710**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Final	02/04/2025	KS	RW

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Appendix 1 ..... Non target bird species

1. INTRODUCTION

MKO has been appointed by Egis to undertake winter bird surveys for the period November 2024 to March 2025 inclusive, for the proposed upgrade works at Limerick Wastewater Treatment Plant, Bunlicky, Dock Road, Co. Limerick and at Corcanree Pumping Station, Corcanree Business Park, Dock Road, Co. Limerick.

The proposed WwTP Upgrade works are located within the Severn Trent Response Wastewater Treatment Plant, Dock Road, Bunlicky, Co. Limerick. Bunlicky Wastewater Treatment Plant is located approximately 2.5km west of Limerick City Centre (Grid reference: R 54623 55688). The site is accessed via a local road off the Dock Road (R510) roundabout. Bunlicky Wastewater Treatment Plant is located adjacent to the River Shannon and River Fergus Estuaries SPA [004077] along its northern boundary.

The proposed pumping station upgrade works are located within a field adjacent to the Corcanree Pump Station, Corcanree Business Park, Dock Road, Limerick (grid ref: R 55457 56224). The pump station is accessed via the Dock Road (N69) and local access roads within Corcanree Business Park. The proposed pumping station upgrade works site is also adjacent to the River Shannon and River Fergus Estuaries SPA [004077] along its northern boundary.

A site location map is provided as Figure 1.1.

The objective of the winter surveys is to assess the suitability of the proposed development sites to support a variety of wintering wildfowl and waders, including the bird species listed as Special Conservation Interests (SCIs) for the River Shannon and River Fergus Estuaries SPA.

The assessment objectives can be summarised as follows:

- To undertake field surveys to assess for the presence of suitable habitat and the occurrence of wintering bird species within and adjacent to the development sites.
- The study seeks to determine the distribution of the species within and adjacent to the proposed development sites and to determine the presence of feeding/roosting areas within/adjacent to the proposed development sites.

Section two of this report provides the methodology, constraints, survey information, weather conditions and survey coverage. The results of the desk study and field surveys are presented in section three of this report. An evaluation and discussion of the results is provided in Section four. The concluding section of the report considers the findings and potential impacts of the proposed development on SCI listed species of the River Shannon and River Fergus Estuaries SPA.

1.1 Statement of Authority

Wintering bird surveys were undertaken between November 2024 and March 2025 by Kieran Sugrue (B.Sc. Zoology). This report has been prepared by Kieran Sugrue. This report has been reviewed by Rachel Walsh (B.Sc. Env., MCIEEM), who has 5 years' experience in professional ecological consultancy and has undertaken Appropriate Assessments and Ecological Impact Assessments for a wide range of projects.



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Drawing Title

Site Location

Project Title	
Limerick WwTP Upgrade	
Drawn By: KS	Checked By: RW
Project No.: 210710	Drawing No.: Fig 1-1
Scale: 1:26,000	Date: 17.04.2025

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2. METHODLOGY

2.1 Desk Study

A number of sources were assessed to determine the likely usage of both breeding and wintering bird species, including Bird Atlases, National Biodiversity Data Centre (NDBC), Birdwatch Ireland and Conservation Objectives Supporting Documents from the National Parks and Wildlife Service (NPWS) for the nearby River Shannon and River Fergus Estuaries SPA. Results of the desk study are provided in Section 3.1.

2.2 Field Survey Methodology

During the initial field visit the sites were assessed and suitable vantage points were identified in line with previous years wintering bird surveys undertaken at the proposed development sites during the 2020/2021 & 2022/2023 survey periods. Surrounding private lands were scanned using a spotting scope from elevated vantage points. Any significant flocks of wintering wildfowl or waders were recorded using such an approach.

The survey area covered the development site at Bunlicky WwTP and Corcanree Pumping Station, and areas of potentially suitable supporting habitat in proximity to the proposed development site including areas of agricultural grassland adjacent to Bunlicky WwTP, Bunlicky Lake, the estuarine habitat adjacent to the outfall at Bunlicky and the estuarine habitat adjacent to Corcanree Pumping station.

The surveys were undertaken monthly from November 2024 to March 2025. Surveys were undertaken at alternate high/low tides, within two hours of high/low tide. A combination of low and high tide counts has been used due to the differences in behaviour and site use between tidal states, with different species likely to be foraging and roosting in different areas of River Shannon and River Fergus Estuaries SPA and the surrounding terrestrial habitats, depending on the stage of the tidal cycle.

The surveys were undertaken by an appropriately qualified Ecologist. All observations were recorded, and detailed point data was gathered for each species observation, with all bird species denoted using standard British Trust for Ornithology (BTO) codes and with the number of each species recorded next to each registration. The species recorded in the surveys were those covered by Irish Wetlands Bird Survey (I-WeBS) counts, i.e., all divers, grebes, cormorant, shag, herons, swans, geese, ducks, rails, crakes, waders, gulls, and kingfisher. However, in addition to this, all other bird species, including raptors and all common and widespread passerines, were also recorded from within the proposed development sites.

2.2.1 I-WeBS Surveys

The winter bird surveys at the nearby SPA followed the Irish Wetland Bird Survey (I-WeBS) methodology; the simple 'look-see' method, whereby all birds present within a predefined area are counted (Gilbert et al., 1998; Bibby, C.J., 2000; Birdwatch Ireland, 2018). The surveys were carried out at suitable vantage points within the sites, additional vantage points located overlooking the section of the River Shannon and River Fergus Estuaries SPA in close proximity to the proposed development sites. Vantage points were chosen to have as large as possible a view of the proposed development sites, adjacent wetland habitats and potential adjacent daytime foraging habitat in the vicinity of the proposed development sites. The chosen vantage points were stopped at for 15-minute intervals each, along the transect walk on each survey day. Vantage points focused on areas which were deemed to be of likely significance to wintering waterbirds of River Shannon and River Fergus Estuaries SPA.

Details of the surveys carried out including date, time, duration, location, and weather conditions are provided in Table 2.2. A map of the vantage point locations used during the surveys is presented in Figure 2.1.

2.2.2 Transects

Walked transects were undertaken within the site boundaries in conjunction with vantage point surveys. During the surveys species of note were recorded both within and adjacent to the development sites. All bird species were denoted using standard British Trust for Ornithology (BTO) codes and with the number of each species recorded next to each registration. Transects walked during the survey are shown in Figure 2.2. During the surveys species of note were recorded both within and adjacent to the development sites.



Map Legend

- Site Boundary
- Vantage Points

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Drawing Title
Vantage Point Locations

Project Title
Limerick WwTP Upgrade

Drawn By	Checked By
KS	AvdGM
Project No.	Drawing No.
210710	Fig 2-1
Scale	Date
1:8,000	17.04.2025

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Map Legend

- Site Boundary
- Transects

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Drawing Title
Bird Survey Transects

Project Title
Limerick WwTP Upgrade

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KS	AvdGM
Project No.	Drawing No.
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Scale	Date
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2.2.3 Survey Details

Details of the surveys including survey dates, weather conditions and survey duration are provided in Table 2.1.

Table 2-1 Survey Effort

Date	Survey duration	Tide	Weather conditions
25/11/2024	6 hours	High	Wind speed: Calm Cloud cover: 60% Visibility: Good Rain: Dry Frost: No Snow: No
12/12/2024	6 hours	Low	Wind speed: Light breeze Cloud cover: 100% Visibility: Good Rain: Dry Frost: No Snow: No
23/01/2025	6 hours	High	Wind speed: Light breeze (Increased to a Strong breeze as day progressed) Cloud cover: 100% Visibility: Good Rain: Dry (Heavy Rain prior to starting survey) Frost: No Snow: No
24/02/2025	6 hours	Low	Wind speed: Light breeze Cloud cover: 15% Visibility: Good Rain: Dry (Light Rain prior to starting survey) Frost: No Snow: No
24/03/2025	6 hours	High	Wind speed: Light breeze Cloud cover: >5% Visibility: Good Rain: Dry Frost: No Snow: No

2.2.4 Survey Constraints

During the survey effort on November 25th, 2024, cattle blocked access to the southwestern area of the site, however this area was able to be surveyed from a vantage point. Apart from this activity, no significant survey constraints limited the survey approach, and a comprehensive assessment was undertaken. All surveys were undertaken during optimal weather conditions as poor weather conditions and high wind can lead to decreased bird movements and hinder surveyor visibility.

3. RESULTS

3.1 Desk Study

A number of sources were assessed to determine the likely usage of the sites by both breeding and wintering bird species, including Bird Atlases, National Biodiversity Data Centre (NBDC), BirdWatch Ireland and Conservation Objectives Supporting Documents from the National Parks and Wildlife Service (NPWS) for nearby Special Protection Areas (SPAs).

3.1.1 Breeding and Wintering Bird Atlases

The Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland (Balmer et al., 2013) provides the most up-to-date information regarding the distribution and relative abundance of bird species in Britain and Ireland, based on surveys carried out between 2007 and 2011. The atlases show data for breeding and wintering birds respectively in individual 10 km x 10 km squares (hectads). Table 3.1 shows those species found in the relevant hectad (R55) which are recorded as breeding in the most recent atlas.

This dataset also provides species that have been recorded within the relevant 2km tetrads (R55N and R55M) on National Biodiversity Data Centre (NBDC) datasets as well as those listed in Annex I of the EU Birds Directive recorded on the BoCCI Red List. Birds listed under Annex I are offered special protection by the EU Birds Directive. Those listed on the Birds of Conservation Concern in Ireland (BoCCI) Red List meet one or more of the following criteria:

- IUCN: Global conservation status (Critically Endangered (CE), Endangered (E)or Vulnerable (V), but not Near Threatened. These species are recognised as the highest priorities for action at a global scale and are thus priorities at an all-Ireland level.
- European conservation status. The conservation status of all European species was assessed most recently by Birdlife International (2004), one of the main changes in the revision being to include the IUCN criteria. These species are those of global conservation concern (including those classified as Near Threatened) and are Red listed.
- The Irish breeding population has undergone significant historical decline since 1800.
- The Irish non-breeding population has undergone a significant decline of 50% in the last 25 years.
- The Irish breeding range has undergone a decline of 70% or more in the last 25 years.

One species listed under Annex I of the EU Birds Directive have been recorded within the tetrad R55N Little Egret (*Egretta garzetta*). A further seven red-listed birds of conservation concern have been recorded within this tetrad: Meadow Pipit (*Anthus pratensis*), Stock Dove (*Columba oenas*), Common Kestrel (*Falco tinnunculus*), Northern Lapwing (*Vanellus vanellus*), Northern Shoveler (*Anas clypeata*), Common Swift (*Apus apus*) and Scaup (*Anas marila*).

Two species listed under Annex I of the EU Birds Directive has been recorded within the tetrad R55M: Dunlin (*Calidris alpina*) and Kingfisher (*Alcedo atthis*). A further eleven red-listed birds of conservation concern have been recorded within this tetrad: Common Goldeneye (*Bucephala clangula*), Common Kestrel (*Falco tinnunculus*), Common Redshank (*Tringa totanus*), Common Snipe (*Gallinago gallinago*), Common Swift (*Apus apus*), Eurasian Curlew (*Numenius arquata*), Grey Wagtail (*Motacilla cinerea*), Meadow Pipit (*Anthus pratensis*), Northern Lapwing (*Vanellus vanellus*), Redwing (*Turdus iliacus*) and Stock Dove (*Columba oenas*).

Table 3-1 NBDC Bird data and Bird Atlas data (Hectad R55)

Common Name	Scientific name	Designation
Common Kingfisher	*Alcedo atthis*	Protected EU Birds Directive Annex I Bird Species
European Golden Plover	*Pluvialis apricaria*	
Hen Harrier	*Circus cyaneus*	
Little Egret	*Egretta garzetta*	
Mediterranean Gull	*Larus melanocephalus*	
Merlin	*Falco columbarius*	
Red-necked Phalarope	*Phalaropus lobatus*	
Short-eared Owl	*Asio flammeus*	
Whooper Swan	*Cygnus cygnus*	
Barn Owl	*Tyto alba*	Birds of Conservation Concern – Red list
Black-headed Gull	*Larus ridibundus*	
Common Goldeneye	*Bucephala clangula*	
Common Snipe	*Gallinago gallinago*	
Common Swift	*Apus apus*	
Dunlin	*Calidris alpina*	
Eurasian Curlew	*Numenius arquata*	
Eurasian Oystercatcher	*Haematopus ostralegus*	
Eurasian Woodcock	*Scolopax rusticola*	
Greater Scaup	*Aythya marila*	
Herring Gull	*Larus argentatus*	
Northern Lapwing	*Vanellus vanellus*	
Northern Shoveler	*Anas clypeata*	

Common Name	Scientific name	Designation
Common Goldeneye	*Bucephala clangula*	
Common Pochard	*Aythya ferina*	
Common Redshank	*Tringa totanus*	
Yellowhammer	*Emberiza citrinella*	
Kestrel	*Falco tinnunculus*	
Stock Dove	*Columba oenas*	
Black-tailed Godwit	*Limosa limosa*	
Grey Wagtail	*Motacilla cinerea*	
Redwing	*Turdus iliacus*	
Meadow Pipit	*Anthus pratensis*	

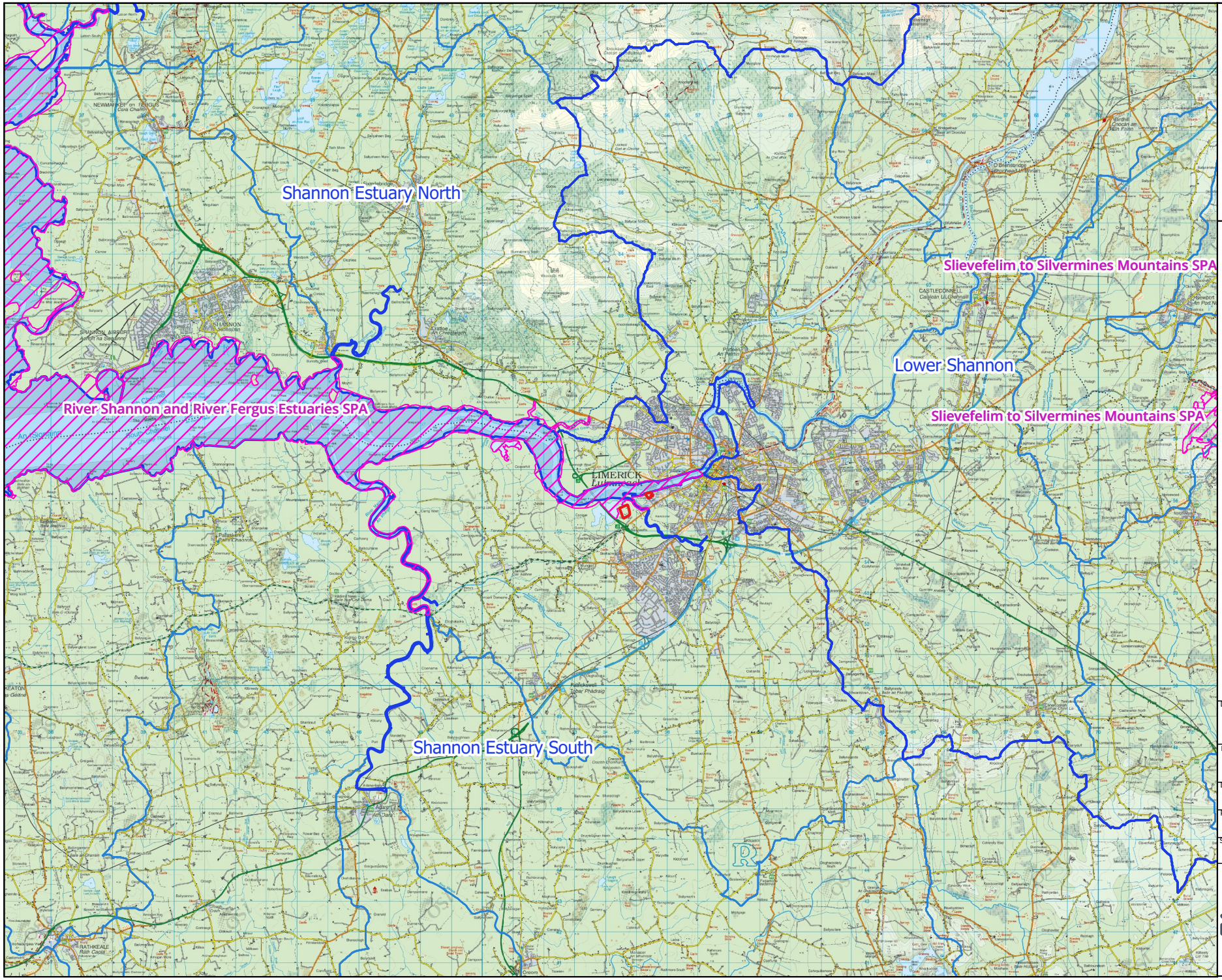
3.1.2 Sites designated for Wintering Bird Species within the vicinity of the Proposed Development Sites

Using QGIS Software, designated sites within the vicinity of the proposed development sites were identified. Only one special protection area was identified within the vicinity of the proposed development sites. The site synopses and conservation objectives of this site, as per the NPWS website (www.npws.ie), were considered at the time of preparation of this report. Details of this sites, including its distance from the proposed development sites, are provided in Table 3.2. Figure 3.1 shows the location of the proposed development sites in relation to designated Special Protection Areas within the vicinity.

Table 3-2 EU Designated sites within the vicinity of the proposed works

EU Designated Site	Distance from Proposed development site (km)	Qualify Interests/Special Conservation Interests for which the Natura 2000 Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 02/04/2025)	Conservation Objective
River Shannon and River Fergus Estuaries SPA	Adjacent to the northern boundary of the proposed development	› Cormorant (*Phalacrocorax carbo*) [A017] › Whooper Swan (*Cygnus cygnus*) [A038] › Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] › Shelduck (*Tadorna tadorna*) [A048] › Wigeon (*Anas penelope*) [A050] › Teal (*Anas crecca*) [A052] › Pintail (*Anas acuta*) [A054] › Shoveler *(Anas clypeata*) [A056] › Scaup (*Aythya marila*) [A062] › Ringed Plover (*Charadrius hiaticula*) [A137] › Golden Plover (*Pluvialis apricaria*) [A140] › Grey Plover (*Pluvialis squatarola*) [A141] › Lapwing (*Vanellus vanellus*) [A142] › Knot (Calidris canutus) [A143] › Dunlin (*Calidris alpina*) [A149] › Black-tailed Godwit (*Limosa limosa*) [A156] › Bar-tailed Godwit (*Limosa lapponica*) [A157] › Curlew (*Numenius arquata*) [A160]	Detailed conservation objectives for this site (Version 1, September 2012) were reviewed as part of the assessment and are available at www.npws.ie. Each of the listed SCI species has the conservation objective to maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. The wetlands and waterbirds SCI has the conservation objective "*To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly- occurring migratory waterbirds that utilise it*"

EU Designated Site	Distance from Proposed development site (km)	Qualify Interests/Special Conservation Interests for which the Natura 2000 Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 02/04/2025)	Conservation Objective
		› Redshank (Tringa *totanus*) [A162] › Greenshank (*Tringa nebularia*) [A164] › Black-headed Gull (*Chroicocephalus ridibundus*) [A179] › Wetland and Waterbirds [A999]	



Map Legend

- Site Boundary
- Special Protection Area (SPA)
- WFD Hydrological Catchments
- WFD Hydrological Subcatchments

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Drawing Title
Special Protected Areas

Project Title
Limerick WwTP Upgrade

Drawn By	Checked By
KS	RW
Project No.	Drawing No.
210710	Fig 3-1
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3.1.3 Irish Wetland Bird Survey (I-WeBS) Data

Irish Wetland Bird Survey (I-WeBS) data was obtained from BirdWatch Ireland on the 13th of May 2025, following a formal data request. This data includes the most up to date information on the species present at the most proximal IWeBS site i.e. Limerick City (0I477) and Bunlicky Lake (0I003).

Data for each subsite is set out in the sections below. The data also shows where Nationally or Internationally important numbers of each species have been recorded in the past, with all important flocks highlighted in red. A site is considered nationally important if it supports 1% or more of the all-Ireland population, based on the most recent estimates for Ireland, namely Crowe and Holt (2013). A site is classified as internationally important if it regularly supports in excess of 20,000 waterbirds or 1% or more of the flyway population estimate of a species, based on Wetlands International (2017).

3.1.3.1 Limerick City Subsite (0I477)

Details of I-WeBS data for the Limerick City subsite (0I477) are presented in Table 3-3 and includes annual peak counts for the period 2020-2024.

Table 3-3 IWeBS data for Limerick City subsite in close proximity to the proposed development site.

Species	1% National	1% International	2020/21	2011/2022	2022/23	2023/24	Peak
Mute Swan	90	100	67	42	45	62	67
Whooper Swan	150	340	9	-	-	24	26
Greylag Goose	35	980	165	109	171	49	171
Wigeon	560	14000	10	16	-	15	16
Gadwall	20	1200	-	34	8	21	34
Teal	360	5000	-	34	7	66	34
Mallard	280	53000	58	87	68	125	87
Shoveler	20	650	3	20	8	18	29
Pochard	110	2000	-	7	2	8	16
Tufted Duck	270	8900	41	21	28	25	58
Goosander	-	-	-	1	-	62	2
Goldeneye	40	11400	-	-	-	1	4
Little Grebe	20	4700	5	11	-	7	11
Cormorant	110	1200	14	74	29	31	74
Grey Heron	25	5000	4	3	4	2	4
Water Rail	-	-	3	1	-	6	3

Species	1% National	1% International	2020/21	2011/2022	2022/23	2023/24	Peak
Moorhen	-	-	19	24	16	36	24
Coot	190	15500	30	43	32	39	93
Oystercatcher	610	8200	45	68	45	98	97
Lapwing	850	72300	37	67	4	-	67
Jack Snipe	-	-	-	-	-	1	1
Snipe	-	-	69	4	-	27	69
Redshank	240	2400	3	2	-	4	3
Greenshank	20	3300	-	1	-	-	1
Kingfisher	-	-	1	2	-	-	2
Black-headed Gull	-	-	1204	1286	292	788	1286
Ring-billed Gull	-	-	1	-	-	-	2
Common Gull	-	-	48	75	10	52	75
Lesser Black-backed Gull	-	-	44	180	146	62	180
Herring Gull	-	-	189	243	17	230	243
Mediterranean Gull	-	-	1	1	-	-	1
Iceland Gull	-	-	2	1	2	1	6
Glaucous Gull	-	-	1	-	-	-	1
Great Black-backed Gull	-	-	7	13	4	9	13
Yellow-legged Gull	-	-	-	-	-	1	1

3.1.3.2 Bunlicky Lake Subsite (0I003)

Details of I-WeBS data for the Bunlicky Lake subsite (0I003) are presented in Table 3-4 and includes annual peak counts for the period 2018-2020. There are no IWeBS data available for this site for the monitoring period 2021/2022, 2022/2023 or 2023/24. Bunlicky Lake was not surveyed in full since January 2015, but individual Greylag Goose counts were sourced as part of a separate request under I-WeBS.

Table 3-4 IWeBS data for Bunlicky Lake subsite west of the proposed development site.

Species	1% National	1% International	2018/19	2019/20	Peak
Greylag Goose	35	980	18	112	112

3.1.4 River Shannon and River Fergus Estuaries SPA (004077)

A detailed conservation objectives document is available for River Shannon and River Fergus Estuaries SPA (www.npws.ie, accessed on 20/11/2023). The Special Conservation Interests of this SPA and their conservation objective are listed in Table 3.5.

Table 3-5 Special Conservation Interest and Conservation Objectives (Version 01, 2012, NPWS)

Special Conservation Interest (SCI)	Conservation Objective
Wetland and Waterbirds [A999]	To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly- occurring migratory waterbirds that utilise it.
Cormorant (*Phalacrocorax carbo*) [A017]	To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA.
Whooper Swan (*Cygnus cygnus*) [A038]	To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA.
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA.
Shelduck (*Tadorna tadorna*) [A048]	To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA.
Wigeon (*Anas penelope*) [A050]	To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA.
Teal (*Anas crecca)* [A052]	To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA.
Pintail (*Anas acuta*) [A054]	To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA.
Shoveler (*Anas clypeata*) [A056]	To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA.
Scaup (*Aythya marila*) [A062]	To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA.
Ringed Plover (*Charadrius hiaticula*) [A137]	To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA.
Golden Plover (*Pluvialis apricaria*) [A140]	To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA.

Special Conservation Interest (SCI)	Conservation Objective
Grey Plover (*Pluvialis squatarola*) [A141]	To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA.
Lapwing (*Vanellus vanellus*) [A142]	To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA.
Knot (*Calidris canutus*) [A143]	To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA.
Dunlin (*Calidris alpina*) [A149]	To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA.
Black-tailed Godwit (*Limosa limosa*) [A156]	To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA.
Bar-tailed Godwit (*Limosa lapponica*) [A157]	To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA.
Curlew (*Numenius arquata*) [A160]	To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA.
Redshank (*Tringa totanus*) [A162]	To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA.
Greenshank (*Tringa nebularia*) [A164]	To maintain the favourable conservation condition of Greenshank in the River Shannon and River Fergus Estuaries SPA.
Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	To maintain the favourable conservation condition of Black-headed Gull in the River Shannon and River Fergus Estuaries SPA.

3.1.4.1 Special Conservation Interests

A review of desktop literature pertaining to the SPA was conducted including the site-specific conservation document, conservation objectives supporting documents, site synopsis and the most recent available Article 12 reports.

3.1.4.1.1 *Wetlands and Waterbirds*

The following relevant information has been extracted from the NPWS site synopsis and Natura 2000 Data From for the SPA:

> *"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 macro invertebrate community, e.g. Macoma-Scrobicularia-Nereis, 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 a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey*

Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull.

It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds".

The wetland habitat designated as part of the River Shannon and River Fergus Estuaries SPA has the target that the permanent area occupied by the wetland habitat should be stable and not significantly less than 32,261ha other than that occurring from natural patterns of variation.

3.1.4.1.2 Cormorant (Phalacrocorax carbo) [A017]

This species has been designated for its wintering and breeding population within the SPA. According to the site species conservation objectives document Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995). According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 245 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining 1.0 –24.9% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2019) the short-term population trend (for the period of 2002 - 2018) for this species is increasing and the long-term trend (for the period of 2002 1985-2018) is also increasing.

3.1.4.1.3 Whooper Swan (Cygnus cygnus) [A038]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Whooper Swan (*Cygnus cygnus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 118 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as increasing and the current conservation condition of this species is favourable.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2002 - 2010) for this species is increasing and the long-term trend (since circa 1980) is also increasing.

3.1.4.1.4 Light-bellied Brent Goose (Branta bernicla hrota) [A046]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta bernicla hrota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 494 individuals.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is also increasing.

3.1.4.1.5 Shelduck (Tadorna tadorna) [A048]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,025 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is Fluctuating and the long-term trend (since circa 1980) is stable.

3.1.4.1.6 Wigeon (Anas penelope) [A050]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,761 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is highly unfavourable.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is also decreasing.

3.1.4.1.7 Teal (Anas crecca) [A052]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all -Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,260 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is stable and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.8 Pintail (Anas acuta) [A054]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is fluctuating and the long-term trend (since circa 1980) is unknown.

3.1.4.1.9 Shoveler (Anas clypeata) [A056]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is increasing.

3.1.4.1.10 Scaup (Aythya marila) [A062]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.11 Ringed Plover (Charadrius hiaticula) [A137]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Ringed Plover (*Charadrius hiaticula*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 223 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2000 - 2011) for this species is stable and the long-term trend (since circa 1980) is unknown.

3.1.4.1.12 Golden Plover (Pluvialis apricaria) [A140]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Golden Plover (*Pluvialis apricaria*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 5,664individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2000 - 2010) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.13 Grey Plover (Pluvialis squatarola) [A141]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 558 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.14 Lapwing (Vanellus vanellus) [A142]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,126 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1991 - 2008) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.15 Knot (Calidris canutus) [A143]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Knot (*Calidris canutus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,015 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.16 Dunlin (Calidris alpina) [A149]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site

regularly supports 1% or more of the biogeographic population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,131 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.17 Black-tailed Godwit (Limosa limosa) [A156]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,035 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is increasing.

3.1.4.1.18 Bar-tailed Godwit (Limosa lapponica) [A157]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 460 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.19 Curlew (Numenius arquata) [A160]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,396 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.20 Redshank (Tringa totanus) [A162]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,645 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1991 - 2008) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.21 Greenshank (Tringa nebularia) [A164]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Greenshank (*Tringa nebularia*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 61 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining -25.0% to -49.9% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is stable and the long-term trend (since circa 1980) is increasing.

3.1.4.1.22 Black-headed Gull (Chroicocephalus ridibundus) [A179]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012). This species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining -25.0% to -49.9% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2019) the short-term population trend (for the period of 2002 - 2018) for this species is increasing and the long-term trend (for the period of 1985 - 2018) is increasing.

3.2 Field Survey Results

The following section provides the results of the Bird Surveys undertaken between November 2024 and March 2025, inclusive.

3.2.1 Species records within the proposed development sites

Table 3.6 lists the target species of conservation interest recorded from within (or flying over) the proposed development site boundaries during the surveys carried out between November 2024 and March 2025. These records, along with records of target species of conservation interest recorded in adjacent lands outside the proposed development site boundaries, are presented in Figures 3.2 to Figures 3.6.

Non-target bird species recorded within the development sites are presented in Appendix 1.

Only one SCI species of the nearby River Shannon and River Fergus Estuaries SPA was recorded roosting or feeding within the proposed development site boundary at Bunlicky; black headed gulls were recorded roosting on the wastewater treatment plant site infrastructure during the majority of the surveys carried out. The number of Black-headed gulls recorded roosting ranged between 4 and 50. This species was recorded roosting on the storm tank, aeration tanks and settlement tanks within the WwTP. Black-headed gulls appear to be habituated to the activity within the WwTP and were not disturbed by human activity and noise generated by the plant.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development sites at Bunlicky and Corcanree. This species was not recorded using the habitats within the proposed development site boundaries during any of the surveys undertaken.

Two red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Gilbert et, al., 2021) were recorded from within the proposed development sites at Bunlicky WwTP and at the Corcanree pumping station. Snipes were recorded on several occasions, flushed from wet grassland in the western section Bunlicky WwTP and once on one occasion from the grassland in the north-east of the Corcanree pumping station. Two Grey wagtails were recorded utilising trees and other vegetation in the western section of the site at Bunlicky WwTP.

The remaining target species recorded flying over the sites included a Common gull flying over Bunlicky WwTP. This individual did not land in the habitats within the proposed development sites. This species is not a listed SCI species of the nearby River Shannon and River Fergus Estuaries SPA.

3.2.2 Species records within habitats adjacent to the proposed development sites

Table 3.7 lists the target species of conservation interest recorded in habitats adjacent to the proposed development sites during the surveys carried out between November 2024 and March 2025.

Non-target bird species recorded within the development sites are presented in Appendix 1.

Six SCI species of the nearby River Shannon and River Fergus Estuaries SPA, two of which are red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Lapwing & Redshank) were recorded roosting or feeding within habitats adjacent to the proposed development sites. Lapwing & Redshank were recorded utilising the mudflats and sandflats north of Bunlicky lake, along the River Shannon. High numbers of Cormorants were recorded roosting in nests on an island in Bunlicky Lake on every visit. The number of Cormorants recorded roosting ranged between 19 and 150. Cormorants were also recorded in flight over grasslands between Bunlicky Lake and the River Shannon. Black-headed gulls were recorded utilising several adjacent habitats, such as, mudflats and sandflats, Bunlicky Lake, the Ballinacurra stream and commuting over wet grasslands.

Three further red listed bird species on the BoCCI (Gilbert et, al., 2021) were recorded utilising habitats adjacent to the proposed development sites at Bunlicky WwTP and at the Corcanree pumping station. Snipes were recorded on several occasions, flushed from wet grassland between the River Shannon and Bunlicky Lake and from grassland north-east of Bunlicky WwTP site boundary. A Kestrel was recorded hunting in the wet grassland located to the west of the Bunlicky WwTP, and a Grey wagtail was also recorded utilising this area.

The remaining target species recorded included Mute swans roosting in Bunlicky Lake, the Ballinacurra Creek Stream, the mudflats and sandflats north of Bunlicky Lake and the River Shannon. Greylag geese were recorded feeding in wet grasslands between the River Shannon and Bunlicky Lake and in wet grasslands south of Bunlicky Lake, they were also recorded roosting in Bunlicky Lake. Mallards were recorded utilising several adjacent habitats, such as, mudflats and sandflats, Bunlicky Lake, and commuting over several grasslands adjacent to both Bunlicky WwTP and Corcanree pumping station.

Coot and Moorhen were recorded utilising the reedbeds along the edge of the River Shannon, as well as those in the Ballinacurra Creek Stream. Additionally, Great black-backed gulls, Lesser black-backed gulls & Common gulls were recorded in flight over the River Shannon on several occasions. Lastly, Grey heron and Little egret were recorded utilising the channel edges of the River Shannon, and roosting on the islands located in Bunlicky Lake.

Table 3-6 Target bird survey recorded from within or flying over the proposed development sites at Bunlicky WwTP and Corcanree Pump Station.

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
Black-headed gull (*Chroicocephalus ridibundus*)	50 Black-headed gulls roosting on the wastewater treatment plant infrastructure. 15 Black-headed gulls were recorded flying over the site.	Bunlicky WwTP	3.2	25/11/2024	SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Amber listed
	4 Black-headed gulls roosting on site infrastructure. 17 Black-headed gulls were recorded flying over the site.	Bunlicky WwTP	3.3	12/12/2024	
	14 Black-headed gulls roosting on site infrastructure. 6 Black-headed gulls were recorded flying over the site.	Bunlicky WwTP	3.4	23/01/2025	
	3 Black-headed gulls were recorded flying over the site.	Corcanree Pump Station			
	45 Black-headed gulls were recorded flying over the site.	Bunlicky WwTP	3.5	24/02/2025	
	1 Black-headed gull were recorded flying over the site.	Corcanree Pump Station			
	2 Black-headed gulls fly over site.	Bunlicky WwTP	3.6	24/03/2025	
	2 Black-headed gulls fly over site.	Corcanree Pump Station			
Cormorant (*Phalacrocorax carbo*)	11 Cormorants flew over the site, flying towards Bunlicky.	Corcanree Pump Station	3.3	12/12/2024	
	1 Cormorant flew over the site.	Corcanree Pump Station	3.4	23/01/2025	
	1 Cormorant flew over the site, towards the River Shannon.	Bunlicky WwTP	3.6	24/03/2024	
Grey wagtail (*Motacilla cinerea*)	2 Grey wagtails recorded within Bunlicky WwTP	Bunlicky WwTP	3.6	24/03/2024	BoCCI Red Listed

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
Snipe (*Gallinago gallinago*)	18 Snipe flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.2	25/11/2025	BoCCI Red Listed
	2 Snipe flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.3	12/12/2024	
	10 Snipe flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.4	23/01/2025	
	2 Snipe flushed from wet grassland and flew through eastern section of the site.	Corcanree Pump Station			
	10 Snipe flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.5	24/02/2025	
	5 Snipe flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.6	24/03/2025	
	1 Snipe flushed from wet grassland in western section of the site.	Corcanree Pump Station	3.6	24/03/2025	
Common Gull (*Larus canus*)	1 Common gull recorded flying southwest over the site.	Corcanree Pump Station	3.3	12/12/2024	BoCCI Amber listed

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Table 3-7 Target bird survey recorded from within adjacent habitats to the Bunlicky WwTP and Corcanree Pump Station.

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
Lapwing (*Vanellus vanellus*)	40 Lapwing foraging on the mudflats/sandflats of the River Shannon.	Mudflats/sandflats of the River Shannon.	3.3	12/12/2024	SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Red listed
Redshank (*Tringa totanus*)	1 Redshank calling at riverbank of the River Shannon. 1 Redshank foraging on mudflats/sandflats at channel edge.	River Shannon	3.3	12/12/2024	
	8 Redshank foraging on the mud mudflats/sandflats at channel edge in a side channel of the River Shannon.	River Shannon	3.5	24/02/2024	
	3 Redshank flushed from channel edge and flew along bank/across channel of the River Shannon.	River Shannon			
Mallard (*Anas platyrhynchos*)	2 Mallard flew south over Bunlicky Lake	Bunlicky Lake	3.2	25/11/2024	BoCCI Amber Listed
	1 Mallard flew along the surface of the River Shannon.	River Shannon			
	5 Mallard along shoreline of Bunlicky Lake (flushed and flew north)	Bunlicky Lake	3.3	12/12/2024	
	4 Mallard foraged along the channel edges of the River Shannon.	River Shannon			
	8 Mallard recorded in flight over Bunlicky Lake	Bunlicky Lake			
	1 Mallard recorded in flight over Wet grassland to the northeast of Bunlicky WwTP.	Wet grassland northeast of Bunlicky WwTP.			
	2 Mallards roosting in the eastern section of River Shannon.	River Shannon			
	2 Mallards on the River Shannon.	River Shannon	3.4	23/01/2025	
	6 Mallards recorded in flight over Bunlicky Lake	Bunlicky Lake	3.5	24/02/2025	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	5 Mallards flushed from Ballinacurra Creek and flew west/northwest.	Ballinacurra Creek Stream			
	3 Mallard flushed from side channel of the River Shannon and flew west. 3 Mallard flushed from channel edge and flew north across the River Shannon.	River Shannon			
	2 Mallards feeding on Bunlicky Lake.	Bunlicky Lake	3.6	24/03/2025	
	4 Mallards feeding on the River Shannon.	River Shannon			
Grey heron (*Ardea cinerea*)	1 Grey heron flew east along River Shannon.	River Shannon	3.2	25/11/2024	-
	1 Grey heron foraging at the edge of the channel of the River Shannon.	River Shannon	3.3	12/12/2024	
	1 Grey heron recorded flying west over Wet grassland to the north of Bunlicky WwTP	Wet grassland north of Bunlicky WwTP	3.4	23/01/2025	
	1 Grey heron foraging at the edge of the channel of the River Shannon.	River Shannon	3.6	24/03/2025	
Coot (*Fulica atra*)	1 Coot present at edge of channel of the River Shannon.	River Shannon	3.2	25/11/2024	BoCCI Amber Listed
	1 Coot flushed and flew west across Bunlicky Lake	Bunlicky Lake	3.3	12/12/2024	
	1 Coot present within Ballinacurra Creek	Ballinacurra Creek	3.4	23/01/2025	
Great black-backed gull (*Larus marinus*)	2 Great black-backed gulls sitting on buoys in the River Shannon.	River Shannon	3.2	25/11/2024	-
	1 Great black-backed gull sitting on buoy in the River Shannon.	River Shannon	3.6	24/03/2025	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
Moorhen (*Numenius arquata*)	1 Moorhen present within Ballinacurra Creek	Ballinacurra Creek	3.2	25/11/2024	-
Lesser black-backed gull (*Larus fuscus*)	1 Lesser black-backed gull recorded flying west over the River Shannon	River Shannon	3.5	24/02/2025	BoCCI Amber Listed
Common gull (*Larus canus*)	2 Common gulls recorded flying was along River Shannon	River Shannon	3.3	12/12/2024	BoCCI Amber listed
	2 Common gulls in flight over River Shannon	River Shannon	3.6	24/03/2024	
Grey wagtail (*Motacilla cinerea*)	1 Grey wagtail recorded flying west over Wet grassland to the north of Bunlicky WwTP	Wet grassland north of Bunlicky WwTP	3.4	23/01/2025	BoCCI Red Listed
Ringed plover (*Charadrius hiaticula*)	1 Ringed plover calling reedbed along River Shannon	River Shnanon	3.5	24/02/2024	SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Amber listed
Black-headed gull (*Chroicocephalus ridibundus*)	15 Black-headed gulls roosting on WwTP outfall pipe. 30 Black-headed gulls feeding on surface of the River Shannon. 10 Black-headed gulls were recorded flying over River Shannon.	River Shannon north of the Corcanree Pump Station	3.2	25/11/2024	
	27 Black-headed gulls flying over wet grassland to the north/northeast of Bunlicky WwTP	Wet grassland northeast of Bunlicky WwTP	3.2		
	4 Black-headed gulls were recorded flying over Bunlicky Lake	Bunlicky Lake	3.2		
	9 Black-headed gulls recorded in flight over Bunlicky Lake.	Bunlicky Lake	3.3	12/12/2024	
	7 Black-headed gulls recorded in flight over River Shannon. 80 Black-headed gulls on mudflats/sandflats exposed by low tide	River Shannon/River Shannon mudflats/sandflats			
	2 Black-headed gulls were recorded flying over wet grassland south of Bunlicky WwTP	Wet grassland south of Bunlicky WwTP			

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	2 Black-headed gulls were recorded flying over Bunlicky Lake	Bunlicky Lake	3.4	23/01/2025	
	2 Black-headed gulls were recorded flying over River Shannon. 10 Black-headed gulls roosting on the River Shannon	River Shannon			
	9 Black-headed gulls flying over wet grassland to the north/northeast of Bunlicky WwTP	Wet grassland northeast of Bunlicky WwTP			
	4 Black-headed gulls were recorded flying over Bunlicky Lake. 1 Black-headed gull roosting on lake.	Bunlicky Lake	3.5	24/02/2024	
	17 Black-headed gulls were recorded flying over River Shannon	River Shannon			
	3 Black-headed gulls were recorded in flight over the Wet grasslands west of Bunlicky WwTP.	Wet grasslands west of Bunlicky WwTP			
	5 Black-headed gulls were recorded in flight over the Wet grasslands northeast of Bunlicky WwTP.	Wet grasslands northeast of Bunlicky WwTP			
	4 Black-headed gulls recorded in flight over the River Shannon. 24 Black-headed gulls recorded flocking/feeding over the River Shannon.	River Shannon	3.6	24/03/2025	
Cormorant (*Phalacrocorax carbo*)	19 Cormorants roosting on the island vegetation in Bunlicky Lake. 10 Cormorants flew over Bunlicky Lake.	Bunlicky Lake	3.2	25/11/2024	
	3 Cormorants flew over the grassland between the Site and the River Shannon.	Grassland between the Site and River Shannon	3.2		
	4 Cormorants flew over River Shannon.	River Shannon	3.2		

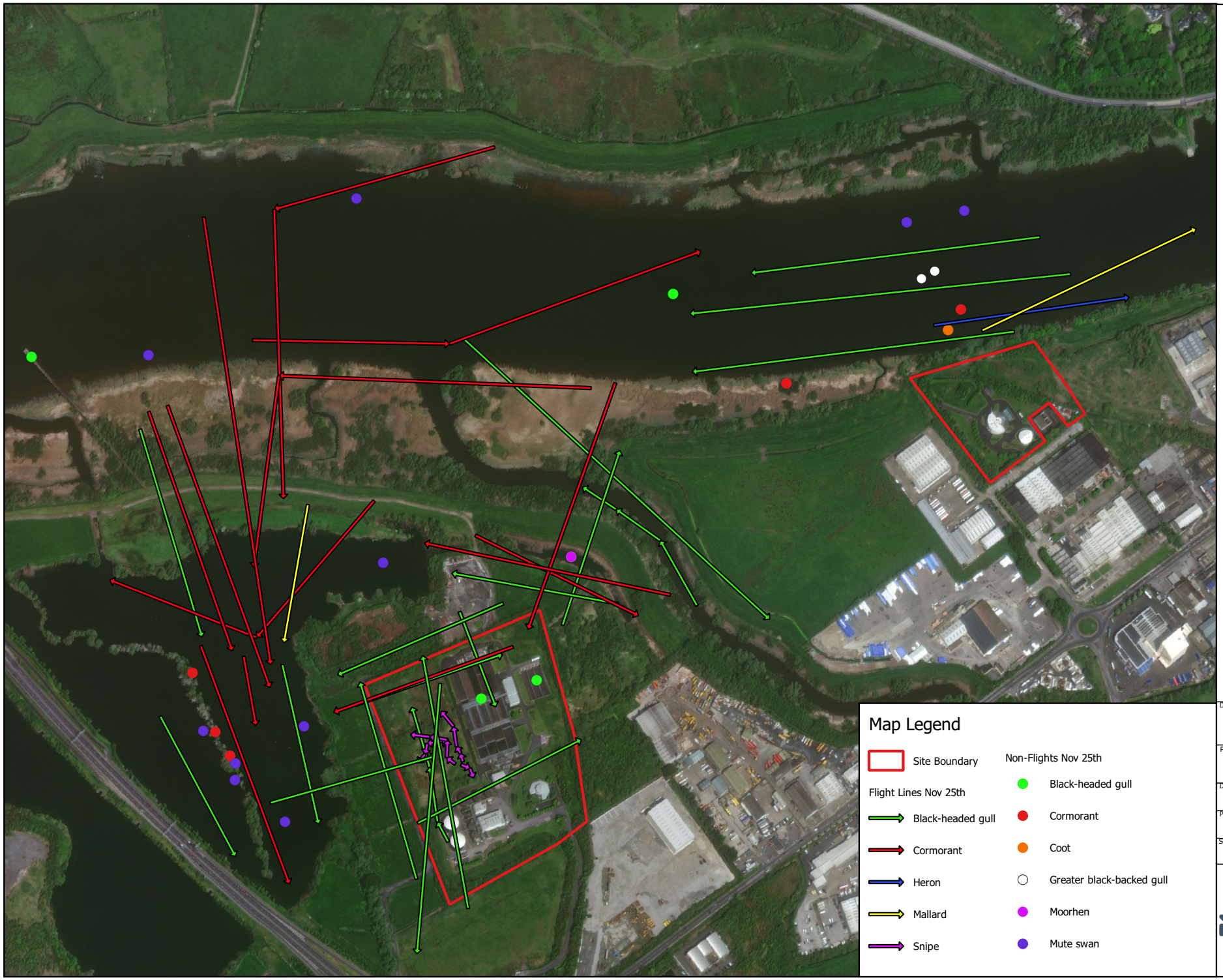
Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	19 Cormorants roosting on the island vegetation in Bunlicky Lake. 29 Cormorants recorded in flight over Bunlicky Lake.	Bunlicky Lake	3.3	12/12/2024	
	22 Cormorants recorded in flight over the River Shannon. 2 Cormorants recorded roosting on the surface of the River Shannon	River Shannon			
	5 Cormorants recorded in flight over the River Shannon	River Shannon	3.4	23/01/2025	
	37 Cormorants roosting on the island vegetation in Bunlicky Lake. 1 Cormorant recorded in flight over Bunlicky Lake.	Bunlicky Lake			
	9 Cormorants flew over the Wet grassland between the Bunlicky Lake and the River Shannon.	Wet grassland between the Bunlicky Lake and the River Shannon			
	6 Cormorants flew over River Shannon.	River Shannon	3.5	24/02/2025	
	1 Cormorants flew over the Wet grassland northeast of Bunlicky WwTP.	Wet grassland northeast of Bunlicky WwTP			
	150 Cormorants roosting on the island vegetation in Bunlicky Lake. 8 Cormorant recorded in flight over Bunlicky Lake.	Bunlicky Lake			
	11 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake			
	3 Cormorants on water's surface within the River Shannon	River Shannon			
	5 Cormorants recorded in flight over River Shannon	River Shannon	3.6	24/03/2025	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	26 Cormorants in flight over Bunlicky Lake	Bunlicky Lake			
	2 Cormorants flew over the Wet grassland between the Bunlicky Lake and the River Shannon.	Wet grassland between the Bunlicky Lake and the River Shannon			
Teal (*Anas crecca*)	12 Teal flushed and flew out of side channel onto the River Shannon. 75 Teal flushed and flew west along the River Shannon	River Shannon	3.3	12/12/2024	
	17 Teal roosting/feeding in the mudflats/sandflats at channel edges of the River Shannon.	Mudflats/Sandflats of River Shannon	3.4	23/01/2025	
	27 teal feeding in the main channel of the River Shannon. 3 Teal feeding in a side channel of the River Shannon.	River Shannon	3.5	24/02/2025	
	6 teal present within the main channel of the River Shannon. 9 Teal recorded flying into side channel of the River Shannon and landing on waters surface.	River Shannon	3.6	24/03/2025	
Mute Swan (*Cygnus olor*)	4 Mute swans present on River Shannon.	River Shannon	3.2	25/11/2024	BoCCI Amber listed
	7 Mute swans present on Bunlicky Lake.	Bunlicky Lake			
	5 Mute swans foraging on Bunlicky Lake. 4 Mute swan on islands within Bunlicky Lake.	Bunlicky Lake	3.3	12/12/2024	
	8 Mute swans swimming/foraging in River Shannon/side channel of river.	River Shannon			
	3 Mute Swans in back channel to the northeast of Bunlicky WwTP.	Northeast of Bunlicky WwTP			

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	1 Mute swan recorded in flight over Bunlicky Lake. 5 Mute swans recorded roosting on Bunlicky Lake.	Bunlicky Lake	3.3	12/12/2024	
	4 Mute swans foraging along the River Shannon.	River Shannon			
	3 Mute swans recorded roosting in the Ballinacurra Steam.	Ballinacurra Steam			
	5 Mute swans roosting in Bunlicky Lake.	Bunlicky Lake	3.4	23/01/2025	
	5 Mute swans foraging on the River Shannon.	River Shannon			
	2 Mute swans foraging in Bunlicky Lake	Bunlicky Lake	3.5	24/02/2024	
	7 Mute swans foraging along River Shannon	River Shannon			
	4 Mute swans recorded flying west over Bunlicky Lake. 2 Mute swans recorded feeding on Bunlicky Lake.	Bunlicky Lake	3.6	24/03/2025	
	3 Mute swans feeding on the River Shannon	River Shannon			
	3 Mute swans feeding in the Ballinacurra Creek Stream	Ballinacurra Creek Stream			
Snipe (*Gallinago gallinago*)	1 Snipe flushed from grassland between the River Shannon and Bunlicky Lake	Grassland between the River Shannon and Bunlicky Lake	3.4	23/01/2025	BoCCI Red listed
	1 Snipe flushed from grassland north-east of the Bunlicky WwTP site boundary.	Grassland north-east of Bunlicky WwTP site boundary.			
	1 Snipe recorded flying west across Bunlicky Lake.	Bunlicky Lake			
	1 Snipe flushed from reedbed at edge of the River Shannon.	River Shannon			

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	1 Snipe flushed from Wet grassland east of Corcanree Pumping Station.	Wet grassland east of Corcanree Pumping Station	3.6	23/03/2025	
	1 Snipe flushed from reedbed at edge of the River Shannon.	River Shannon			
Little egret (*Egretta garzetta*)	1 Little egret roosting on the island vegetation in Bunlicky Lake	River Shannon	3.6	24/03/2024	-
Kestrel (*Falco tinnunculus*)	1 Kestrel recorded hunting in the Wet grassland west of Bunlicky WwTP	Wet grassland west of Bunlicky WwTP	3.6	24/03/2024	BoCCI Red listed
Greylag Goose (*Anser answer*)	1 Greylag geese flew north across Bunlicky Lake.	Bunlicky Lake	3.5	23/01/2025	BoCCI Amber listed
	1 Greylag geese flew south across Bunlicky Lake. 6 Greylag geese feeding on Bunlicky Lake.	Bunlicky Lake	3.6	24/03/2024	
	4 Greylag geese feeding in wet grassland south of Bunlicky Lake between the Bunlicky WwTP site boundary and the lake.	Wet grassland south of Bunlicky lake			
	9 Greylag geese feeding in grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake			

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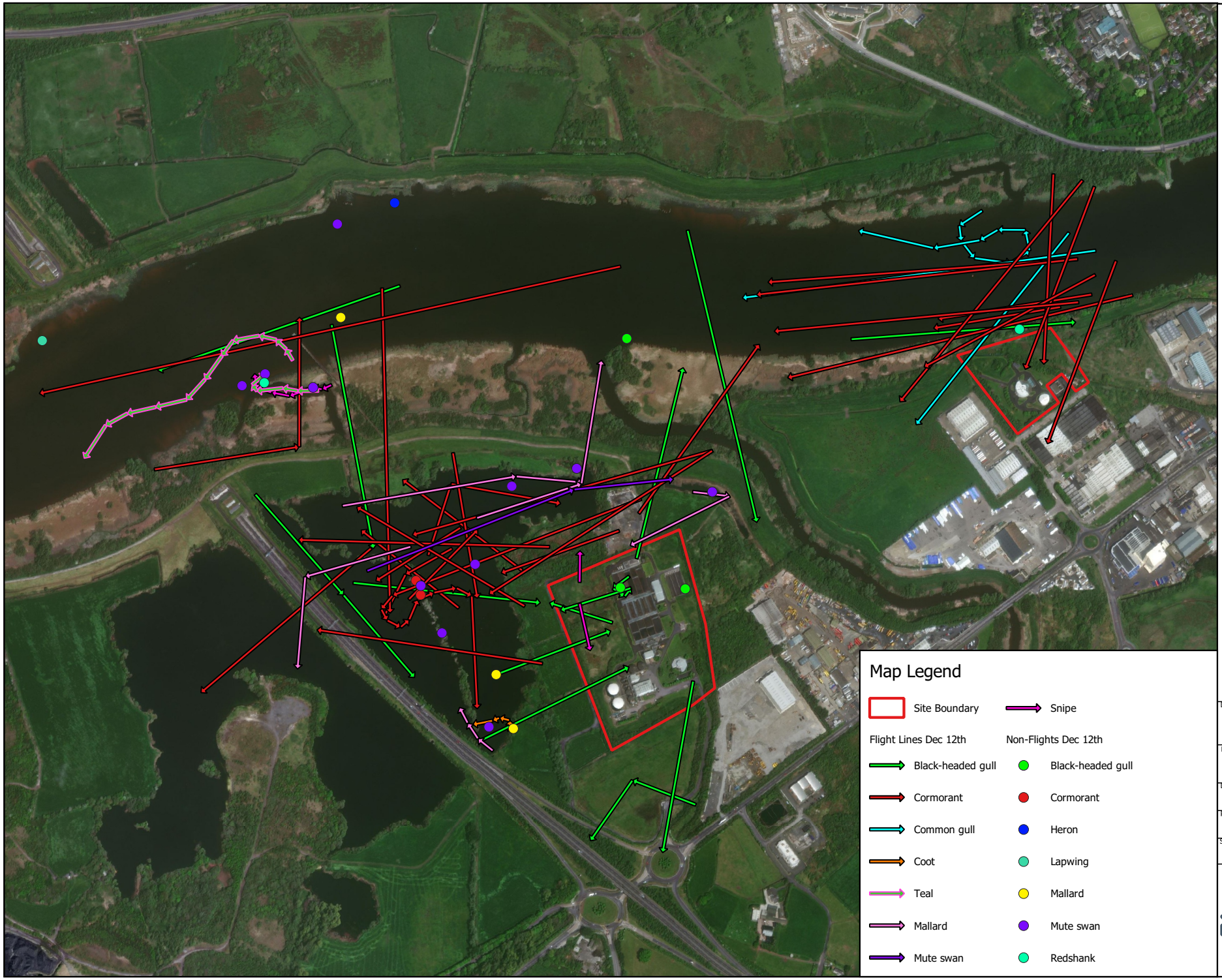
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210710	Fig 3-2
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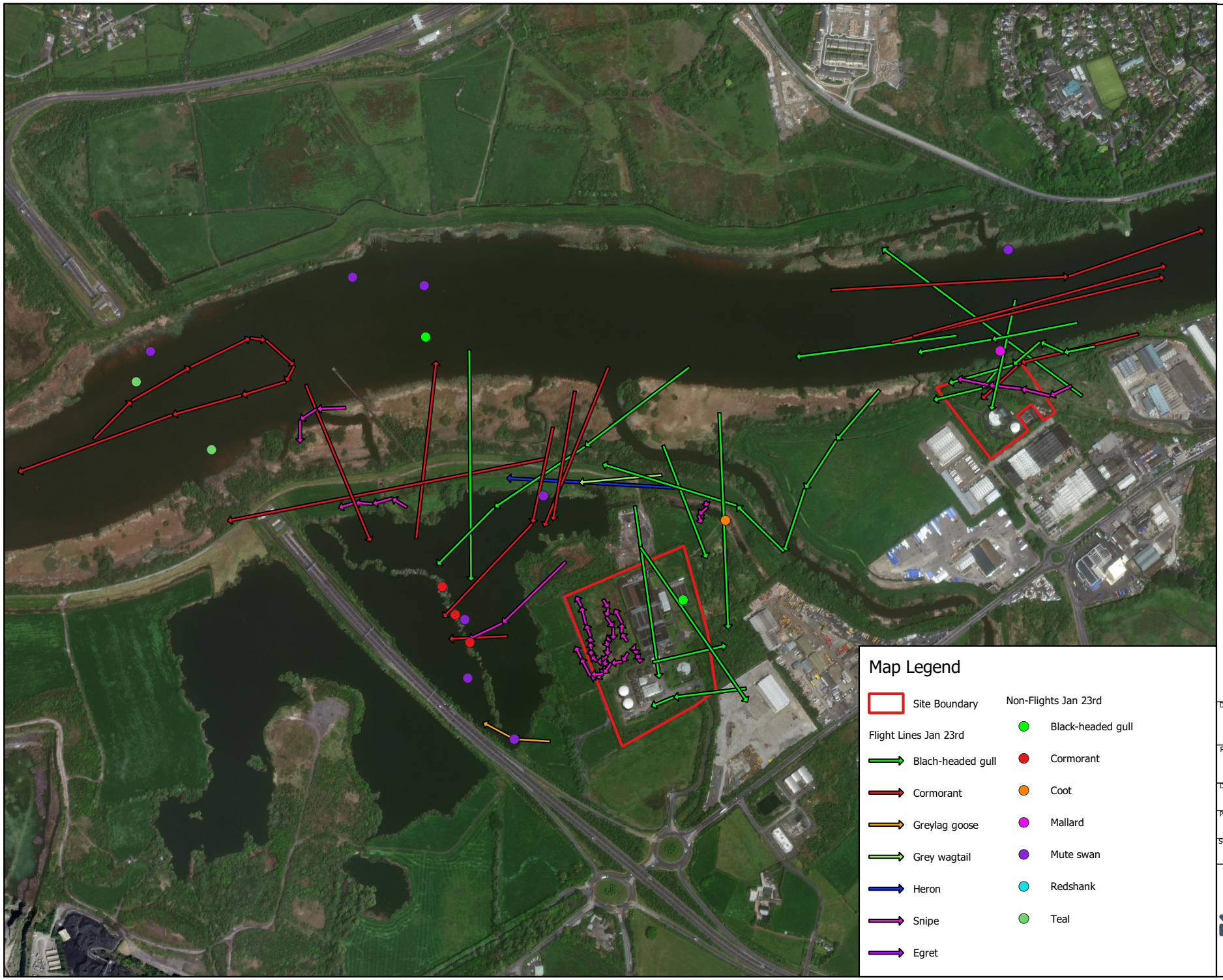
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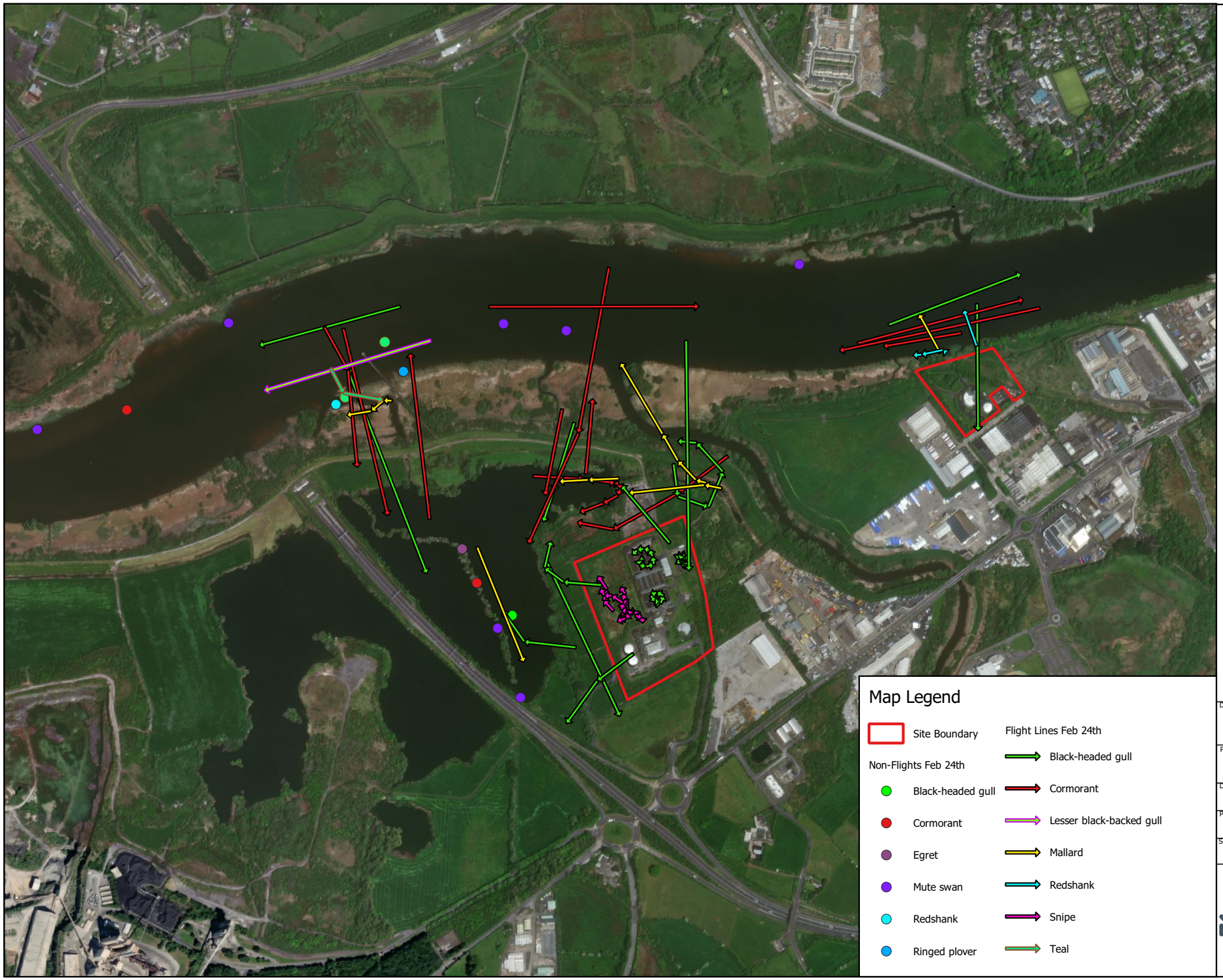
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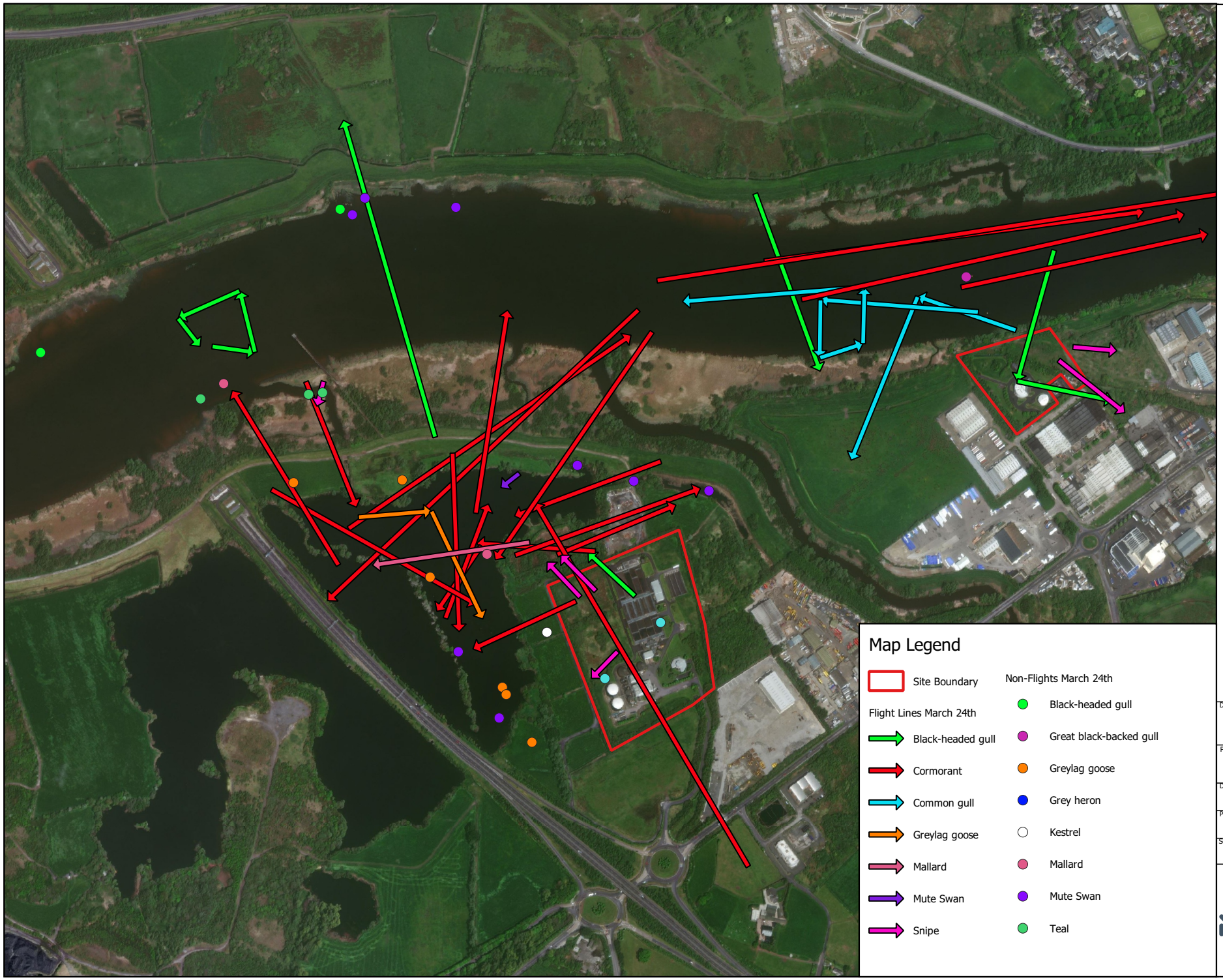
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4. SUMMARY OF FIELD SURVEY AND DISCUSSION

The surveys undertaken over the period winter period November 2024 to March 2025 provide an understanding of the usage of the proposed development sites and adjacent habitats by wintering bird species. A total of five target bird species were recorded within or flying over the proposed development site boundaries, while a total of nineteen target bird species were recorded within or flying over habitats adjacent to the proposed development sites during the winter site visits.

The majority of the birds recorded within the development site boundaries during the surveys were an assemblage of common birds that are typical of amenity grassland, agricultural grassland and urban habitats found within the wider area. The majority of birds recorded within habitats adjacent to the sites were wetland and waterbirds.

No Annex I SCI listed species of the River Shannon and River Fergus Estuaries SPA, were recorded using the habitats within the site boundaries. One Annex I species, the Little egret which is not a SCI listed species of the River Shannon and River Fergus Estuaries SPA was recorded in the wider area on the islands within Bunlicky Lake.

The number of SCI listed species, Black-headed gulls recorded roosting within the Bunlicky WwTP site boundary ranged between 4 and 50. The population estimate for this species in Ireland is approximately 48,821 (Lewis et al., 2019), international and national thresholds for this species are not currently available, as demonstrated in Table 3.3. However, when comparing the population estimate to the species count recorded roosting on the storm tank, aeration tanks and settlement tanks within the WwTP, the habitats within the site boundary does not appear to support an important bird assemblage of Black-headed gulls. These gulls appear to be habituated to the activity within the WwTP and were not disturbed by human activity and noise generated by the plant. Black-headed gulls were also recorded utilising several habitats adjacent to the site boundaries such as, mudflats and sandflats, the Ballinacurra stream and Bunlicky Lake.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development sites at Bunlicky and Corcanree. This species was not recorded using the habitats within the proposed development site boundaries during any of the surveys undertaken. However, high numbers of Cormorants were recorded roosting in nests on an island in Bunlicky Lake on almost every visit. The number of Cormorants recorded roosting ranged between 19 and 150. As shown in Table 3.3 the threshold for wintering cormorant is 110 birds (Lewis et al., 2019). Therefore, this breeding colony in Bunlicky Lake is of high importance because roosting numbers during winter exceed the threshold for a population which is 1% of the national total (following NRA, 2009). Cormorants were also recorded in flight over grasslands between Bunlicky Lake and the River Shannon. No other SCI species of the River Shannon and River Fergus Estuaries SPA was recorded within or flying over the site boundaries during the surveys.

Six SCI species of the nearby River Shannon and River Fergus Estuaries SPA, two of which are red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Lapwing & Redshank) were recorded roosting or feeding within habitats adjacent to the proposed development sites. Lapwing & Redshank were recorded utilising the mudflats and sandflats north of Bunlicky lake, along the River Shannon.

Two red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Gilbert et, al., 2021) were recorded from within the proposed development sites at Bunlicky WwTP and at the Corcanree pumping station. Snipes were recorded on several occasions, flushed from wet grassland in the western section Bunlicky WwTP and once on one occasion from the grassland in the north-east of the Corcanree pumping station. Two Grey wagtails were recorded utilising trees and other vegetation in the western section of the site at Bunlicky WwTP.

The remaining target species recorded flying over the sites included a Common gull flying over Bunlicky WwTP. This individual did not land in the habitats within the proposed development sites. This species is not listed SCI species of the nearby River Shannon and River Fergus Estuaries SPA.

The remaining target species recorded included Mute swans roosting in Bunlicky Lake, the Ballinacurra Creek Stream, the mudflats and sandflats north of Bunlicky Lake and the River Shannon. Greylag geese were recorded feeding in wet grasslands between the River Shannon and Bunlicky Lake and in wet grasslands south of Bunlicky Lake, they were also recorded roosting in Bunlicky Lake. Mallards were recorded utilising several adjacent habitats, such as, mudflats and sandflats, Bunlicky Lake, and commuting over several grasslands adjacent to both Bunlicky WwTP and Corcanree pumping station.

Coot and Moorhen were recorded utilising the reedbeds along the edge of the River Shannon, as well as those in the Ballinacurra Creek Stream. Additionally, Great black-backed gulls, Lesser black-backed gulls & Common gulls were recorded in flight over the River Shannon on several occasions. Lastly, Grey heron and Little egret were recorded utilising the channel edges of the River Shannon, and roosting on the islands located in Bunlicky Lake.

5. CONCLUSION

Based on the wintering bird assemblages recorded over the nine surveys carried out between November 2024 and March 2025, it can be concluded that neither Bunlicky WwTP or Corcanree Pumping Station support important assemblages of wintering wildfowl, waders, or SCI species for which the River Shannon and River Fergus estuaries SPA has been designated due to the low population counts within the site boundaries when compared with the national population count. These flocks of the SCI species Black-headed gulls were recorded roosting on site infrastructure at Bunlicky WwTP. There is no potential for loss of supporting habitat for the SCI species of River Shannon and River Fergus Estuaries SPA.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development sites at Bunlicky and Corcanree. This species was not recorded using the habitats within the proposed development site boundaries during any of the surveys undertaken. However, there is a breeding colony of Cormorant situated in Bunlicky Lake, adjacent to the Bunlicky WwTP which is a colony of high importance. Cormorants were also recorded in flight over grasslands between Bunlicky Lake and the River Shannon. No other SCI species of the River Shannon and River Fergus Estuaries SPA was recorded within or flying over the site boundaries during the surveys.

Habitats within the site primarily consist of amenity grassland, wet grassland, buildings and artificial surfaces, hedges, and treelines. Species listed as SCIs for the River Shannon and River Fergus Estuaries SPA are unlikely to depend on these habitats within the proposed development site.

According to the site-specific conservation objectives document the SCI species of the River Shannon and River Fergus Estuaries SPA, are primarily associated with intertidal sheltered and shallow subtidal, sand and mud flats habitats. These habitats are located within the vicinity of the project area however; they do not occur within the development boundaries.

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APPENDIX 1

NON-TARGET BIRD SPECIES

Species	Scientific name	BoCCI Status	Date recorded
Magpie	*Pica pica*	Green	25/11/24 12/12/24 24/03/25
Robin	*Erithacus rubecula*	Green	12/12/24 23/01/25 24/03/25
Wood pigeon	*Columba palumbus*	Green	25/11/24 12/12/24 23/01/25 24/02/25
Wren	*Troglodytes troglodytes*	Green	25/11/24 12/12/24 23/01/25 24/02/25 24/03/25
Hooded crow	*Corvus cornix*	Green	25/11/24 12/12/24 23/01/25 24/02/25 24/03/25
Blackbird	*Turdus merula*	Green	25/11/24 12/12/24 23/01/25 24/02/25 24/03/25
Bullfinch	*Pyrrhula pyrrhula*	Green	25/11/24 12/12/24
Starling	*Sturnus vulgaris*	Amber (breeding population)	23/01/25 24/03/25
Pied wagtail	*Motacilla alba yarrellii*	Green	12/12/24 23/01/25
Greenfinch	*Chloris chloris*	Amber	25/11/24 24/02/25
Jackdaw	*Corvus monedula*	Green	25/11/24 12/12/24 23/01/25
Chaffinch	*Fringilla coelebs*	Green	25/11/24 23/01/25 24/02/25 24/03/25
Rook	*Corvus frugilegus*	Green	25/11/24 23/01/25 24/02/25
Blue tit	*Cyanistes caeruleus*	Green	24/02/25 24/03/25
Goldfinch	*Carduelis carduelis*	Green	25/11/24 24/03/25
Long tailed tit	*Aegithalus caudatus*	Green	12/12/24 24/02/25
Dunnock	*Prunella modularis*	Green	25/11/24 12/12/24

Species	Scientific name	BoCCI Status	Date recorded
			24/02/25
Sparrow	*Passer domesticus*	Amber	12/12/24 23/01/25
Song thrush	*Turdus philomelos*	Green	25/11/24 12/12/24
Great tit	*Parus major*	Green	25/11/24 12/12/24 23/01/25 24/02/25 24/03/25
Goldcrest	*Regulus regulus*	Amber	24/03/25
Chiffchaff	*Phylloscopus collybita*	Green	24/03/25
Willow warbler	*Phylloscopus trochilus*	Amber	24/03/25

MKO Planning and Environmental Consultants

Winter Bird Survey Report

Bunlicky Wastewater Treatment Plant Upgrade Project, Co. Limerick

DOCUMENT DETAILS

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Project Number:	**210710**
Document Title:	**Winter Bird Survey Report**
Document File Name:	**BSR – F1 – 2024.02.27- 210710**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

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Appendix 1 – Non target bird species

1. INTRODUCTION

MKO has been appointed by JB Barry Ltd. to undertake winter bird surveys for the period October 2022 to March 2023 inclusive, for the proposed upgrade works at Limerick Wastewater Treatment Plant, Bunlicky, Dock Road, Co. Limerick and at Corcanree Pumping Station, Corcanree Business Park, Dock Road, Co. Limerick.

The proposed WwTP Upgrade works are located within the Severn Trent Response Wastewater Treatment Plant, Dock Road, Bunlicky, Co. Limerick. Bunlicky Wastewater Treatment Plant is located approximately 2.5km west of Limerick City Centre (Grid reference: R 54623 55688). The site is accessed via a local road off the Dock Road (R510) roundabout. Bunlicky Wastewater Treatment Plant is located adjacent to the River Shannon and River Fergus Estuaries SPA [004077] along its northern boundary.

The proposed pumping station upgrade works are located within a field adjacent to the Corcanree Pump Station, Corcanree Business Park, Dock Road, Limerick (grid ref: R 55457 56224). The pump station is accessed via the Dock Road (N69) and local access roads within Corcanree Business Park. The proposed pumping station upgrade works site is also adjacent to the River Shannon and River Fergus Estuaries SPA [004077] along its northern boundary.

A site location map is provided as Figure 1.1.

The objective of the winter surveys is to assess the suitability of the proposed development sites to support a variety of wintering wildfowl and waders, including the bird species listed as Special Conservation Interests (SCIs) for the River Shannon and River Fergus Estuaries SPA.

The assessment objectives can be summarised as follows:

- To undertake field surveys to assess for the presence of suitable habitat and the occurrence of wintering bird species within and adjacent to the development sites.
- The study seeks to determine the distribution of the species within and adjacent to the proposed development sites and to determine the presence of feeding/roosting areas within/adjacent to the proposed development sites.

Section two of this report provides the methodology, constraints, survey information, weather conditions and survey coverage. The results of the desk study and field surveys are presented in section three of this report. An evaluation and discussion of the results is provided in Section four. The concluding section of the report considers the findings and potential impacts of the proposed development on SCI listed species of the River Shannon and River Fergus Estuaries SPA.

1.1 Statement of Authority

Wintering bird surveys were undertaken between October 2022 and March 2023 by Neansaí O'Donovan (B.Sc, Wildlife Biology). This report has been prepared by Neansaí O'Donovan (B.Sc. Wildlife Biology) who has over 3 years' experience in ecological consultancy. This report has been reviewed by Rachel Walsh (B.Sc. Env.), who has extensive experience in ecological assessment.



Map Legend

- Site Boundary
- Special Protected Area (SPA)

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Drawing Title: Site Location

Project Title: Limerick WwTP Upgrade

Drawn By	Checked By
NOD	RW
Project No.	Drawing No.
210710	Figure 1.1
Scale	Date
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2. METHODLOGY

2.1 Desk Study

A number of sources were assessed to determine the likely usage of both breeding and wintering bird species, including Bird Atlases, National Biodiversity Data Centre (NDBC), Birdwatch Ireland and Conservation Objectives Supporting Documents from the National Parks and Wildlife Service (NPWS) for the nearby River Shannon and River Fergus Estuaries SPA. Results of the desk study are provided in section 3.1.

2.2 Field Survey Methodology

During the initial field visit the sites were assessed and suitable vantage points were identified in line with previous years wintering bird surveys undertaken at the proposed development sites during the 2020/2021. Surrounding private lands were scanned using a spotting scope from elevated vantage points. Any significant flocks of wintering wildfowl or waders were recorded using such an approach. The survey area covered the development site at Bunlicky WwTP and Corcanree Pumping Station, and areas of potentially suitable supporting habitat in proximity to the proposed development site including areas of agricultural grassland adjacent to Bunlicky WwTP, Bunlicky Lake, the estuarine habitat adjacent to the outfall at Bunlicky and the estuarine habitat adjacent to Corcanree Pumping station.

The surveys were undertaken monthly in October to December 2022, and the survey effort was increased to bi-monthly for January to March 2023. Surveys were undertaken at alternate high/low tides, within two hours of high/low tide. A combination of low and high tide counts has been used due to the differences in behaviour and site use between tidal states, with different species likely to be foraging and roosting in different areas of River Shannon and River Fergus Estuaries SPA and the surrounding terrestrial habitats, depending on the stage of the tidal cycle.

The surveys were undertaken by an appropriately qualified Ecologist. All observations were recorded, and detailed point data was gathered for each species observation, with all bird species denoted using standard British Trust for Ornithology (BTO) codes and with the number of each species recorded next to each registration. The species recorded in the surveys were those covered by Irish Wetlands Bird Survey (I-WeBS) counts, i.e., all divers, grebes, cormorant, shag, herons, swans, geese, ducks, rails, crakes, waders, gulls, and kingfisher. However, in addition to this, all other bird species, including raptors and all common and widespread passerines, were also recorded from within the proposed development sites.

2.2.1 I-WeBS Surveys

The winter bird surveys at the nearby SPA followed the Irish Wetland Bird Survey (I-WeBS) methodology; the simple 'look-see' method, whereby all birds present within a predefined area are counted (Gilbert et al., 1998; Bibby, C.J., 2000; Birdwatch Ireland, 2018). The surveys were carried out at suitable vantage points within the sites, additional vantage points located overlooking the section of the River Shannon and River Fergus Estuaries SPA in close proximity to the proposed development sites. Vantage points were chosen to have as large as possible a view of the proposed development sites, adjacent wetland habitats and potential adjacent daytime foraging habitat in the vicinity of the proposed development sites. The chosen vantage points were stopped at for 15-minute intervals each, along the transect walk on each survey day. Vantage points focused on areas which were deemed to be of likely significance to wintering waterbirds of River Shannon and River Fergus Estuaries SPA.

Details of the surveys carried out including date, time, duration, location, and weather conditions are provided in Table 2.2. A map of the vantage point locations used during the surveys is presented in Figure 2.1.

2.2.2 Transects

Walked transects were undertaken within the site boundaries in conjunction with vantage point surveys. During the surveys species of note were recorded both within and adjacent to the development sites. All bird species were denoted using standard British Trust for Ornithology (BTO) codes and with the number of each species recorded next to each registration. Transects walked during the survey are shown in Figure 2.2. During the surveys species of note were recorded both within and adjacent to the development sites.



Map Legend

- Site Boundary
- Vantage Points

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N

Drawing Title
Vantage Point Locations

Project Title
Limerick WwTP Upgrade

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Scale	Date
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Map Legend

- Site Boundary
- Transects

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N

Drawing Title

Bird Survey Transects

Project Title

Limerick WwTP Upgrade

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2.2.3 Survey Details

Details of the surveys including survey dates, weather conditions and survey duration are provided in Table 2.1.

Table 2-1 Survey Effort

Date	Survey duration	Tide	Weather conditions
28/10/2022	6 hours	High Tide	Wind speed: Strong breeze Cloud cover: 20-30% Visibility: Good (> 2km) Rain: No Frost: None Snow: None
25/11/2022	6 hours	Low Tide	Wind speed: Fresh breeze Cloud cover: 10-20% Visibility: Excellent Rain: No Frost: None Snow: None
15/12/2022	6 hours	High Tide	Wind speed: Gentle breeze Cloud cover: 10-20% Visibility: Excellent until thick band of fog came in the late afternoon. Rain: None Frost: Yes Snow: None
17/01/2023	6 hours	High Tide	Wind speed: Fresh breeze Cloud cover: approx. 60% Visibility: Good (> 2km) Rain: None Frost: Yes Snow: None
31/01/2023	6 hours	High Tide	Wind speed: Strong breeze Cloud cover: approx. 60% Visibility: Good (> 2km) Rain: None Frost: None Snow: None
14/02/2023	5 hours	High tide	Wind speed: Strong breeze Cloud cover: approx. 50% Visibility: Good (> 2km) Rain: Scattered showers Frost: None Snow: None
24/02/2023	6 hours	Low tide	Wind speed: Moderate breeze Cloud cover: approx. 60% Visibility: Excellent Rain: No Frost: No Snow: No
07/03/2023	6 hours	Low Tide	Wind speed: Moderate breeze Cloud cover: approx. 30% Visibility: Excellent Rain: No Frost: No

Date	Survey duration	Tide	Weather conditions
			Snow: No
24/03/2023	6 hours	Low Tide	Wind speed: Strong breeze Cloud cover: 100% Visibility: Good Rain: Heavy scattered showers Frost: No Snow: No

2.2.4 Survey Constraints

During the survey effort on January 17th, 2023, a helicopter intermittently flew along the River Shannon which may have affected bird activity outside the development sites along the River Shannon. Apart from this activity, no significant survey constraints limited the survey approach, and a comprehensive assessment was undertaken. All surveys were undertaken during optimal weather conditions as poor weather conditions and high wind can lead to decreased bird movements and hinder surveyor visibility.

3. RESULTS

3.1 Desk Study

A number of sources were assessed to determine the likely usage of the sites by both breeding and wintering bird species, including Bird Atlases, National Biodiversity Data Centre (NBDC), BirdWatch Ireland and Conservation Objectives Supporting Documents from the National Parks and Wildlife Service (NPWS) for nearby Special Protection Areas (SPAs).

3.1.1 Breeding and Wintering Bird Atlases

The Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland (Balmer et al., 2013) provides the most up-to-date information regarding the distribution and relative abundance of bird species in Britain and Ireland, based on surveys carried out between 2007 and 2011. The atlases show data for breeding and wintering birds respectively in individual 10 km x 10 km squares (hectads). Table 3.1 shows those species found in the relevant hectad (R55) which are recorded as breeding in the most recent atlas.

This dataset also provides species that have been recorded within the relevant 2km tetrads (R55N and R55M) on National Biodiversity Data Centre (NBDC) datasets as well as those listed in Annex I of the EU Birds Directive recorded on the BoCCI Red List. Birds listed under Annex I are offered special protection by the EU Birds Directive. Those listed on the Birds of Conservation Concern in Ireland (BoCCI) Red List meet one or more of the following criteria:

- IUCN: Global conservation status (Critically Endangered (CE), Endangered (E)or Vulnerable (V), but not Near Threatened. These species are recognised as the highest priorities for action at a global scale and are thus priorities at an all-Ireland level.
- European conservation status. The conservation status of all European species was assessed most recently by Birdlife International (2004), one of the main changes in the revision being to include the IUCN criteria. These species are those of global conservation concern (including those classified as Near Threatened) and are Red listed.
- The Irish breeding population has undergone significant historical decline since 1800.
- The Irish non-breeding population has undergone a significant decline of 50% in the last 25 years.
- The Irish breeding range has undergone a decline of 70% or more in the last 25 years.

Two species listed under Annex I of the EU Birds Directive have been recorded within the tetrad R55N Little Egret (*Egretta garzetta*) and Northern Lapwing (*Vanellus vanellus*). A further three red-listed birds of conservation concern have been recorded within this tetrad: Northern Shoveler (*Anas clypeata*), Swift (*Apus apus*) and Scaup (*Anas marila*).

Two species listed under Annex I of the EU Birds Directive has been recorded within the tetrad R55M: Dunlin (*Calidris alpina*) and Kingfisher (*Alcedo atthis*). A further eleven red-listed birds of conservation concern have been recorded within this tetrad: Common Goldeneye (*Bucephala clangula*), Common Kestrel (*Falco tinnunculus*), Common Redshank (*Tringa totanus*), Common Snipe (*Gallinago gallinago*), Common Swift (*Apus apus*), Eurasian Curlew (*Numenius arquata*), Grey Wagtail (*Motacilla cinerea*), Meadow Pipit (*Anthus pratensis*), Northern Lapwing (*Vanellus vanellus*), Redwing (*Turdus iliacus*) and Stock Pigeon (*Columba oenas*).

Table 3-1 NBDC Bird data and Bird Atlas data (Hectad R55)

Common Name	Scientific name	Designation
Common Kingfisher	*Alcedo atthis*	Protected EU Birds Directive Annex I Bird Species
Corn Crake	*Crex crex*	
European Golden Plover	*Pluvialis apricaria*	
Hen Harrier	*Circus cyaneus*	
Little Egret	*Egretta garzetta*	
Mediterranean Gull	*Larus melanocephalus*	
Merlin	*Falco columbarius*	
Peregrine Falcon	*Falco peregrinus*	
Red-necked Phalarope	*Phalaropus lobatus*	
Sandwich Tern	*Sterna sandvicensis*	
Short-eared Owl	*Asio flammeus*	
Whooper Swan	*Cygnus cygnus*	
Barn Owl	*Tyto alba*	Birds of Conservation Concern – Red list
Black-headed Gull	*Larus ridibundus*	
Common Goldeneye	*Bucephala clangula*	
Common Pochard	*Aythya ferina*	
Common Redshank	*Tringa totanus*	
Common Snipe	*Gallinago gallinago*	
Common Swift	*Apus apus*	
Dunlin	*Calidris alpina*	
Eurasian Curlew	*Numenius arquata*	
Eurasian Oystercatcher	*Haematopus ostralegus*	

Common Name	Scientific name	Designation
Eurasian Woodcock	*Scolopax rusticola*	
Greater Scaup	*Aythya marila*	
Herring Gull	*Larus argentatus*	
Northern Lapwing	*Vanellus vanellus*	
Northern Shoveler	*Anas clypeata*	
Common Goldeneye	*Bucephala clangula*	
Common Pochard	*Aythya ferina*	
Common Redshank	*Tringa totanus*	
Yellowhammer	*Emberiza citrinella*	
Kestrel	*Falco tinnunculus*	

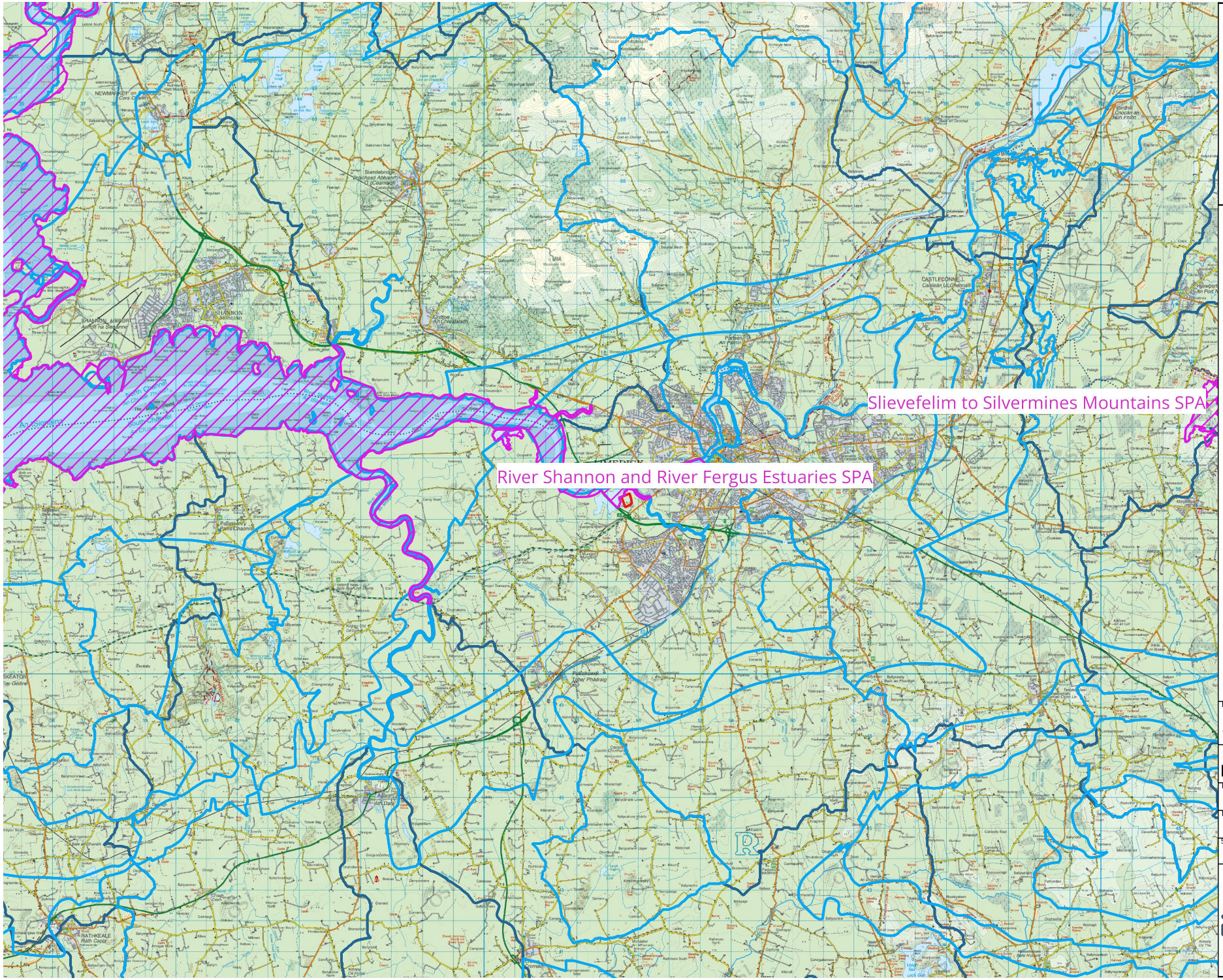
3.1.2 Sites designated for Wintering Bird Species within the vicinity of the Proposed Development Sites

Using QGIS Software (Version 3.28.6) designated sites within the vicinity of the proposed development sites were identified. Only one special protection area was identified within the vicinity of the proposed development sites. The site synopses and conservation objectives of this site, as per the NPWS website (www.npws.ie), were considered at the time of preparation of this report. Details of this sites, including its distance from the proposed development sites, are provided in Table 3.2. Figure 3.1 shows the location of the proposed development sites in relation to designated Special Protection Areas within the vicinity.

Table 3-2 EU Designated sites within the vicinity of the proposed works

EU Designated Site	Distance from Proposed development site (km)	Qualify Interests/Special Conservation Interests for which the Natura 2000 Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 20/11/2023)	Conservation Objective
River Shannon and River Fergus Estuaries SPA	Adjacent to the northern boundary of the proposed development	› Cormorant (*Phalacrocorax carbo*) [A017] › Whooper Swan (*Cygnus cygnus*) [A038] › Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] › Shelduck (*Tadorna tadorna*) [A048] › Wigeon (*Anas penelope*) [A050] › Teal (*Anas crecca*) [A052] › Pintail (*Anas acuta*) [A054] › Shoveler *(Anas clypeata*) [A056] › Scaup (*Aythya marila*) [A062] › Ringed Plover (*Charadrius hiaticula*) [A137] › Golden Plover (*Pluvialis apricaria*) [A140] › Grey Plover (*Pluvialis squatarola*) [A141] › Lapwing (*Vanellus vanellus*) [A142] › Knot (Calidris canutus) [A143] › Dunlin (*Calidris alpina*) [A149]	Detailed conservation objectives for this site (Version 1, September 2012) were reviewed as part of the assessment and are available at www.npws.ie. Each of the listed SCI species has the conservation objective to maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. The wetlands and waterbirds SCI has the conservation objective "*To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly- occurring migratory waterbirds that utilise it*"

EU Designated Site	Distance from Proposed development site (km)	Qualify Interests/Special Conservation Interests for which the Natura 2000 Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 20/11/2023)	Conservation Objective
		› Black-tailed Godwit (*Limosa limosa*) [A156] › Bar-tailed Godwit (*Limosa lapponica*) [A157] › Curlew (*Numenius arquata*) [A160] › Redshank (Tringa *totanus*) [A162] › Greenshank (*Tringa nebularia*) [A164] › Black-headed Gull (*Chroicocephalus ridibundus*) [A179] › Wetland and Waterbirds [A999]	



Map Legend

- Site Boundary
- Special Protected Area (SPA)
- Groundwater Catchment
- Water Framework Directive (WFD) Subcatchments

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Drawing Title
Special Protected Areas

Project Title
Limerick WwTP Upgrade

Drawn By	Checked By
NOD	RW
Project No.	Drawing No.
210710	Figure 3.1
Scale	Date
1:160,000	13.12.2023

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3.1.3 Irish Wetland Bird Survey (I-WeBS) Data

Irish Wetland Bird Survey (I-WeBS) data was obtained from BirdWatch Ireland on the 23rd of November 2023, following a formal data request. This data includes the most up to date information on the species present at the most proximal IWeBS site i.e. Limerick City (0I477) and Bunlicky Lake (0I003).

Data for each subsite is set out in the sections below. The data also shows where Nationally or Internationally important numbers of each species have been recorded in the past, with all important flocks highlighted in red. A site is considered nationally important if it supports 1% or more of the all-Ireland population, based on the most recent estimates for Ireland, namely Crowe and Holt (2013). A site is classified as internationally important if it regularly supports in excess of 20,000 waterbirds or 1% or more of the flyway population estimate of a species, based on Wetlands International (2017).

3.1.3.1 Limerick City Subsite (0I477)

Details of I-WeBS data for the Limerick City subsite (0I477) are presented in Table 3-3 and includes annual peak counts for the period 2017-2023. There are no IWeBS data available for the monitoring period 2018/19 or 2019/20 for this monitoring site.

Table 3-3 IWeBS data for Limerick City subsite in close proximity to the proposed development site.

Species	1% National	1% International	2017/18	2020/21	2011/2022	2022/23	Peak
Mute Swan	90	100	6	67	42	45	67
Whooper Swan	150	340	26	9	-	-	26
Greylag Goose	35	980		165	109	171	171
Wigeon	560	14000	6	10	16	-	16
Gadwall	20	1200	-	-	34	8	34
Teal	360	5000	-	-	34	7	34
Mallard	280	53000	5	58	87	68	87
Shoveler	20	650	29	3	20	8	29
Pochard	110	2000	16	-	7	2	16
Tufted Duck	270	8900	58	41	21	28	58
Goosander	-	-	2	-	1	-	2
Little Grebe	20	4700	6	5	11	-	11
Cormorant	110	1200	1	14	74	29	74
Grey Heron	25	5000	1	4	3	4	4
Water Rail	-	-	2	3	1	-	3

Species	1% National	1% International	2017/18	2020/21	2011/2022	2022/23	Peak
Moorhen	-	-	4	19	24	16	24
Coot	190	15500	93	30	43	32	93
Oystercatcher	610	8200	97	45	68	45	97
Lapwing	850	72300	57	37	67	4	67
Snipe	-	-	10	69	4	-	69
Redshank	240	2400	1	3	2	-	3
Greenshank	20	3300	-	-	1	-	1
Kingfisher	-	-	-	1	2	-	2
Black-headed Gull	-	-		1204	1286	292	1286
Ring-billed Gull	-	-	2	1	-	-	2
Common Gull	-	-	-	48	75	10	75
Lesser Black-backed Gull	-	-	-	44	180	146	180
Herring Gull	-	-	-	189	243	17	243
Mediterranean Gull	-	-	-	1	1	-	1
Iceland Gull	-	-	6	2	1	2	6
Glaucous Gull	-	-	-	1	-	-	1
Great Black-backed Gull	-	-	-	7	13	4	13

3.1.3.2 Bunlicky Lake Subsite (0I003)

Details of I-WeBS data for the Bunlicky Lake subsite (0I003) are presented in Table 3-4 and includes annual peak counts for the period 2018-2020. There are no IWeBS data available for this site for the monitoring period 2021/2022 or 2022/2023. Bunlicky Lake was not surveyed in full since January 2015, but individual Greylag Goose counts were sourced as part of a separate request under I-WeBS.

Table 3-4 IWeBS data for Bunlicky Lake subsite west of the proposed development site.

Species	1% National	1% International	2018/19	2019/20	Peak
Greylag Goose	35	980	18	112	112

3.1.4 River Shannon and River Fergus Estuaries SPA (004077)

A detailed conservation objectives document is available for River Shannon and River Fergus Estuaries SPA (www.npws.ie, accessed on 20/11/2023). The Special Conservation Interests of this SPA and their conservation objective are listed in Table 3.5.

Table 3-5 Special Conservation Interest and Conservation Objectives (Version 01, 2012, NPWS)

Special Conservation Interest (SCI)	Conservation Objective
Wetland and Waterbirds [A999]	To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly- occurring migratory waterbirds that utilise it.
Cormorant (*Phalacrocorax carbo*) [A017]	To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA.
Whooper Swan (*Cygnus cygnus*) [A038]	To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA.
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA.
Shelduck (*Tadorna tadorna*) [A048]	To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA.
Wigeon (*Anas penelope*) [A050]	To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA.
Teal (*Anas crecca)* [A052]	To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA.
Pintail (*Anas acuta*) [A054]	To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA.
Shoveler (*Anas clypeata*) [A056]	To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA.
Scaup (*Aythya marila*) [A062]	To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA.
Ringed Plover (*Charadrius hiaticula*) [A137]	To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA.
Golden Plover (*Pluvialis apricaria*) [A140]	To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA.
Grey Plover (*Pluvialis squatarola*) [A141]	To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA.
Lapwing (*Vanellus vanellus*) [A142]	To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA.
Knot (*Calidris canutus*) [A143]	To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA.

Special Conservation Interest (SCI)	Conservation Objective
Dunlin (*Calidris alpina*) [A149]	To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA.
Black-tailed Godwit (*Limosa limosa*) [A156]	To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA.
Bar-tailed Godwit (*Limosa lapponica*) [A157]	To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA.
Curlew (*Numenius arquata*) [A160]	To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA.
Redshank (*Tringa totanus*) [A162]	To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA.
Greenshank (*Tringa nebularia*) [A164]	To maintain the favourable conservation condition of Greenshank in the River Shannon and River Fergus Estuaries SPA.
Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	To maintain the favourable conservation condition of Black-headed Gull in the River Shannon and River Fergus Estuaries SPA.

3.1.4.1 Special Conservation Interests

A review of desktop literature pertaining to the SPA was conducted including the site-specific conservation document, conservation objectives supporting documents, site synopsis and the most recent available Article 12 reports.

3.1.4.1.1 *Wetlands and Waterbirds*

The following relevant information has been extracted from the NPWS site synopsis and Natura 2000 Data From for the SPA:

> *"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 macro invertebrate community, e.g. Macoma-Scrobicularia-Nereis, 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 a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull.*
>
> *It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds".*

The wetland habitat designated as part of the River Shannon and River Fergus Estuaries SPA has the target that the permanent area occupied by the wetland habitat should be stable and not significantly less than 32,261ha other than that occurring from natural patterns of variation.

3.1.4.1.2 Cormorant (Phalacrocorax carbo) [A017]

This species has been designated for its wintering and breeding population within the SPA. According to the site species conservation objectives document Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995). According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 245 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining 1.0 –24.9% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2019) the short-term population trend (for the period of 2002 - 2018) for this species is increasing and the long-term trend (for the period of 2002 1985-2018) is also increasing.

3.1.4.1.3 Whooper Swan (Cygnus cygnus) [A038]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Whooper Swan (*Cygnus cygnus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 118 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as increasing and the current conservation condition of this species is favourable.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2002 - 2010) for this species is increasing and the long-term trend (since circa 1980) is also increasing.

3.1.4.1.4 Light-bellied Brent Goose (Branta bernicla hrota) [A046]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta bernicla hrota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 494 individuals.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is also increasing.

3.1.4.1.5 Shelduck (Tadorna tadorna) [A048]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,025 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is Fluctuating and the long-term trend (since circa 1980) is stable.

3.1.4.1.6 *Wigeon (Anas penelope) [A050]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,761 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is highly unfavourable.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is also decreasing.

3.1.4.1.7 *Teal (Anas crecca) [A052]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all -Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,260 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is stable and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.8 *Pintail (Anas acuta) [A054]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is fluctuating and the long-term trend (since circa 1980) is unknown.

3.1.4.1.9 *Shoveler (Anas clypeata) [A056]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus

Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is increasing.

3.1.4.1.10 *Scaup (Aythya marila) [A062]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.11 *Ringed Plover (Charadrius hiaticula) [A137]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Ringed Plover (*Charadrius hiaticula*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 223 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2000 - 2011) for this species is stable and the long-term trend (since circa 1980) is unknown.

3.1.4.1.12 *Golden Plover (Pluvialis apricaria) [A140]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Golden Plover (*Pluvialis apricaria*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 5,664individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2000 - 2010) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.13 *Grey Plover (Pluvialis squatarola) [A141]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 558 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.14 *Lapwing (Vanellus vanellus) [A142]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,126 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1991 - 2008) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.15 *Knot (Calidris canutus) [A143]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Knot (*Calidris canutus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,015 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.16 *Dunlin (Calidris alpina) [A149]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographic population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,131 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.17 Black-tailed Godwit (Limosa limosa) [A156]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,035 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is increasing.

3.1.4.1.18 Bar-tailed Godwit (Limosa lapponica) [A157]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 460 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.19 Curlew (Numenius arquata) [A160]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,396 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.20 Redshank (Tringa totanus) [A162]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,645 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1991 - 2008) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.21 *Greenshank (Tringa nebularia) [A164]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Greenshank (*Tringa nebularia*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 61 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining -25.0% to -49.9% and the current conservation condition of this species is undetermined.

According to the Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is stable and the long-term trend (since circa 1980) is increasing.

3.1.4.1.22 *Black-headed Gull (Chroicocephalus ridibundus) [A179]*

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012). This species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining -25.0% to -49.9% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2019) the short-term population trend (for the period of 2002 - 2018) for this species is increasing and the long-term trend (for the period of 1985 - 2018) is increasing.

3.2 Field Survey Results

The following section provides the results of the Bird Surveys undertaken between October 2022 and March 2023, inclusive.

3.2.1 Species records within the proposed development sites

Table 3.6 lists of the target species of conservation interest recorded from within (or flying over) the proposed development site boundaries during the surveys carried out between October 2022 and March 2023. These records, along with records of target species of conservation interest recorded in adjacent lands outside the proposed development site boundaries, are presented in Figures 3.2 to Figures 3.10.

Non-target bird species recorded within the development sites are presented in Appendix 1.

Only one SCI species of the nearby River Shannon and River Fergus Estuaries SPA was recorded roosting or feeding within the proposed development site boundary at Bunlicky; black headed gulls were recorded roosting on the wastewater treatment plant site infrastructure during the majority of the surveys carried out. The number of Black-headed gulls recorded roosting ranged between 1 and 204, with an average of 67 individuals. This species was recorded roosting on the storm tank, aeration tanks and settlement tanks within the WwTP. Black-headed gulls appear to be habituated to the activity within the WwTP and were not disturbed by human activity and noise generated by the plant.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development sites at Bunlicky and Corcanree. This species was not recorded using the habitats within the proposed development site boundaries during any of the surveys undertaken.

Four red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Gilbert et, al., 2021) were recorded from within the proposed development sites at Bunlicky WwTP and at the Corcanree pumping station. Snipes were recorded on several occasions, flushed from wet grassland in the western section Bunlicky WwTP and once on one occasion from the grassland in the north-east of the Corcanree pumping station. A single redwing was recorded on one occasion roosting on vegetation in the western section of the site at Bunlicky WwTP. An individual grey wagtail was recorded on one occasion roosting in the north of the Bunlicky WwTP and a pair were recorded on a separate occasion again in the north before taking flight and flying north out of the site boundary. A Kestrel was recorded within the proposed development at Corcanree pumping station in flight along the northern section of the site and hunting over the wet grassland to the north and to the west of the site.

The remaining target species recorded flying over the sites included a Mallard flying over Bunlicky WwTP and a Herring Gull flying over Corcanree pumping station. Neither species landed in the habitats within the proposed development sites. Neither of these species are listed SCI species of the nearby River Shannon and River Fergus Estuaries SPA.

3.2.2 Species records within habitats adjacent to the proposed development sites

Table 3.7 lists the target species of conservation interest recorded in habitats adjacent to the proposed development sites during the surveys carried out between October 2022 and March 2023. Non-target bird species recorded within the development sites are presented in Appendix 1.

Six SCI species of the nearby River Shannon and River Fergus Estuaries SPA, three of which are red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Dunlin, Curlew, Redshank) were recorded roosting or feeding within habitats adjacent to the proposed development sites. Dunlin, Redshank and Teal were recorded utilising the mudflats and sandflats north of Bunlicky lake. Curlew was recorded in flight over Bunlicky Lake. High numbers of Cormorants were recorded roosting in nests on an island in Bunlicky Lake on almost every visit. The number of Cormorants recorded roosting ranged between 16 and 200, with an average of 98 individuals. Cormorants were also recorded in flight over grasslands between Bunlicky Lake and the River Shannon. Black-headed gulls were recorded utilising several adjacent habitats, such as, mudflats and sandflats, Bunlicky Lake, the Ballinacurra stream and commuting over wet grasslands.

One further red listed bird species on the BoCCI (Gilbert et, al., 2021) was recorded utilising habitats adjacent to the proposed development sites at Bunlicky WwTP and at the Corcanree pumping station. Snipes were recorded on several occasions, flushed from wet grassland between the River Shannon and Bunlicky Lake and from grassland north-east of Bunlicky WwTP site boundary.

The remaining target species recorded included Mute swans roosting in Bunlicky Lake, the Ballinacurra Stream and the mudflats and sandflats north of Bunlicky Lake. Greylag geese were recorded feeding in wet grasslands between the River Shannon and Bunlicky Lake and in wet grasslands south of Bunlicky Lake, they were also recorded roosting in Bunlicky Lake. Lastly, Mallards were recorded utilising several adjacent habitats, such as, mudflats and sandflats, Bunlicky Lake, and commuting over several grasslands adjacent to both Bunlicky WwTP and Corcanree pumping station.

Table 3-6 Target bird survey recorded from within or flying over the proposed development sites at Bunlicky WwTP and Corcanree Pump Station.

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
Black-headed gull (*Chroicocephalus ridibundus*)	99 Black-headed gulls roosting on the wastewater treatment plant infrastructure. 23 Black-headed gulls were recorded flying over the site.	Bunlicky WwTP	3.2	28/10/2022	SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Amber listed
	101 Black-headed gulls roosting on site infrastructure. 9 Black-headed gulls were recorded flying over the site.	Bunlicky WwTP	3.3	25/11/2022	
	141 Black-headed gulls roosting on site infrastructure. 15 Black-headed gulls were recorded flying over the site.	Bunlicky WwTP	3.4	12/12/2022	
	195 Black-headed gulls roosting on site infrastructure. 9 Black-headed gulls fly over site.	Bunlicky WwTP	3.5	17/01/2023	
	81 Black headed gulls roosting on site infrastructure. 28 Black-headed gulls fly over site.	Bunlicky WwTP	3.6	31/01/2023	
	67 Black headed gulls roosting on site infrastructure. 11 Black-headed gulls fly over site.	Bunlicky WwTP	3.7	14/02/2023	
	20 Black headed gulls roosting on site infrastructure. 5 Black-headed gulls fly over site.	Bunlicky WwTP	3.8	24/02/2023	
	24 Black headed gulls roosting on site infrastructure. 24 Black-headed gulls fly over site.	Bunlicky WwTP	3.9	07/03/2023	
	5 Black-headed gulls fly over site.	Bunlicky WwTP	3.10	24/03/2023	
	1 Black-headed gull in flight over site.	Corcanree	3.2	28/10/2022	
	2 Black-headed gulls in flight over site.	Corcanree	3.4	12/12/2022	
	2 Black-headed gulls in flight over site.	Corcanree	3.6	31/01/2023	
	1 Black-headed gull in flight over site.	Corcanree	3.9	07/03/2023	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
Cormorant (*Phalacrocorax carbo*)	2 Cormorants flew over the site, 1 circled the site before flying towards the River Shannon. 1 flew towards Bunlicky.	Corcanree Pump Station	3.2	28/10/2022	
	2 Cormorants flew over the site, 1 flew towards the River Shannon. 1 flew towards Bunlicky.	Corcanree Pump Station	3.6	31/01/2023	
	1 Cormorant flew over the site, towards the River Shannon.	Corcanree Pump Station	3.7	14/02/2023	
	4 Cormorants flew over the site, 1 flew towards the River Shannon. 3 flew towards Bunlicky.	Corcanree Pump Station	3.8	24/02/2023	
Mute Swan (*Cygnus olor*)	1 Mute swan flew over the site, towards the River Shannon.	Corcanree Pump Station	3.8	24/02/2023	BoCCI Amber listed
Kestrel (*Falco tinnunculus*)	1 Kestrel over the site, before briefly hunting in the wet grasslands to the south and west.	Corcanree Pump Station	3.10	24/03/2023	BoCCI Red listed
Snipe (*Gallinago gallinago*)	1 Snipe flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.2	28/10/2022	
	1 Snipe flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.3	25/11/2022	
	2 Snipes flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.4	12/12/2022	
	2 Snipes flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.6	31/01/2023	
	5 Snipes flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.7	14/02/2023	
	3 Snipes flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.8	24/02/2023	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	2 Snipes flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.9	07/03/2023	
	2 Snipes flushed from wet grassland in western section of the site.	Corcanree Pump Station	3.9	07/03/2023	
	2 Snipes flushed from wet grassland in western section of the site.	Bunlicky WwTP	3.10	24/03/2023	
Redwing (*Turdus iliacus*)	1 Redwing roosting in western section of the site.	Bunlicky WwTP	3.3	28/10/2022	BoCCI Red listed
	1 Redwing roosting in western section of the site.	Bunlicky WwTP	3.3	25/11/2022	
Grey Wagtail (*Motacilla cinerea*)	2 Grey wagtails roosting in northern section of the site.	Bunlicky WwTP	3.8	24/02/2023	
	1 Grey wagtail roosting in western section of the site.	Bunlicky WwTP	3.4	12/12/2023	
Common Gull (*Larus canus*)	4 Common gulls flying over the site.	Bunlicky WwTP	3.3	28/10/2022	BoCCI Amber listed
	2 Common gulls flying over the site.	Corcanree Pump Station	3.8	24/02/2023	
Herring Gull (*Larus argentatus*)	1 Common gull flying over the site.	Corcanree Pump Station	3.8	24/02/2023	

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Table 3-7 Target bird survey recorded from within adjacent habitats of the Bunlicky WwTP and Corcanree Pump Station.

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
Little egret (*Egretta garzetta*)	1 Little egret roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.8	24/02/2023	Annex I listed species of the EU Birds Directive
	3 Little egret roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.10	24/03/2023	
Dunlin (*Calidris alpina*)	10 Dunlin roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.9	07/03/2023	SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Red listed
Curlew (*Numenius arquata*)	25 Curlew flew over Bunlicky lake in a westerly direction	Bunlicky Lake	3.6	31/01/2023	
Redshank (*Tringa totanus*)	3 Redshank flew in an easterly direction from in the mudflats/sandflats north of Bunlicky Lake up the River Shannon	Mudflats/Sandflats north of Bunlicky Lake	3.4	12/12/2022	
	17 Redshank roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.5	17/01/2023	
	10 Redshank roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.10	07/03/2023	
	15 Redshank roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.10	24/03/2023	
Black-headed gull (*Chroicocephalus ridibundus*)	6 Black-headed gulls were recorded flying over the site.	Wet grassland west of the Corcanree Pump Station	3.2	28/10/2022	SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Amber listed
	6 Black-headed gulls roosting in the Ballinacurra Creek Stream.	Ballinacurra Creek Stream.	3.2	28/10/2022	
	9 Black-headed gulls were recorded flying over wet grassland adjacent to Bunlicky WwTP.	Wet grassland east of Bunlicky WwTP	3.4	12/12/2022	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	5 Black-headed gulls roosting on the water in Bunlicky Lake.	Bunlicky Lake	3.5	17/01/2023	
	5 Black-headed gulls flew over wet grassland south of Bunlicky Lake.	Wet grassland south of Bunlicky lake	3.8	24/02/2023	
	15 Black-headed gulls roosting in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.10	24/03/2023	
Cormorant (*Phalacrocorax carbo*)	12 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake	Grassland between the River Shannon and Bunlicky Lake	3.2	28/10/2022	
	10 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.3	25/11/2023	
	16 Cormorants rooting in the eastern section of Bunlicky Lake.	Bunlicky Lake	3.3	25/11/2023	
	5 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.4	12/12/2022	
	3 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.5	17/01/2023	
	113 Cormorants rooting on the island vegetation in Bunlicky Lake. 2 Cormorants roosting on the water in Bunlicky Lake.	Bunlicky Lake	3.5	17/01/2023	
	8 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.6	31/01/2023	
	82 Cormorants rooting on the island vegetation in Bunlicky Lake.	Bunlicky Lake	3.6	31/01/2023	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	2 Cormorants flew over wet grassland south of Bunlicky Lake between the Bunlicky WwTP site boundary and the lake in a southernly direction.	Wet grassland south of Bunlicky lake	3.6	31/01/2023	
	34 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.7	14/02/2023	
	3 Cormorants flying in Bunlicky Lake.	Bunlicky Lake	3.7	14/02/2023	
	81 Cormorants rooting on the island vegetation in Bunlicky Lake.	Bunlicky Lake	3.7	14/02/2023	
	54 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.8	24/02/2023	
	173 Cormorants rooting on the island vegetation in Bunlicky Lake.	Bunlicky Lake	3.8	24/02/2023	
	38 Cormorants flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.7	07/03/2023	
	173 Cormorants rooting on the island vegetation in Bunlicky Lake. 27 Cormorants roosting on the water in Bunlicky Lake	Bunlicky Lake	3.9	07/03/2023	
	1 Cormorant flew north over the Ballinacurra Steam towards the River Shannon	Ballinacurra Steam	3.10	24/03/2023	
	14 Cormorant flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.10	24/03/2023	

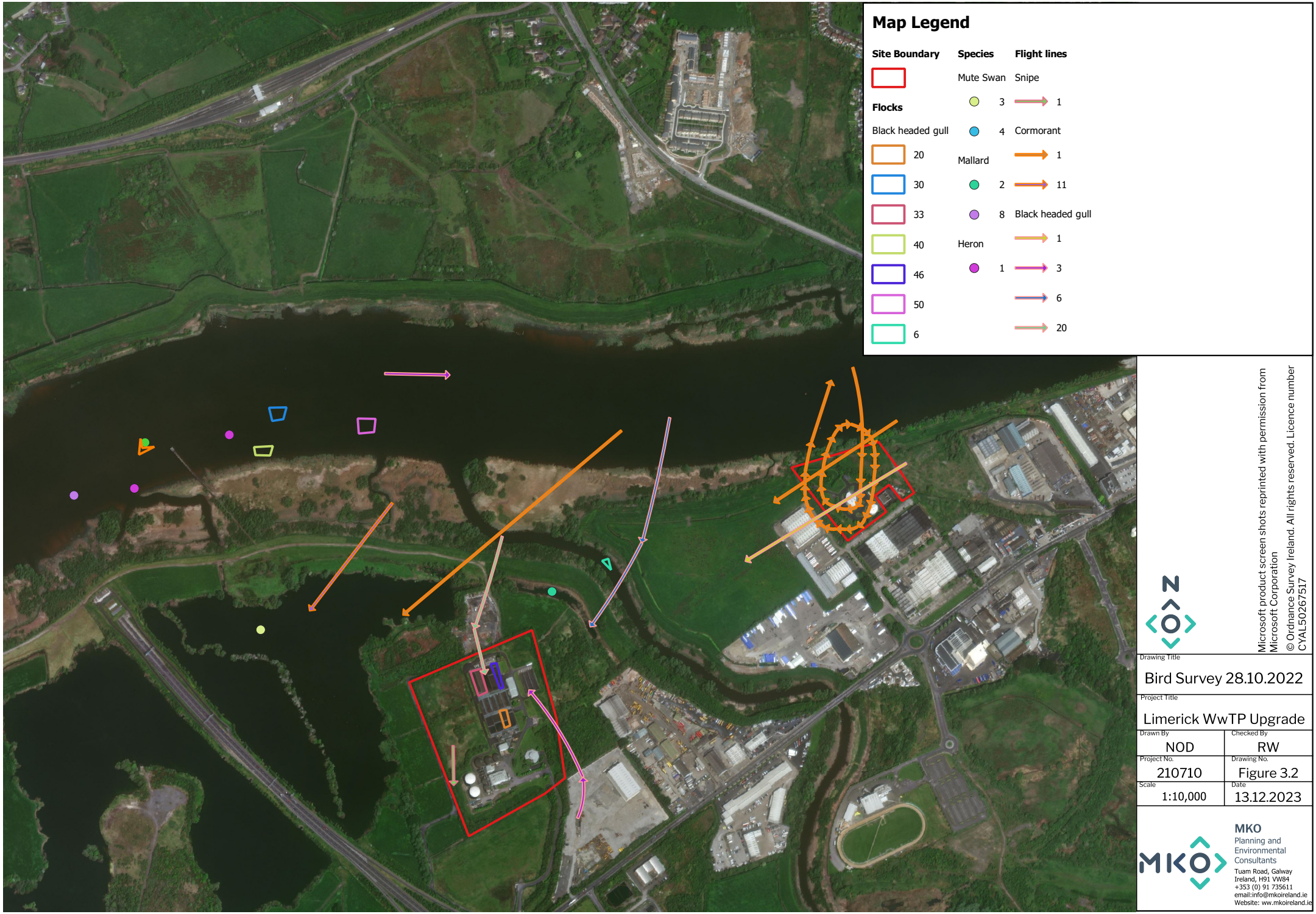
Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	121 Cormorants rooting on the island vegetation in Bunlicky Lake	Bunlicky Lake	3.10	24/03/2023	
Teal (*Anas crecca*)	25 Teal flew from in the mudflats/sandflats north of Bunlicky Lake north towards the River Shannon	Mudflats/Sandflats north of Bunlicky Lake	3.8	24/02/2023	
	30 Teal roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.9	07/03/2023	
Mute Swan (*Cygnus olor*)	3 Mute swans roosting in Bunlicky Lake	Bunlicky Lake	3.2	28/10/2022	BoCCI Amber listed
	2 Mute swans flew in a southerly direction from in the mudflats/sandflats north of Bunlicky Lake towards Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.4	12/12/2022	
	6 Mute swans roosting in Bunlicky Lake	Bunlicky Lake	3.7	14/02/2023	
	14 Mute swans roosting in Bunlicky Lake	Bunlicky Lake	3.8	24/02/2023	
	6 Mute swans roosting in Bunlicky Lake	Bunlicky Lake	3.9	07/03/2023	
	1 Mute swan roosting in the Ballinacurra Creek Stream	Ballinacurra Creek Stream.	3.10	24/03/2023	
	1 Mute swan roosting in Bunlicky Lake	Bunlicky Lake	3.10	24/03/2023	
Snipe (*Gallinago gallinago*)	1 Snipe flushed from grassland between the River Shannon and Bunlicky Lake	Grassland between the River Shannon and Bunlicky Lake	3.4	12/12/2022	BoCCI Red listed
	4 Snipe flushed from grassland north-east of the Bunlicky WwTP site boundary.	Grassland north-east of Bunlicky WwTP site boundary.	3.5	17/01/2023	

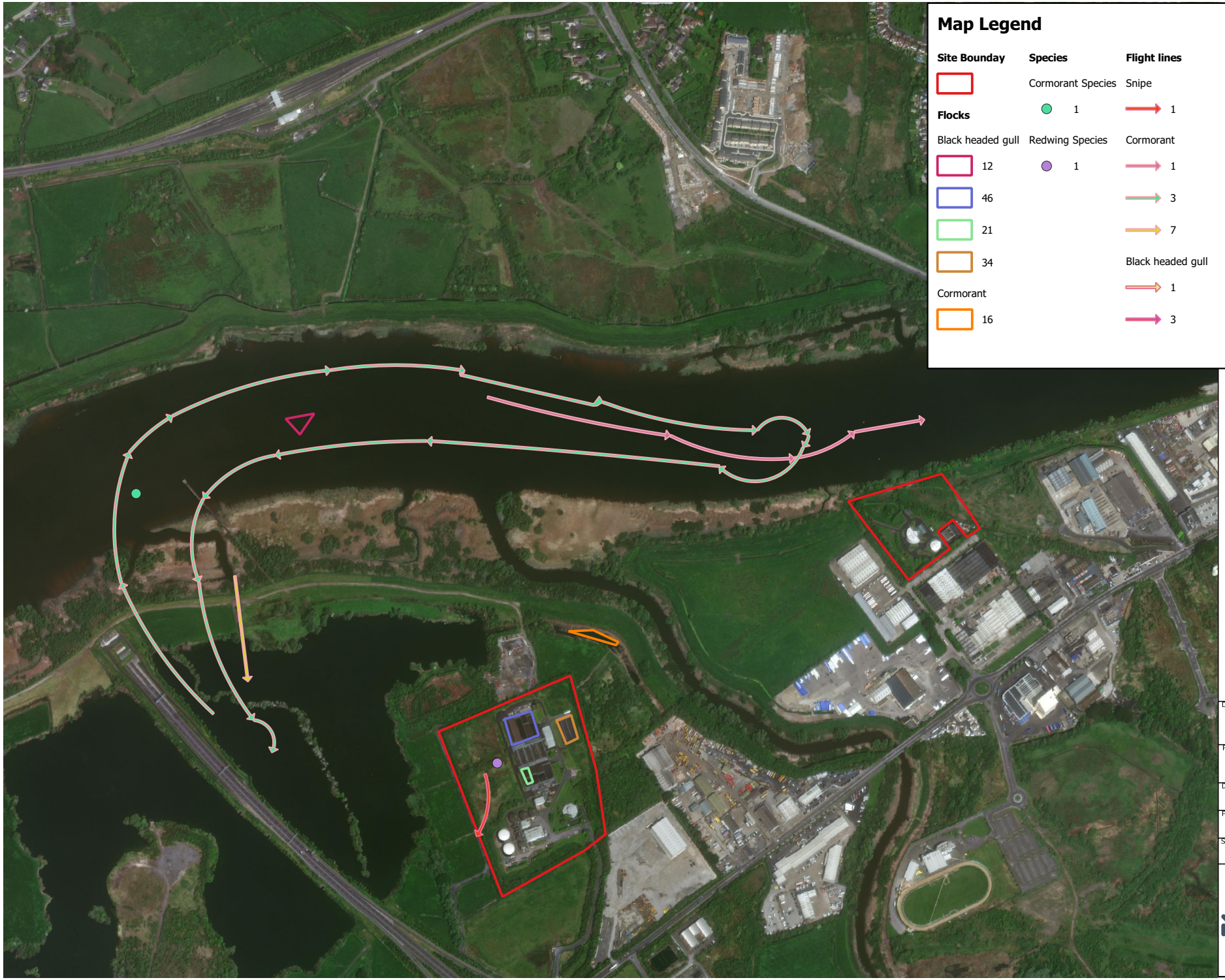
Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	13 Snipe flushed from grassland between the River Shannon and Bunlicky Lake	Grassland between the River Shannon and Bunlicky Lake	3.6	31/01/2023	
	8 Snipe flushed from grassland between the River Shannon and Bunlicky Lake	Grassland between the River Shannon and Bunlicky Lake	3.7	14/02/2023	
	1 Snipe flushed from grassland between the River Shannon and Bunlicky Lake	Grassland between the River Shannon and Bunlicky Lake	3.8	24/02/2023	
	2 Snipe flushed from grassland between the River Shannon and Bunlicky Lake	Grassland between the River Shannon and Bunlicky Lake	3.9	07/03/2023	
	1 Snipe flushed from grassland between the River Shannon and Corcanree Pumping Station.	Grassland between the River Shannon and Corcanree Pumping Station.	3.10	24/03/2023	
Greylag Goose (*Anser answer*)	6 Greylag geese roosting in wet grassland south of Bunlicky Lake between the Bunlicky WwTP site boundary and the lake.	Wet grassland south of Bunlicky lake	3.4	12/12/2022	BoCCI Amber listed
	8 Greylag geese roosting in grassland between the River Shannon and Bunlicky Lake. 3 Greylag geese flew from grassland between the River Shannon and Bunlicky Lake towards the River Shannon	Grassland between the River Shannon and Bunlicky Lake	3.5	17/01/2023	
	10 Greylag geese roosting in wet grassland south of Bunlicky Lake between the Bunlicky WwTP site boundary and the lake.	Wet grassland south of Bunlicky lake	3.5	17/01/2023	
	6 Greylag geese roosting in wet grassland south of Bunlicky Lake between the Bunlicky WwTP site boundary and the lake.	Wet grassland south of Bunlicky lake	3.6	31/01/2023	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	10 Greylag geese roosting in grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.8	24/02/2023	
	6 Greylag geese roosting in wet grassland south of Bunlicky Lake between the Bunlicky WwTP site boundary and the lake.	Wet grassland south of Bunlicky lake	3.8	24/02/2023	
	1 Greylag flew from Bunlicky Lake north towards the River Shannon	Bunlicky Lake	3.9	07/03/2023	
	2 Greylag geese roosting in wet grassland south of Bunlicky Lake between the Bunlicky WwTP site boundary and the lake.	Wet grassland south of Bunlicky lake	3.9	07/03/2023	
	8 Greylag geese roosting in grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.10	24/03/2023	
Mallard (*Anas platyrhynchos*)	2 Mallards roosting in the eastern section of Bunlicky Lake.	Bunlicky Lake	3.2	28/10/2022	
	2 Mallards flew over the grassland between the River Shannon and Bunlicky Lake.	Grassland between the River Shannon and Bunlicky Lake	3.4	12/12/2022	
	5 Mallards flew over the grassland east of Corcanree, in a southernly direction.	Grassland east of Corcanree Pump Station	3.7	14/02/2023	
	2 Mallards rooting in Bunlicky Lake.	Bunlicky Lake	3.7	14/02/2023	
	5 Mallards rooting in Bunlicky Lake.	Bunlicky Lake	3.8	24/02/2023	
	3 Mallards flew in a northernly direction over the grassland west of Bunlicky between the WwTP and Bunlicky Lake	Grassland west of Bunlicky between the WwTP and Bunlicky Lake	3.8	24/02/2023	

Species	Number of Individuals recorded	Location	Figure Number	Date of survey	Conservation Status
	5 Mallards roosting/feeding in the mudflats/sandflats north of Bunlicky Lake	Mudflats/Sandflats north of Bunlicky Lake	3.9	07/03/2023	

BoCCI – Birds of Conservation Concern in Ireland 2020 - 2026


Map Legend
Site Boundary
Flocks
Black headed gull
20
30
33
40
46
50
6
Species
Mute Swan
3
4
Mallard
2
8
Heron
1
Flight lines
Snipe
1
Cormorant
1
11
Black headed gull
1
3
6
20
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Drawing Title
Bird Survey 28.10.2022
Project Title
Limerick WwTP Upgrade
Drawn By
NOD
Checked By
RW
Project No.
210710
Drawing No.
Figure 3.2
Scale
1:10,000
Date
13.12.2023
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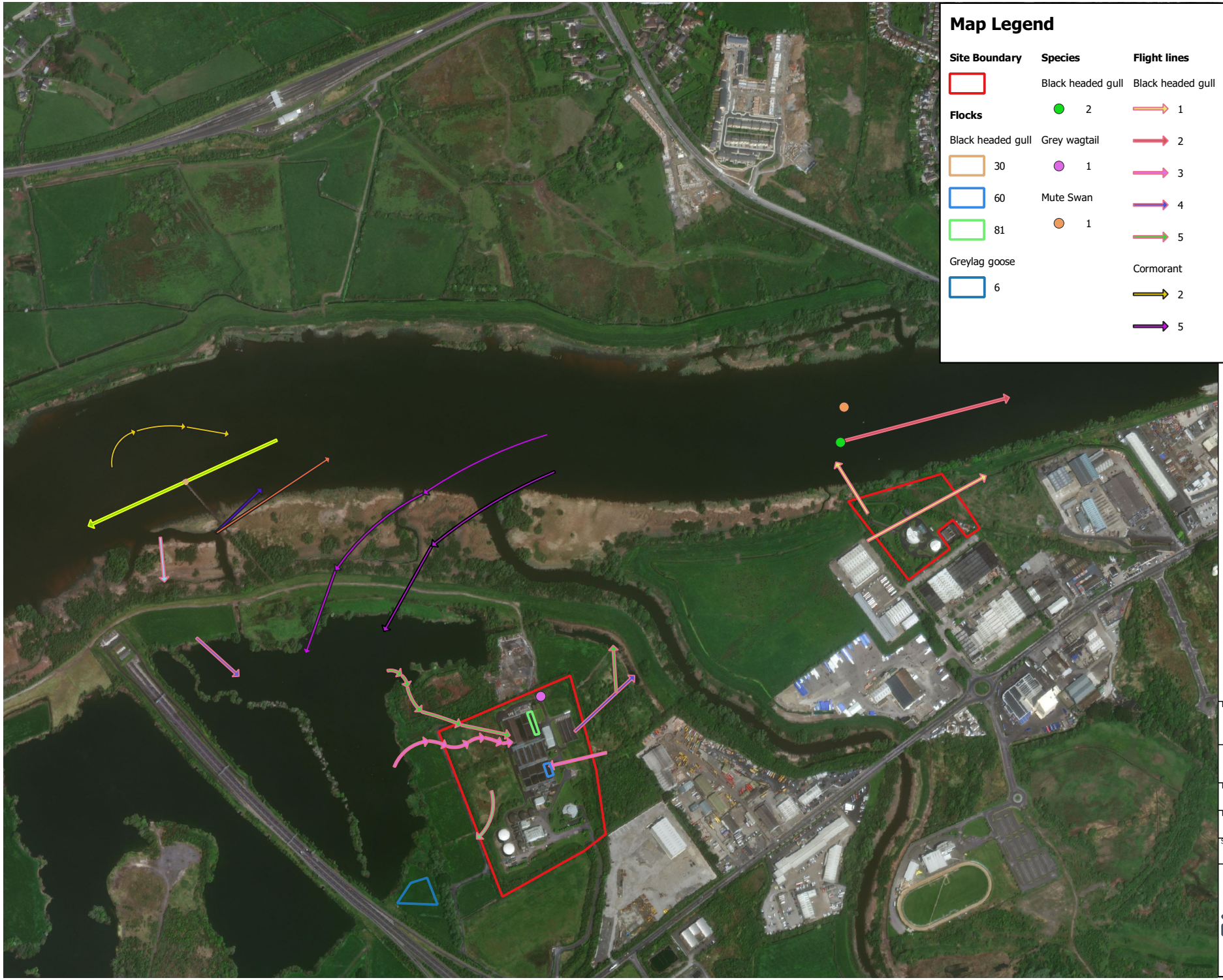
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Drawing Title
Bird Survey 25.11.2022

Project Title
Limerick WwTP Upgrade

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NOD	RW
Project No.	Drawing No.
210710	Figure 3.3
Scale	Date
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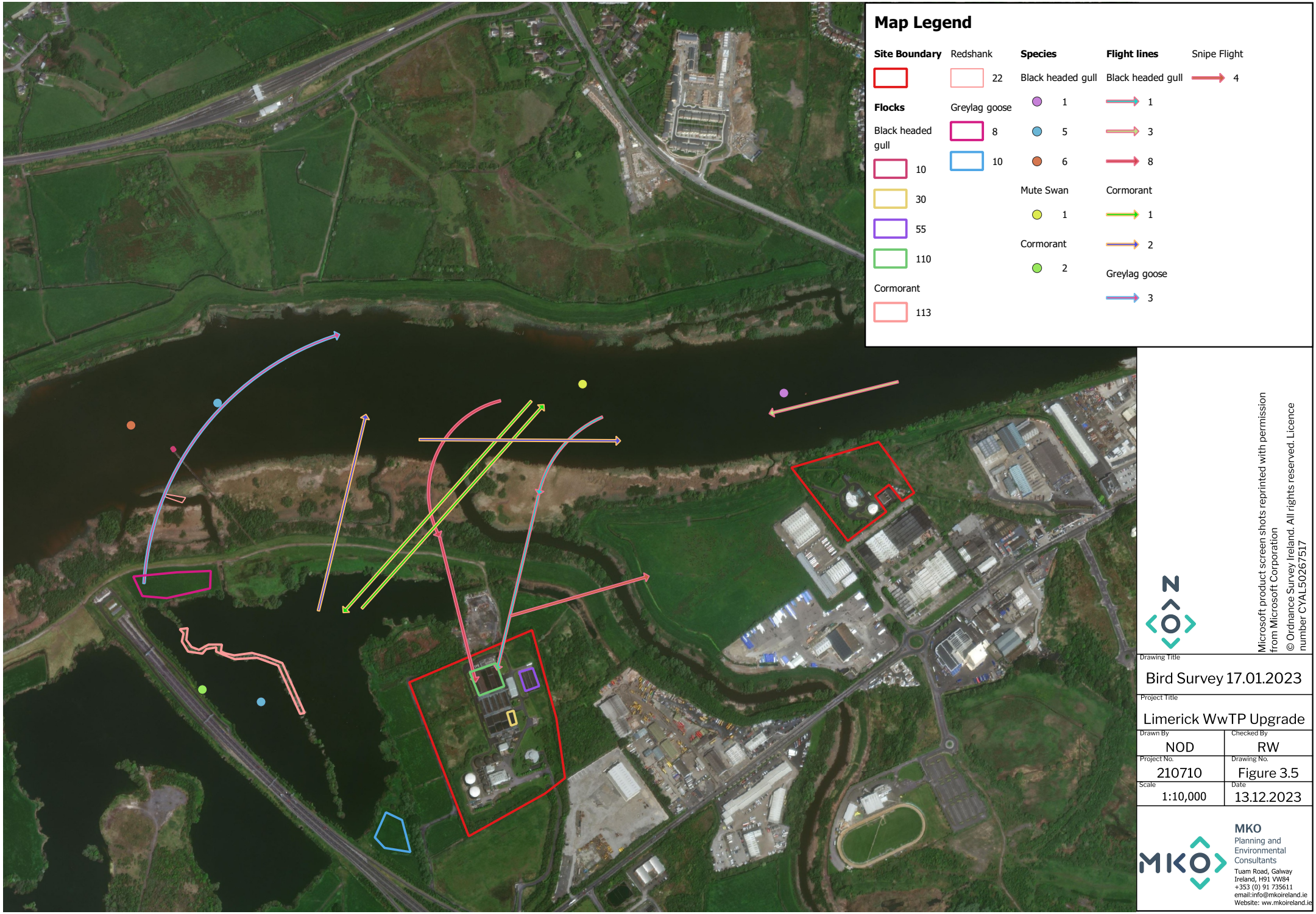
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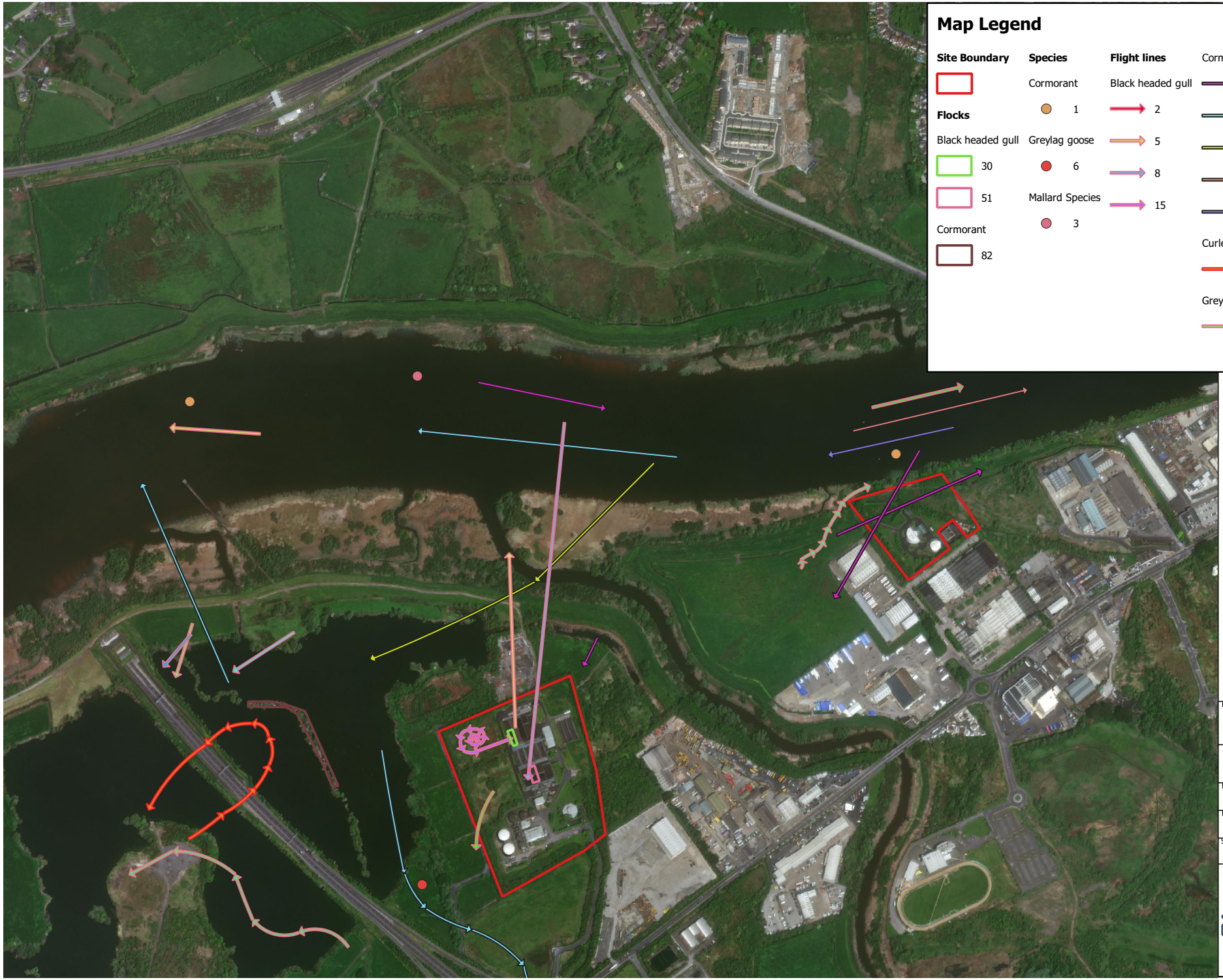
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Map Legend
Site Boundary
Flocks
Black headed gull
10
30
55
110
Cormorant
113
Redshank
22
Greylag goose
8
10
Species
Black headed gull
1
5
6
Mute Swan
1
Cormorant
2
Flight lines
Black headed gull
1
3
8
Cormorant
1
2
Greylag goose
3
Snipe Flight
4
N
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Drawing Title
Bird Survey 17.01.2023
Project Title
Limerick WwTP Upgrade
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Checked By
RW
Project No.
210710
Drawing No.
Figure 3.5
Scale
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Date
13.12.2023
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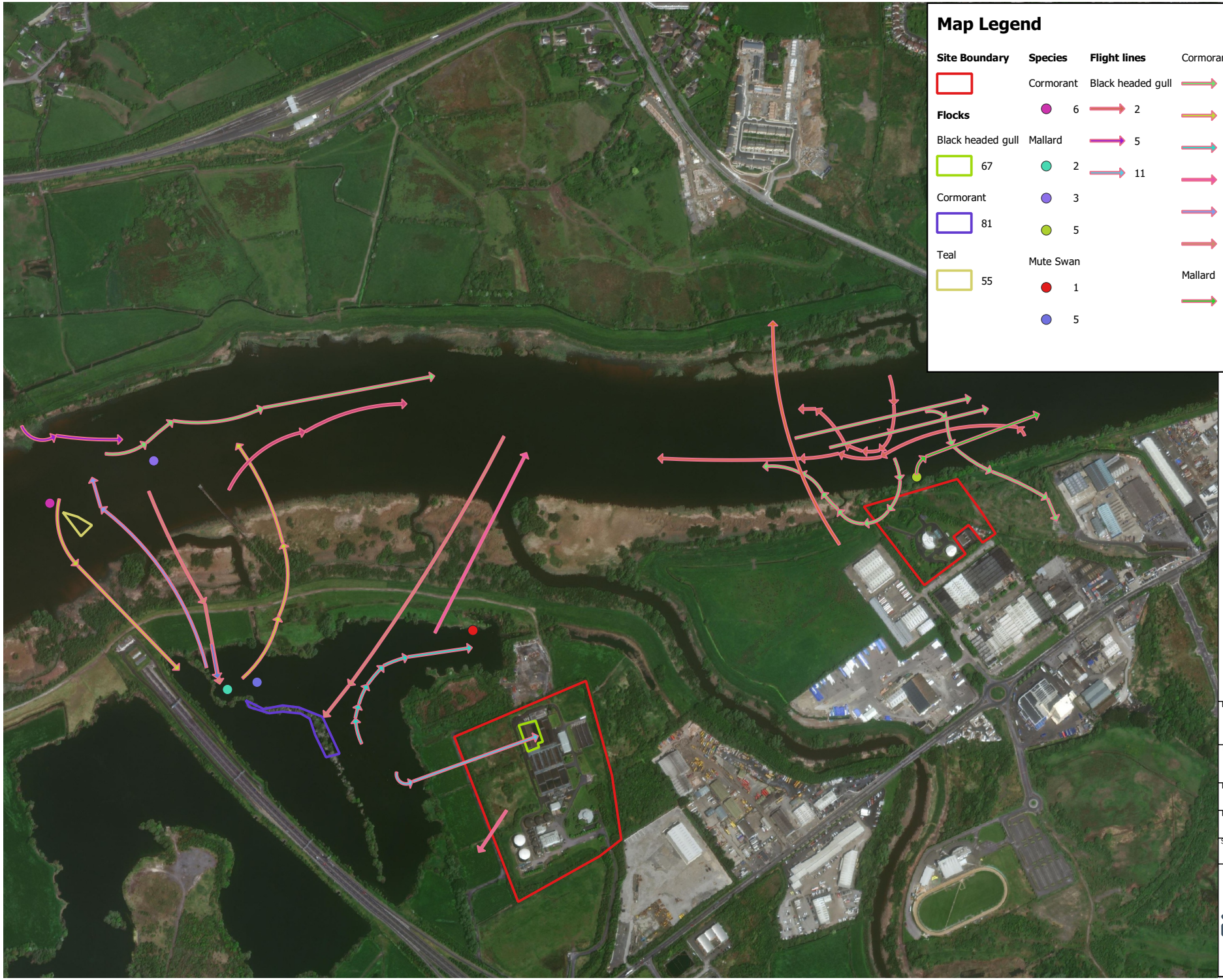
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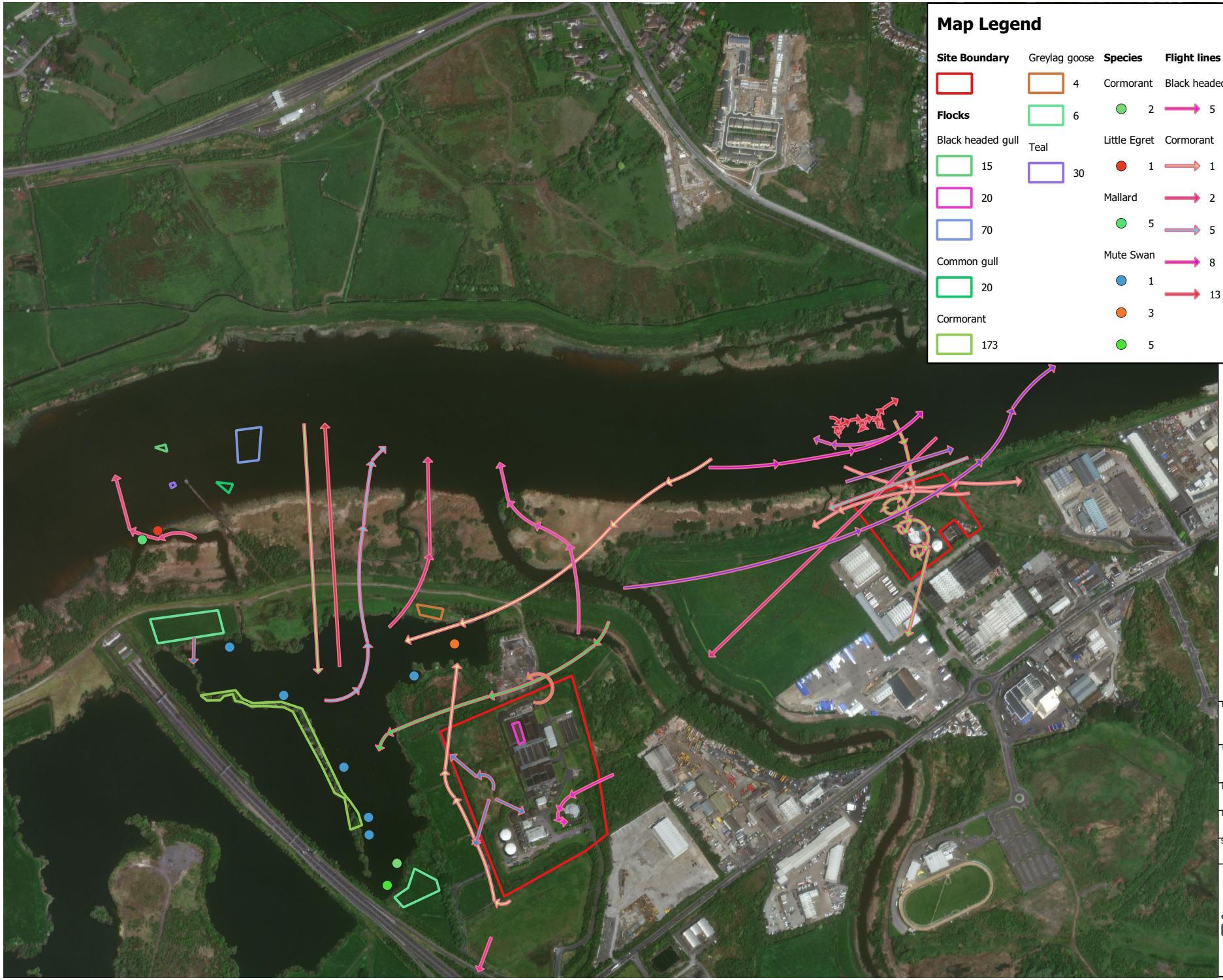
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Project Title
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Map Legend
Site Boundary
Flocks
Black headed gull
67
Cormorant
81
Teal
55
Species
Cormorant
6
Mallard
2
3
5
Mute Swan
1
5
Flight lines
Black headed gull
2
5
11
Cormorant
1
2
3
5
7
9
Mallard
5
Snipe
5
8
Sparrow hawk
1
Teal
15
N
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Drawing Title
Bird Survey 14.02.2023
Project Title
Limerick WwTP Upgrade
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Drawing No.
Figure 3.7
Scale
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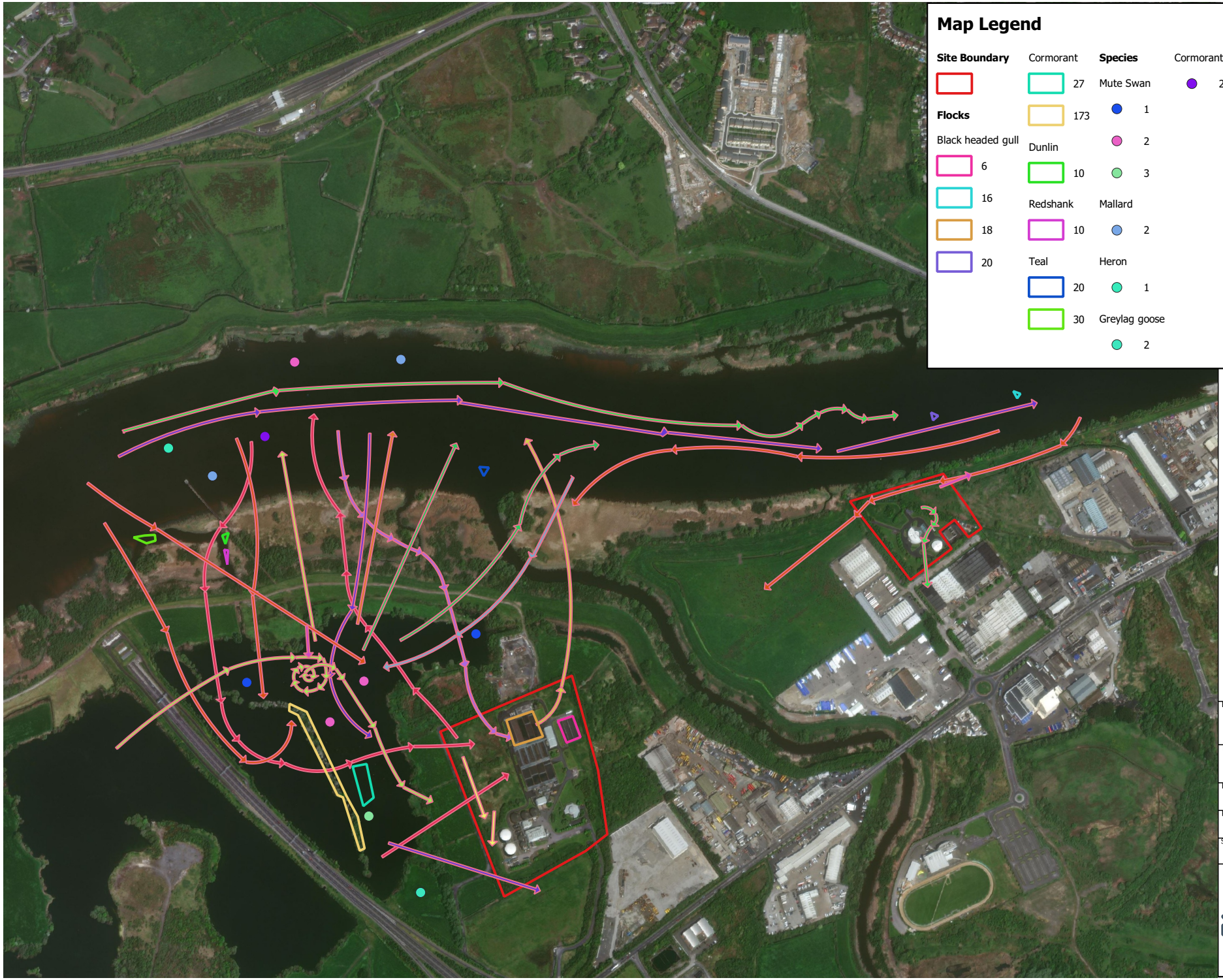
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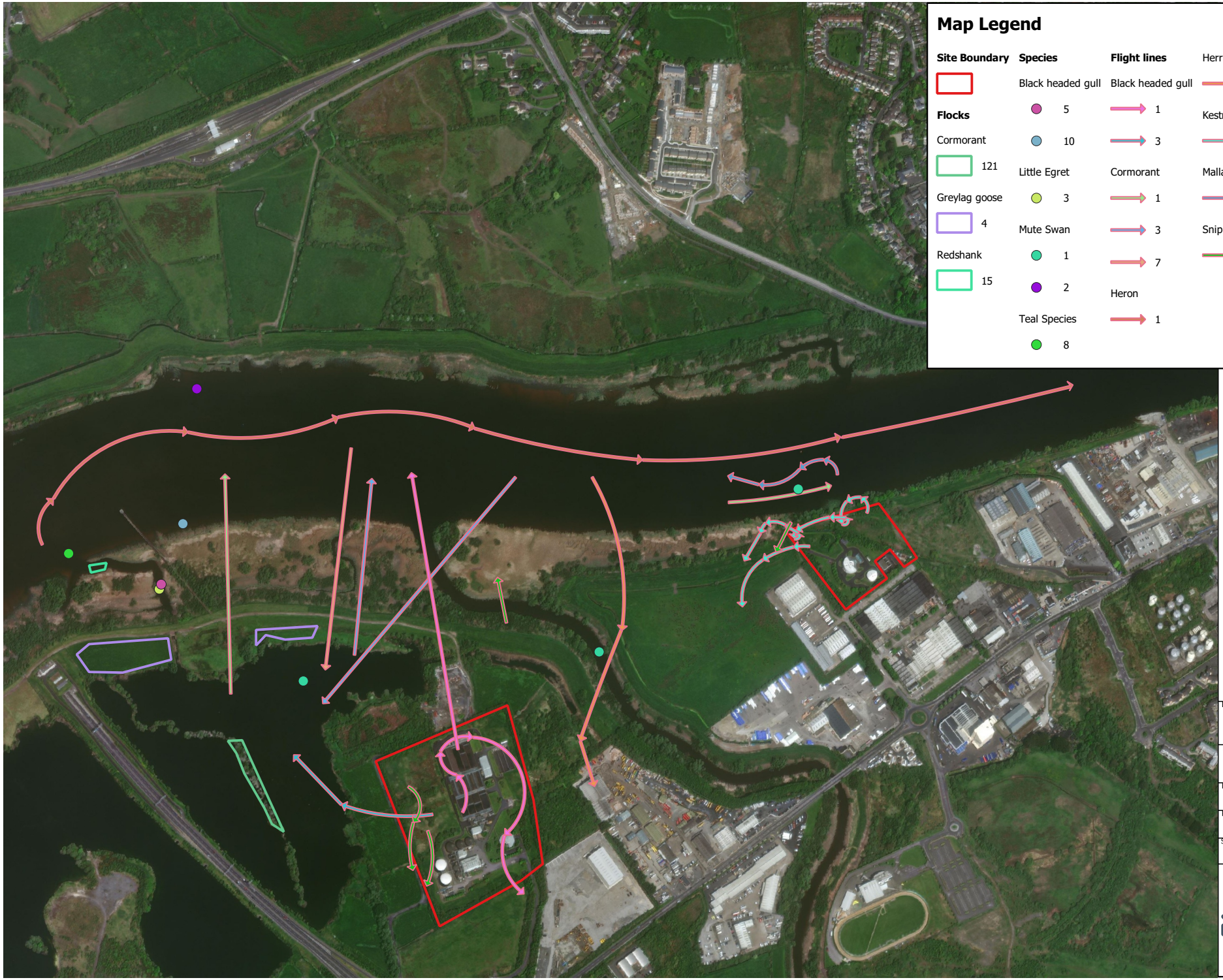
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Project Title
Limerick WwTP Upgrade

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NOD	RW
Project No.	Drawing No.
210710	Figure 3.8
Scale	Date
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Map Legend
Site Boundary
Flocks
Black headed gull
6
16
18
20
Cormorant
27
173
Dunlin
10
Redshank
10
Teal
20
30
Species
Mute Swan
1
2
3
Mallard
2
Heron
1
Greylag goose
2
Cormorant
2
Flight lines
Black headed gull
1
3
5
10
Cormorant
1
2
4
8
15
Greylag goose
1
Kestrel
1
Snipe
1
2
N
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Drawing Title
Bird Survey 07.03.2023
Project Title
Limerick WwTP Upgrade
Drawn By
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Checked By
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Project No.
210710
Drawing No.
Figure 3.9
Scale
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Map Legend
Site Boundary
Flocks
Cormorant
121
Greylag goose
4
Redshank
15
Species
Black headed gull
5
10
Little Egret
3
Mute Swan
1
2
Teal Species
8
Flight lines
Black headed gull
1
3
Cormorant
1
3
7
Heron
1
Herring gull
2
Kestrel
1
Mallard
3
Snipe
1
N
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Drawing Title
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4. SUMMARY OF FIELD SURVEY AND DISCUSSION

The surveys undertaken over the period winter period October 2022 to March 2023 provide an understanding of the usage of the proposed development sites and adjacent habitats by wintering bird species. A total of eight target bird species were recorded within or flying over the proposed development site boundaries, while a total of ten target bird species were recorded within or flying over habitats adjacent to the proposed development sites during the winter site visits.

The majority of the birds recorded within the development site boundaries during the surveys were an assemblage of common birds that are typical of amenity grassland, agricultural grassland and urban habitats found within the wider area. The majority of birds recorded within habitats adjacent to the sites were wetland and waterbirds.

No Annex I SCI listed species of the River Shannon and River Fergus Estuaries SPA, were recorded using the habitats within the site boundaries. One Annex I species, the Little egret which is not a SCI listed species of the River Shannon and River Fergus Estuaries SPA was recorded in the wider area in mudflat and sandflat habitats.

The number of SCI listed species, Black-headed gulls recorded roosting within the Bunlicky WwTP site boundary ranged between 1 and 204, with an average of 67 individuals. The population estimate for this species in Ireland is approximately 48,821 (Lewis et al., 2019), international and national thresholds for this species are not currently available, as demonstrated in Table 3.3. However, when comparing the population estimate to the species count recorded roosting on the storm tank, aeration tanks and settlement tanks within the WwTP, the habitats within the site boundary does not appear to support an important bird assemblage of Black-headed gulls. These gulls appear to be habituated to the activity within the WwTP and were not disturbed by human activity and noise generated by the plant. Black-headed gulls were also recorded utilising several habitats adjacent to the site boundaries such as, mudflats and sandflats, the Ballinacurra stream and Bunlicky Lake.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development sites at Bunlicky and Corcanree. This species was not recorded using the habitats within the proposed development site boundaries during any of the surveys undertaken. However, high numbers of Cormorants were recorded roosting in nests on an island in Bunlicky Lake on almost every visit. The number of Cormorants recorded roosting ranged between 16 and 200, with an average of 98 individuals. As shown in Table 3.3 the threshold for wintering cormorant is 110 birds (Lewis et al., 2019). Therefore, this breeding colony in Bunlicky Lake is of high importance because roosting numbers during winter exceed the threshold for a population which is 1% of the national total (following NRA, 2009). Cormorants were also recorded in flight over grasslands between Bunlicky Lake and the River Shannon. No other SCI species of the River Shannon and River Fergus Estuaries SPA was recorded within or flying over the site boundaries during the surveys.

Six SCI species of the nearby River Shannon and River Fergus Estuaries SPA, three of which are red listed bird species on the Bird of Conservation Concern in Ireland (BoCCI) (Dunlin, Curlew, Redshank) were recorded roosting or feeding within habitats adjacent to the proposed development sites. Dunlin, Redshank and Teal were recorded utilising the mudflats and sandflats north of Bunlicky lake while Curlew was recorded in flight over Bunlicky Lake.

Four red listed bird species on the BoCCI (Gilbert et, al., 2021) were recorded from within the proposed development site at Bunlicky WwTP and at the Corcanree pumping station. Snipes were recorded on several occasions, flushed from wet grassland in the western section Bunlicky WwTP and once on one occasion from the grassland in the north-east of the Corcanree pumping station. Snipes

were also recorded utilising adjacent habitats, flushed from wet grassland between the River Shannon and Bunlicky Lake and from grassland north-east of Bunlicky WwTP site boundary. A single redwing was recorded on one occasion roosting on vegetation in the western section of the site at Bunlicky WwTP. An individual grey wagtail was recorded on one occasion roosting in the north of the Bunlicky WwTP and a pair were recorded on a separate occasion again in the north before taking flight and flying north, out of the site boundary. A Kestrel was recorded within the proposed development at Corcanree pumping station in flight along the northern section of the site and hunting over the wet grassland to the north and to the west of the site.

The remaining target species recorded flying over the sites included, a Mallard flying over Bunlicky WwTP and a Herring Gull flying over Corcanree pumping station. Neither species landed in the habitats within the proposed development sites. Neither of these species are listed SCI species of the nearby River Shannon and River Fergus Estuaries SPA.

The remaining target species recorded within habitats adjacent to the site boundaries included Mute swans roosting in Bunlicky Lake, the Ballinacurra Stream and the mudflats and sandflats north of Bunlicky Lake. Greylag geese were recorded feeding in wet grasslands between the River Shannon and Bunlicky Lake and in wet grasslands south of Bunlicky Lake, they were also recorded roosting in Bunlicky Lake. Lastly, Mallards were recorded utilising several adjacent habitats, such as, mudflats and sandflats, Bunlicky Lake, and commuting over several grasslands adjacent to both Bunlicky WwTP and Corcanree pumping station.

5. CONCLUSION

Based on the wintering bird assemblages recorded over the nine surveys carried out between October 2022 and March 2023, it can be concluded that neither Bunlicky WwTP or Corcanree Pumping Station support important assemblages of wintering wildfowl, waders, or SCI species for which the River Shannon and River Fergus estuaries SPA has been designated due to the low population counts within the site boundaries when compared with the national population count. These flocks of the SCI species Black-headed gulls were recorded roosting on site infrastructure at Bunlicky WwTP. There is no potential for loss of supporting habitat for the SCI species of River Shannon and River Fergus Estuaries SPA.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development sites at Bunlicky and Corcanree. This species was not recorded using the habitats within the proposed development site boundaries during any of the surveys undertaken. However, there is a breeding colony of Cormorant situated in Bunlicky Lake, adjacent to the Bunlicky WwTP which is a colony of high importance. Cormorants were also recorded in flight over grasslands between Bunlicky Lake and the River Shannon. No other SCI species of the River Shannon and River Fergus Estuaries SPA was recorded within or flying over the site boundaries during the surveys.

Habitats within the site primarily consist of amenity grassland, wet grassland, buildings and artificial surfaces, hedges, and treelines. Species listed as SCIs for the River Shannon and River Fergus Estuaries SPA are unlikely to depend on these habitats within the proposed development site.

According to the site-specific conservation objectives document the SCI species of the River Shannon and River Fergus Estuaries SPA, are primarily associated with intertidal sheltered and shallow subtidal, sand and mud flats habitats. These habitats are located within the vicinity of the project area however, they do not occur within the development boundaries.

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APPENDIX 1

NON- TARGET BIRD SPECIES

Species	Scientific name	BoCCI Status	Date recorded
Magpie	*Pica pica*	Green	28/10/2022 25/11/2022 12/12/2022 14/02/2023 24/02/2023 24/03/2023
Robin	*Erithacus rubecula*	Green	28/10/2022 25/11/2022 12/12/2022 17/01/2023 12/12/2022 31/01/2023 14/02/2023 24/02/2023 07/03/2023
Wood pigeon	*Columba palumbus*	Green	28/10/2022 25/11/2022 31/01/2023 24/03/2023
Wren	*Troglodytes troglodytes*	Green	28/10/2022 25/11/2022 12/12/2022 17/01/2023 31/01/2023 14/02/2023 24/02/2023 07/03/2023 24/03/2023
Hooded crow	*Corvus cornix*	Green	28/10/2022 25/11/2022 12/12/2022 17/01/2023 31/01/2023 14/02/2023 24/02/2023 07/03/2023 24/03/2023
Blackbird	*Turdus merula*	Green	28/10/2022 25/11/2022 31/01/2023 14/02/2023 24/02/2023 07/03/2023 24/03/2023
Bullfinch	*Pyrrhula pyrrhula*	Green	28/10/2022 31/01/2023 24/02/2023 24/03/2023
Starling	*Sturnus vulgaris*	Amber (breeding population)	12/12/2022 24/02/2023 07/03/2023 24/03/2023

Species	Scientific name	BoCCI Status	Date recorded
Pied wagtail	*Motacilla alba yarrellii*	Green	28/10/2022 14/02/2023 07/03/2023 24/03/2023
Mistle thrush	*Turdus viscivorus*	Green	28/10/2022 12/12/2022 31/01/2023
Jackdaw	*Corvus monedula*	Green	28/10/2022 17/01/2023 24/03/2023
Chaffinch	*Fringilla coelebs*	Green	28/10/2023 25/11/2023 14/02/2023 24/02/2023 24/03/2023
Rook	*Corvus frugilegus*	Green	28/10/2022 25/11/2022 31/01/2023 24/02/2023 07/03/2023 24/03/2023
Blue tit	*Cyanistes caeruleus*	Green	25/12/2022 25/11/2022 12/12/2022 17/01/2023 14/02/2023
Goldfinch	*Carduelis carduelis*	Green	28/10/2022 25/11/2022 31/01/2023 24/02/2023 24/03/2023
Long tailed tit	*Aegithalus caudatus*	Green	25/11/2022 12/12/2022 17/01/2023 31/01/2023 24/02/2023 07/03/2023 24/03/2023
Goldcrest	*Regulus regulus*	Green	28/10/2023
Siskin	*Carduelis spinus*	Green	31/01/2023

Winter Bird Survey Report

Bunlicky Wastewater Treatment Plant Upgrade Project, Co. Limerick, Co. Limerick

DOCUMENT DETAILS

Client:	**JB Barry Ltd.**
Project Title:	**Bunlicky Wastewater Treatment Plant Upgrade Project, Co. Limerick, Co. Limerick**
Project Number:	**200826**
Document Title:	**Winter Bird Survey Report**
Document File Name:	**BSR – F - 2021.08.12- 200826**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Final	06/08/2021	JOS	JOS

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1. INTRODUCTION

MKO has been appointed by JB Barry Ltd. to undertake winter bird surveys for the period October 2020 to March 2021 inclusive, for the proposed upgrade works at Limerick Wastewater Treatment Plant, Bunlicky, Dock Road, Co. Limerick and at Corcanree Pumping Station, Corcanree Business Park, Dock Road, Co. Limerick.

The proposed WWTP Upgrade works are located within the Severn Trent Response Wastewater Treatment Plant, Dock Road, Bunlicky, Co. Limerick. Bunlicky wastewater treatment plant is located approximately 2.5km west of Limerick City Centre (Grid reference: R 54623 55688). The site is accessed via a local road off the Dock Road (R510) roundabout. Bunlicky wastewater treatment plant is located adjacent to the River Shannon and River Fergus Estuaries SPA [004077] along its northern boundary.

The proposed pumping station upgrade works are located within a field adjacent to the Corcanree Pump Station, Corcanree Business Park, Dock Road, Limerick (grid ref: R 55457 56224). The pump station is accessed via the Dock Road (N69) and local access roads within Corcanree Business Park. The proposed pumping station upgrade works site is also adjacent to the River Shannon and River Fergus Estuaries SPA [004077] along its northern boundary.

A site location map is provided as Figure 1.1.

The objective of the winter surveys was to assess the suitability of the proposed development site to support a variety of wintering wildfowl and waders, including the bird species listed as Special Conservation Interests (SCIs) for the River Shannon and River Fergus Estuaries SPA.

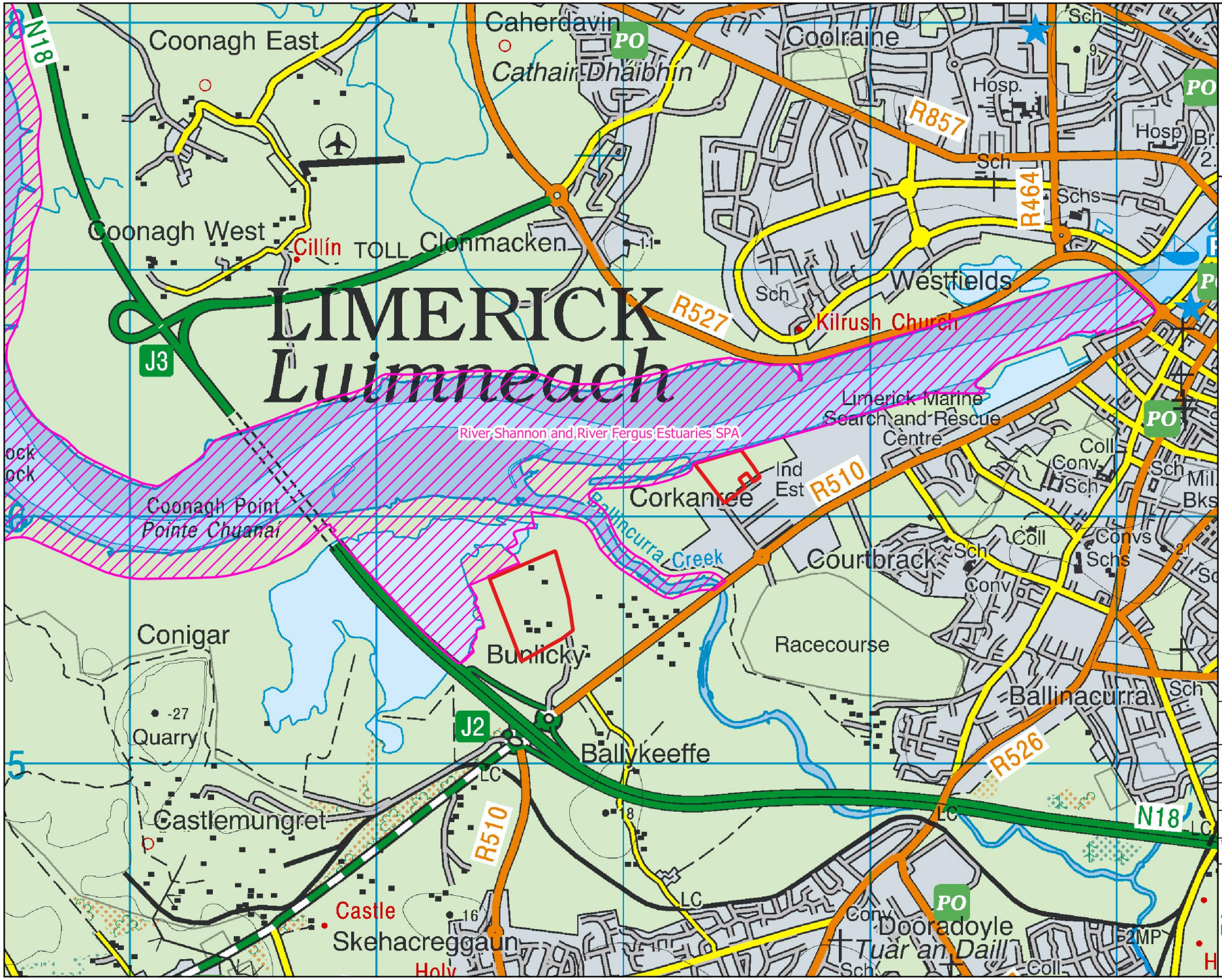
The assessment objectives can be summarised as follows:

- To undertake field surveys to assess for the presence of suitable habitat and the occurrence of wintering bird species within and adjacent to the development site.
- The study seeks to determine the distribution of the species within and adjacent to the proposed development site and to determine the presence of feeding/roosting areas within/adjacent to the proposed development site.

Section two of this report provides the methodology, constraints, survey information, weather conditions and survey coverage. The results of the desk study and field surveys are presented in section three of this report. An evaluation and discussion of the results is provided in Section four. The concluding section of the report considers the findings and potential impacts of the proposed development on SCI listed species of the River Shannon and River Fergus Estuaries SPA.

1.1 Statement of Authority

Wintering bird surveys were undertaken between October 2020 and March 2021 by Julie O'Sullivan (B.Sc, M.Sc). Julie is an experienced ornithologist with over six years professional experience. This report has been prepared by Julie O'Sullivan.



Map Legend

- Site Boundary

Designated Sites

- Special Protection Area (SPA)

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Drawing Title: Site Location

Project Title: Limerick WWTP Upgrade

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2. METHODLOGY

2.1 Desk Study

A number of sources were assessed to determine the likely usage of both breeding and wintering bird species, including Bird Atlases, National Biodiversity Data Centre (NDBC), Birdwatch Ireland and Conservation Objectives Supporting Documents from the National Parks and Wildlife Service (NPWS) for the nearby River Shannon and River Fergus Estuaries SPA. Results of the desk study are provided in section 3.1.

2.2 Field Survey Methodology

During the initial field visit the site was assessed and suitable vantage points were identified. The survey area covered the development site at Bunlicky WWTP and Corcanree Pumping station, and areas of potentially suitable supporting habitat in proximity to the proposed development site including areas of agricultural grassland adjacent to Bunlicky WWTP, Bunlicky Lake, the estuarine habitat adjacent to the outfall at Bunlicky and the estuarine habitat adjacent to Corcanree Pumping station.

The surveys were undertaken monthly in October and November 2020, and the survey effort was increased to bimonthly from December 2020 - March 2021. Due to limited access, the initial bird survey carried out in October 2020 only covered the area within the Bunlicky WWTP boundary, and the immediately adjacent agricultural fields, which were scanned from a vantage point from the access road. It was not possible to gain access to the outfall location during this initial survey in October. The development site at Corcanree was not initially considered to be part of the proposed development until late November, therefore this site was not included in the initial October bird survey area.

Surveys were undertaken at alternate high/low tides, within two hours of high/low tide. A combination of low and high tide counts has been used due to the differences in behaviour and site use between tidal states, with different species likely to be foraging and roosting in different areas of River Shannon and River Fergus Estuaries SPA and the surrounding terrestrial habitats, depending on the stage of the tidal cycle.

The surveys were undertaken by an appropriately qualified ornithologist. All observations were recorded, and detailed point data was gathered for each species observation, with all bird species denoted using standard British Trust for Ornithology (BTO) codes and with the number of each species recorded next to each registration. The species recorded in the surveys were those covered by Irish Wetlands Bird Survey (I-WeBS) counts, i.e. all divers, grebes, cormorant, shag, herons, swans, geese, ducks, rails, crakes, waders, gulls and kingfisher. However, in addition to this, all other bird species, including all common and widespread passerines, were also recorded from within the proposed development site.

2.2.1 I-WeBS Surveys

The winter bird surveys at the nearby SPA followed the Irish Wetland Bird Survey (I-WeBS) methodology; the simple 'look-see' method, whereby all birds present within a predefined area are counted (Gilbert et al., 1998; Birdwatch Ireland, 2018). The surveys were carried out at suitable vantage points within the site, additional vantage points located overlooking the section of the River Shannon and River Fergus Estuaries SPA in close proximity to the proposed development site. Vantage points were chosen to have as large as possible a view of the proposed development site, adjacent wetland habitats and potential adjacent daytime foraging habitat in the vicinity of the proposed development site. Vantage points focused on areas which were deemed to be of likely significance to wintering waterbirds of River Shannon and River Fergus Estuaries SPA.

Details of the surveys carried out including date, time, duration, location and weather conditions are provided in Table 2.2. A map of the vantage point locations used during the surveys is presented in Figure 2.1.

2.2.2 Transects

Walked transects were undertaken within the site boundary. During the surveys species of note were recorded both within and adjacent to the development site. All bird species were denoted using standard British Trust for Ornithology (BTO) codes and with the number of each species recorded next to each registration. Transects walked during the survey are shown in Figure 2.2. During the surveys species of note were recorded both within and adjacent to the development site.



Map Legend

- Site Boundary
- Vantage points

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Drawing Title: Vantage Point Locations

Project Title: Limerick WWTP Upgrade

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Project No.	**Drawing No.**
200826	Figure 2.1
Scale	**Date**
1:8000	27.07.2021

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Map Legend

- Site Boundary
- Transcripts

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Drawing Title

Bird Survey Transects

Project Title

Limerick WWTP Upgrade

Drawn By	Checked By
JOS	PR
Project No.	Drawing No.
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2.2.3 Survey Details

Details of the surveys including survey dates, weather conditions and survey duration are provided in Table 2.1.

Table 2-1 Survey Effort

Date	Survey duration	Tide	Weather conditions
08/10/2020	3 hours	High Tide	Wind speed: Gentle breeze Cloud cover: approx.10-20% Visibility: Good (> 2km) Rain: No Frost: None Snow: None
30/11/2020	5 hours	Low Tide	Wind speed; Calm Cloud cover: 100% Visibility: Good (>2km) Rain: Light rain showers Frost: None Snow: None
18/12/2020	5 hours	Low tide	Wind speed; Calm Cloud cover: 20-30% Visibility: Good (>2km) Rain: None Frost: None Snow: None
21/12/2020	5 hours	High Tide	Wind speed: Calm Cloud cover: approx. 60% Visibility: Good (> 2km) Rain: Light misty rain Frost: None Snow: None
15/01/2021	5 hours	Low Tide	Wind speed: Gentle breeze Cloud cover: 100% Visibility: Good (> 2km) Rain: None Frost: None Snow: None
25/01/2021	5 hours	High tide	Wind speed: Calm Cloud cover: 25-40% Visibility: Good (> 2km) Rain: None Frost: None Snow: None
17/02/2021	5 hours	High tide	Wind speed: Gentle Breeze Cloud cover: 50% Visibility: Good (> 2km) Rain: None Frost: None Snow: None
23/02/2021	5 hours	Low tide	Wind speed: Light breeze Cloud cover: approx. 80-90% Visibility: Good (>2km) Rain: Light rain showers Frost: No Snow: No

Date	Survey duration	Tide	Weather conditions
16/03/2021	5 hours	High Tide	Wind speed: Calm Cloud cover: 100% Visibility: Good Rain: Light misty rain Frost: No Snow: No
29/03/2021	5 hours	Low Tide	Wind speed: Moderate breeze Cloud cover: 66-100% Visibility: Good Rain: No Frost: No Snow: No

2.2.4 Survey Constraints

No significant survey constraints limited the survey approach, and a comprehensive assessment was undertaken. All surveys were undertaken during optimal weather conditions as poor weather conditions and high wind can lead to decreased bird movements and hinder surveyor visibility.

The Corcanree Pumping station was not considered part of the project until late November, therefore this site was not surveyed during the initial survey carried out during October. Not all of the land within the Corcanree proposed development site boundary were accessible during the survey visits. The existing Corcanree pumping station was accessible during the surveys, however the area of grassland outside of the palisade fencing to the north, where the upgrade works are proposed, were not accessible until the final survey carried out on the 29th of March. However, this area of the site was scanned through the fence and the lack of access is not considered to be a significant constraint.

Due to access issues, it was not possible to survey the outfall during the initial survey in October. However, the section of the estuary in which the outfall is located was surveyed from a vantage point on the opposite bank of the Shannon Estuary. Therefore, this is not considered to be a significant constraint. Surrounding private lands were scanned using a spotting scope from elevated vantage points. Any significant flocks of wintering wildfowl or waders would be recorded using such an approach.

3. RESULTS

3.1 Desk Study

A number of sources were assessed to determine the likely usage of the site by both breeding and wintering bird species, including Bird Atlases, National Biodiversity Data Centre (NBDC), BirdWatch Ireland and Conservation Objectives Supporting Documents from the National Parks and Wildlife Service (NPWS) for nearby Special Protection Areas (SPAs).

3.1.1 Breeding and Wintering Bird Atlases

The Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland (Balmer et al., 2013) provides the most up-to-date information regarding the distribution and relative abundance of bird species in Britain and Ireland, based on surveys carried out between 2007 and 2011. The atlases show data for breeding and wintering birds respectively in individual 10 km x 10 km squares (hectads). Table 3.1 shows those species found in the relevant hectad (R55) which are recorded as breeding in the most recent atlas.

This dataset also provides species that have been recorded within the relevant 2km tetrads (R55N and R55M) on National Biodiversity Data Centre (NBDC) datasets as well as those listed in Annex I of the EU Birds Directive recorded on the BoCCI Red List. Birds listed under Annex I are offered special protection by the EU Birds Directive. Those listed on the Birds of Conservation Concern in Ireland (BoCCI) Red List meet one or more of the following criteria:

- IUCN: Global conservation status (Critically Endangered (CE), Endangered (E)or Vulnerable (V), but not Near Threatened. These species are recognised as the highest priorities for action at a global scale and are thus priorities at an all-Ireland level.
- European conservation status. The conservation status of all European species was assessed most recently by Birdlife International (2004), one of the main changes in the revision being to include the IUCN criteria. These species are those of global conservation concern (including those classified as Near Threatened) and are Red-listed.
- The Irish breeding population has undergone significant historical decline since 1800.
- The Irish non-breeding population has undergone a significant decline of 50% in the last 25 years.
- The Irish breeding range has undergone a decline of 70% or more in the last 25 years.

Two species listed under Annex I of the EU Birds Directive have been recorded within the tetrad R55N Little Egret (*Egretta garzetta*) and Northern Lapwing (*Vanellus vanellus*). A further three red-listed birds of conservation concern have been recorded within this tetrad: Northern Shoveler (*Anas clypeata*), Swift (*Apus apus*) and Scaup (*Anas marila*).

One species listed under Annex I of the EU Birds Directive has been recorded within the tetrad R55M: Dunlin. A further eleven red-listed birds of conservation concern have been recorded within this tetrad: Common Goldeneye (*Bucephala clangula*), Common Kestrel (*Falco tinnunculus*), Common Redshank (*Tringa totanus*), Common Snipe (*Gallinago gallinago*), Common Swift (*Apus apus*), Eurasian Curlew (*Numenius arquata*), Grey Wagtail (*Motacilla cinerea*), Meadow Pipit (*Anthus pratensis*), Northern Lapwing (*Vanellus vanellus*), Redwing (*Turdus iliacus*) and Stock Pigeon (*Columba oenas*).

Table 3-1 NBDC Bird data and Bird Atlas data (Hectad R55)

Common Name	Scientific name	Designation
Barn Owl	*Tyto alba*	Protected EU Birds Directive Annex I Bird Species
Black-headed Gull	*Larus ridibundus*	
Common Kingfisher	*Alcedo atthis*	
Common Redshank	*Tringa totanus*	
Corn Crake	*Crex crex*	
Dunlin	*Calidris alpina*	
European Golden Plover	*Pluvialis apricaria*	
Hen Harrier	*Circus cyaneus*	
Herring Gull	*Larus argentatus*	
Little Egret	*Egretta garzetta*	
Mediterranean Gull	*Larus melanocephalus*	
Merlin	*Falco columbarius*	
Peregrine Falcon	*Falco peregrinus*	
Red-necked Phalarope	*Phalaropus lobatus*	
Sandwich Tern	*Sterna sandvicensis*	
Short-eared Owl	*Asio flammeus*	
Whooper Swan	*Cygnus cygnus*	
Yellowhammer	*Emberiza citrinella*	
Common Goldeneye	*Bucephala clangula*	Birds of Conservation Concern – Red list
Common Pochard	*Aythya ferina*	
Common Snipe	*Gallinago gallinago*	
Common Swift	*Apus apus*	

Common Name	Scientific name	Designation
Eurasian Curlew	*Numenius arquata*	
Eurasian Oystercatcher	*Haematopus ostralegus*	
Eurasian Woodcock	*Scolopax rusticola*	
Greater Scaup	*Aythya marila*	
Northern Lapwing	*Vanellus vanellus*	
Northern Shoveler	*Anas clypeata*	
Common Goldeneye	*Bucephala clangula*	
Common Pochard	*Aythya ferina*	
Common Redshank	*Tringa totanus*	
Kestrel	*Falco tinnunculus*	

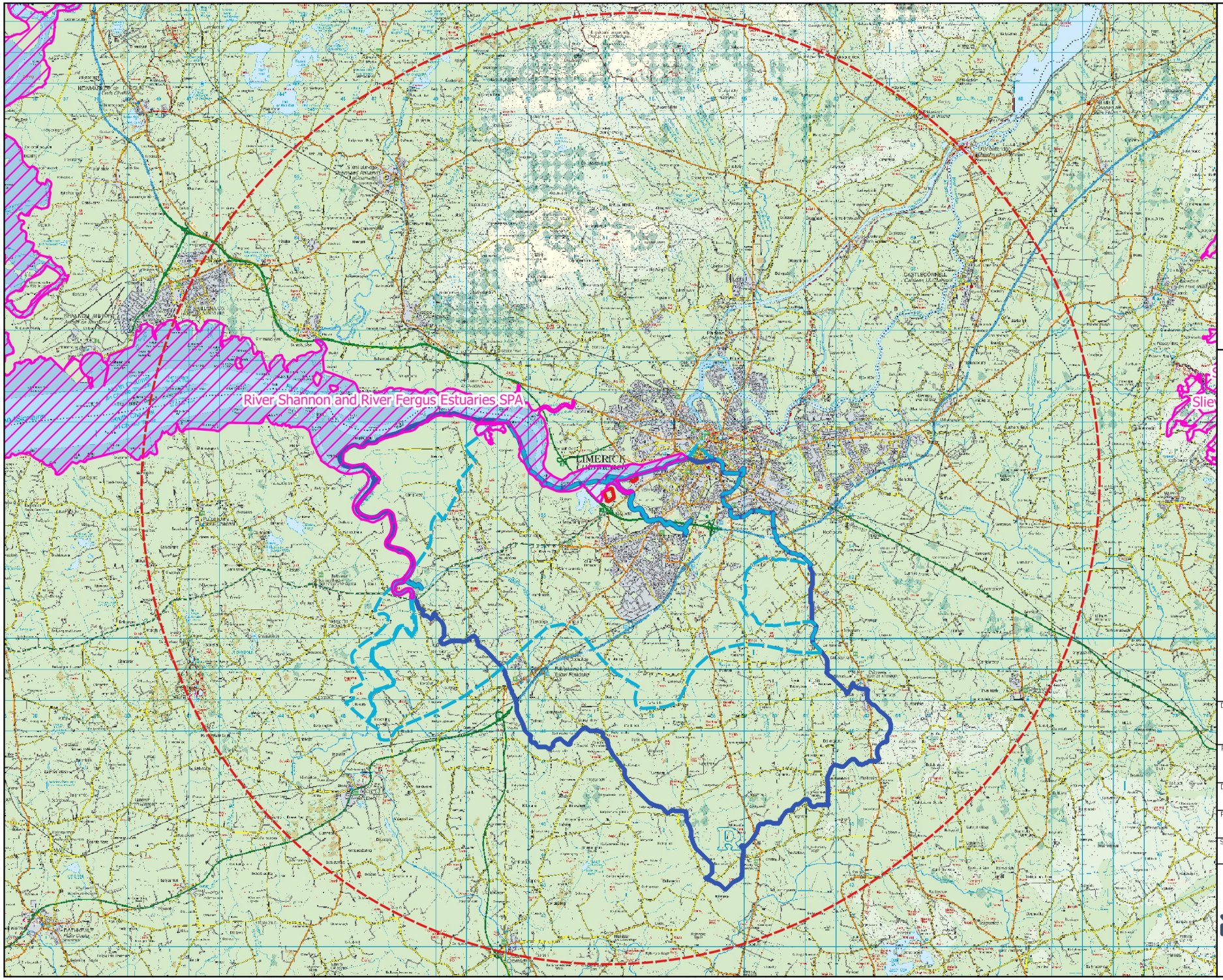
3.1.2 Sites designated for Wintering Bird Species within 15km of the Proposed Development Site

Using QGIS Software (Version 3.16.5) designated sites within a 15km radius of the proposed development site were identified. Only one special protection area was identified within the 15km radius. The site synopses and conservation objectives of this site, as per the NPWS website (www.npws.ie), were considered at the time of preparation of this report. Details of this sites, including its distance from the proposed development site, are provided in Table 3.2. Figure 3.1 shows the location of the proposed development site in relation to designated Special Protection Areas within 15 km.

Table 3-2 EU Designated sites within 15km of the proposed works

EU Designated Site	Distance from Proposed development site (km)	Qualify Interests/Special Conservation Interests for which the Natura 2000 Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 27/07/2021)	Conservation Objective
River Shannon and River Fergus Estuaries SPA	Adjacent to the northern boundary of the proposed development	〉 Cormorant (*Phalacrocorax carbo*) [A017] 〉 Whooper Swan (*Cygnus cygnus*) [A038] 〉 Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] 〉 Shelduck (*Tadorna tadorna*) [A048] 〉 Wigeon (*Anas penelope*) [A050] 〉 Teal (*Anas crecca*) [A052] 〉 Pintail (*Anas acuta*) [A054] 〉 Shoveler *(Anas clypeata*) [A056] 〉 Scaup (*Aythya marila*) [A062] 〉 Ringed Plover (*Charadrius hiaticula*) [A137] 〉 Golden Plover (*Pluvialis apricaria*) [A140] 〉 Grey Plover (*Pluvialis squatarola*) [A141] 〉 Lapwing (*Vanellus vanellus*) [A142] 〉 Knot (Calidris canutus) [A143] 〉 Dunlin (*Calidris alpina*) [A149]	Detailed conservation objectives for this site (Version 1, September 2012) were reviewed as part of the assessment and are available at www.npws.ie. Each of the listed SCI species has the conservation objective to maintain the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA. The wetlands and waterbirds SCI has the conservation objective "*To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly- occurring migratory waterbirds that utilise it*"

EU Designated Site	Distance from Proposed development site (km)	Qualify Interests/Special Conservation Interests for which the Natura 2000 Site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 27/07/2021)	Conservation Objective
		〉 Black-tailed Godwit (*Limosa limosa*) [A156] 〉 Bar-tailed Godwit (*Limosa lapponica*) [A157] 〉 Curlew (*Numenius arquata*) [A160] 〉 Redshank (Tringa *totanus*) [A162] 〉 Greenshank (*Tringa nebularia*) [A164] 〉 Black-headed Gull (*Chroicocephalus ridibundus*) [A179] 〉 Wetland and Waterbirds [A999]	



Map Legend

- Site Boundary
- 15km buffer

EU Designated Sites

- River Shannon and River Fergus Estuaries SPA

Hydrological Catchments

- Ballynaclogh subcatchment
- Limerick City Southwest Groundwater Catchment

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Drawing Title: Special Protection Areas within 15km

Project Title: Limerick WWTP Upgrade

Drawn By	Checked By
JOS	PR
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3.1.3 Irish Wetland Bird Survey (I-WeBS) Data

Irish Wetland Bird Survey (I-WeBS) data was obtained from BirdWatch Ireland on 29th of April 2021, following a formal data request. This data includes the most up to date information on the species present at the most proximal IWeBS site i.e. Limerick City (0I477) and Bunlicky Lake (0I003).

Data for each subsite is set out in the sections below. The data also shows where Nationally or Internationally important numbers of each species have been recorded in the past, with all important flocks highlighted in red. A site is considered nationally important if it supports 1% or more of the all-Ireland population, based on the most recent estimates for Ireland, namely Crowe and Holt (2013). A site is classified as internationally important if it regularly supports in excess of 20,000 waterbirds or 1% or more of the flyway population estimate of a species, based on Wetlands International (2017).

3.1.3.1 Limerick City Subsite (0I477)

Details of I-WeBS data for the Limerick City subsite (0I477) are presented in Table 3-3 and includes annual peak counts for the period 2014-2018. There is no IWeBS data available for the monitoring period 2015/16, 2018/19 or 2019/20 for this monitoring site.

Table 3-3 IWeBS data for Limerick City subsite in close proximity to the proposed development site.

Species	1% National	1% International	2014/15	2016/17	2017/18	Peak
Mute Swan	90	0	68	6	6	68
Whooper Swan	150	340			26	26
Greylag Goose	35	980	82			82
Wigeon	560	14000		4	6	6
Teal	360	5000	22	15		22
Mallard	280	53000	115	45	5	115
Shoveler	20	650	33		29	33
Pochard	110	2000	11		16	16
Tufted Duck	270	8900	51	37	58	58
Goldeneye	40	11400		4		4
Goosander	-	-		3	2	3
Great Northern Diver	20	50		1		1
Little Grebe	20	4700	6		6	6
Cormorant	110	1200	29	9	1	29
Little Egret	20	1100		1		1
Grey Heron	25	5000	4	2	1	4

Species	1% National	1% International	2014/15	2016/17	2017/18	Peak
Water Rail	-	-			2	2
Moorhen	-	-	17		4	17
Coot	190	15500	78		93	93
Oystercatcher	610	8200	104		97	104
Lapwing	850	72300	5	60	57	60
Dunlin	460	13300		1		1
Jack Snipe	-	-		1		1
Snipe	-	-		3	10	10
Common Sandpiper	-	-		3		3
Redshank	240	2400	2	6	1	6
Black-headed Gull	-	-	1390	500		1390
Ring-billed Gull	-	-	2		2	2
Common Gull	-	-	20	30		30
Lesser Black-backed Gull	-	-	22	50		50
Herring Gull	-	-	66	55		66
Iceland Gull	-	-	1	2	6	6
Glaucous Gull	-	-				0
Great Black-backed Gull	-	-	5	20		20
Kingfisher	-	-		1		1

3.1.3.2 Bunlicky Lake (0I003) Subsite

Details of I-WeBS data for the Bunlicky Lake subsite (0I003) are presented in Table 3-4 and includes annual peak counts for the period 2014-2018. There is no IWeBS data available for this site for the monitoring period 2016/17 or 2017/18. Bunlicky Lake was not surveyed fully in 2018/19 or 2019/20, but individual Greylag Goose counts were sourced as part of a separate project under I-WeBS.

Table 3-4 IWeBS data for Bunlicky Lake subsite west of the proposed development site.

Species	1% National	1% International	2014/15	2018/19	2019/20	Peak
Mute Swan	90	100	13			13
Greylag Goose	35	980	88	15	97	97
Tufted Duck	270	8900	38			38
Cormorant	110	1200	71			71
Grey Heron	25	5000	1			1
Black-headed Gull	-	-	29			29

3.1.4 River Shannon and River Fergus Estuaries SPA (004077)

A detailed conservation objectives document is available for River Shannon and River Fergus Estuaries SPA (www.npws.ie, accessed on 27/07/2021). The Special Conservation Interests of this SPA and their conservation objective are listed in Table 3.5.

Table 3-5 Special Conservation Interest and Conservation Objectives (Version 01, 2012, NPWS)

Special Conservation Interest (SCI)	Conservation Objective
Wetland and Waterbirds [A999]	To maintain the favourable conservation condition of the wetland habitat in the River Shannon and River Fergus Estuaries SPA as a resource for the regularly- occurring migratory waterbirds that utilise it.
Cormorant (*Phalacrocorax carbo*) [A017]	To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA.
Whooper Swan (*Cygnus cygnus*) [A038]	To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA.
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA.
Shelduck (*Tadorna tadorna*) [A048]	To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA.
Wigeon (*Anas penelope*) [A050]	To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA.
Teal (*Anas crecca)* [A052]	To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA.
Pintail (*Anas acuta*) [A054]	To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA.
Shoveler (*Anas clypeata*) [A056]	To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA.

Special Conservation Interest (SCI)	Conservation Objective
Scaup (*Aythya marila*) [A062]	To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA.
Ringed Plover (*Charadrius hiaticula*) [A137]	To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA.
Golden Plover (*Pluvialis apricaria*) [A140]	To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA.
Grey Plover (*Pluvialis squatarola*) [A141]	To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA.
Lapwing (*Vanellus vanellus*) [A142]	To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA.
Knot (*Calidris canutus*) [A143]	To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA.
Dunlin (*Calidris alpina*) [A149]	To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA.
Black-tailed Godwit (*Limosa limosa*) [A156]	To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA.
Bar-tailed Godwit (*Limosa lapponica*) [A157]	To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA.
Curlew (*Numenius arquata*) [A160]	To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA.
Redshank (*Tringa totanus*) [A162]	To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA.
Greenshank (*Tringa nebularia*) [A164]	To maintain the favourable conservation condition of Greenshank in the River Shannon and River Fergus Estuaries SPA.
Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	To maintain the favourable conservation condition of Black-headed Gull in the River Shannon and River Fergus Estuaries SPA.

3.1.4.1 Special Conservation Interests

A review of desktop literature pertaining to the SPA was conducted including the site-specific conservation document, conservation objectives supporting documents, site synopsis and the most recent available Article 12 reports.

3.1.4.1.1 *Wetlands and Waterbirds*

The following relevant information has been extracted from the NPWS site synopsis and Natura 2000 Data From for the SPA:

> *"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 macro invertebrate community, e.g. Macoma-Scrobicularia-Nereis, 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 a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull.

It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds".

The wetland habitat designated as part of the River Shannon and River Fergus Estuaries SPA has the target that the permanent area occupied by the wetland habitat should be stable and not significantly less than 32,261ha other than that occurring from natural patterns of variation.

3.1.4.1.2 Cormorant (Phalacrocorax carbo) [A017]

This species has been designated for its wintering and breeding population within the SPA. According to the site species conservation objectives document Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995). According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 245 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining 1.0 –24.9% and the current conservation condition of this species is undetermined.

3.1.4.1.3 Whooper Swan (Cygnus cygnus) [A038]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Whooper Swan (*Cygnus cygnus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 118 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as increasing and the current conservation condition of this species is favourable.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2002 - 2010) for this species is increasing and the long-term trend (since circa 1980) is also increasing.

3.1.4.1.4 Light-bellied Brent Goose (Branta bernicla hrota) [A046]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta*

bernicla hrota). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 494 individuals.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is also increasing.

3.1.4.1.5 Shelduck (Tadorna tadorna) [A048]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,025 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is Fluctuating and the long-term trend (since circa 1980) is stable.

3.1.4.1.6 Wigeon (Anas penelope) [A050]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,761 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is highly unfavourable.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is also decreasing.

3.1.4.1.7 Teal (Anas crecca) [A052]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all -Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,260 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is stable and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.8 Pintail (Anas acuta) [A054]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is fluctuating and the long-term trend (since circa 1980) is unknown.

3.1.4.1.9 Shoveler (Anas clypeata) [A056]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is increasing.

3.1.4.1.10 Scaup (Aythya marila) [A062]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), this species has been identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.11 Ringed Plover (Charadrius hiaticula) [A137]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Ringed Plover (*Charadrius hiaticula*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 223 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2000 - 2011) for this species is stable and the long-term trend (since circa 1980) is unknown.

3.1.4.1.12 Golden Plover (Pluvialis apricaria) [A140]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Golden Plover (*Pluvialis apricaria*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 5,664individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2000 - 2010) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.13 Grey Plover (Pluvialis squatarola) [A141]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 558 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.14 Lapwing (Vanellus vanellus) [A142]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,126 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1991 - 2008) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.15 Knot (Calidris canutus) [A143]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site

regularly supports 1% or more of the all-Ireland population of Knot (*Calidris canutus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,015 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is unknown.

3.1.4.1.16 Dunlin (Calidris alpina) [A149]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographic population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 15,131 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.17 Black-tailed Godwit (Limosa limosa) [A156]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,035 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is increasing.

3.1.4.1.18 Bar-tailed Godwit (Limosa lapponica) [A157]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 460 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists the current conservation condition of this species as undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is increasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.19 Curlew (Numenius arquata) [A160]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,396 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.20 Redshank (Tringa totanus) [A162]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,645 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining >50% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1991 - 2008) for this species is decreasing and the long-term trend (since circa 1980) is decreasing.

3.1.4.1.21 Greenshank (Tringa nebularia) [A164]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), during winter the site regularly supports 1% or more of the all-Ireland population of Greenshank (*Tringa nebularia*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 61 individuals.

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining -25.0% to -49.9% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 1999 - 2011) for this species is stable and the long-term trend (since circa 1980) is increasing.

3.1.4.1.22 Black-headed Gull (Chroicocephalus ridibundus) [A179]

This species has been designated for its wintering population within the SPA. According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012). This species has been

identified as additional Special Conservation Interest (SCI) for the River Shannon and River Fergus Estuaries SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00).

According to the Conservation Objectives Supporting Document (NPWS, Version 1, 2012), the site population status assessment lists this species as declining -25.0% to -49.9% and the current conservation condition of this species is undetermined.

According to the most recent Article 12 reporting (NPWS, 2012) the short-term population trend (for the period of 2002 - 2012) for this species is increasing and the long-term trend (since circa 1980) is increasing.

3.2 Field Survey Results

The following section provides the results of the site visits undertaken between October 2020-March 2021, inclusive.

3.2.1 Species records within the proposed development site

Table 3.6 lists of the target species of conservation interest recorded from within (or flying over) the proposed development site boundary during the surveys carried out between October 2020 and March 2021. These records, along with records of target species of conservation interest recorded in adjacent lands outside the proposed development site boundary, are presented in Figures 3.2 – Figures 3.11.

Non-target bird species recorded within the development site are presented in Appendix 1.

Only one SCI species of the nearby River Shannon and River Fergus Estuaries SPA was recorded roosting or feeding within the proposed development site boundary; black headed gulls were recorded roosting on the wastewater treatment plant site infrastructure during each of the surveys carried out. The number of black-headed gulls recorded roosting ranged between 24 and 118, with an average of 71 individuals. This species was recorded roosting on the storm tank, aeration tanks and settlement tanks within the WWTP. No works are proposed on these elements of the site infrastructure. The black-headed gulls appear to be habituated to the activity within the WWTP and were not disturbed by human activity and noise generated by the plant.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development site. This species was not recorded using the habitats within the proposed development site boundary during any of the surveys undertaken.

Two red listed bird species were recorded from within the proposed development site at Bunlicky WWTP. An individual snipe was recorded on a single occasion, flushed from wet grassland in the western section of the site. A kestrel was also recorded on two occasions hunting over the wet grassland in the western section of the site during the initial October 2020 survey.

The remaining target species recorded flying over the site included common gull and Mallard. Neither species landed in the habitats within the proposed development site. Neither of these species are listed SCI species of the nearby River Shannon and River Fergus Estuaries SPA.

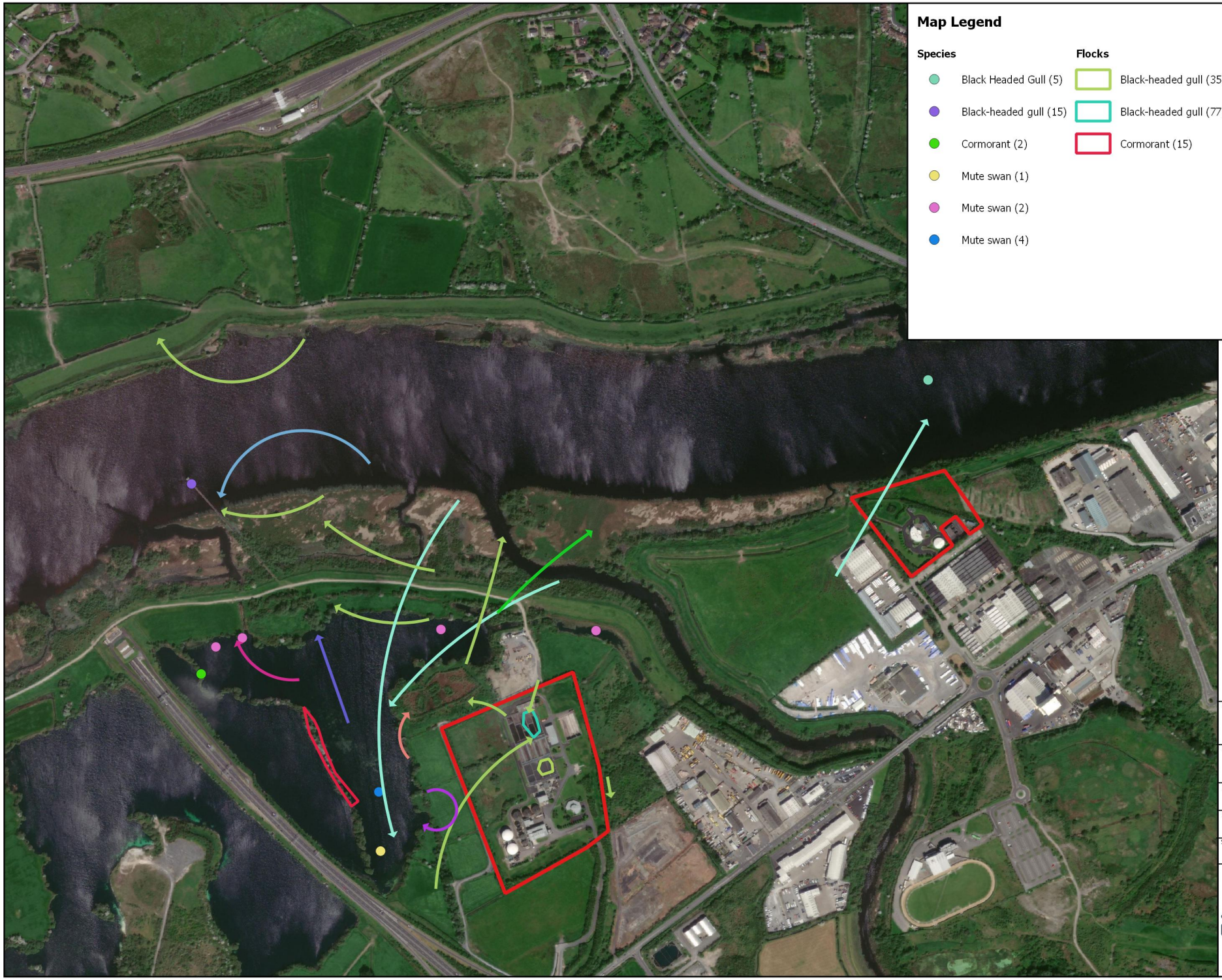
Table 3-6 Target bird survey recorded from within or flying over the proposed development site at Bunlicky WWTP and Corcanree pump station

Species	Number of Individuals recorded	Location	Date of survey	Conservation Status
Black-headed gull (*Chroicocephalus ridibundus*)	81 black-headed gulls roosting on the wastewater treatment plant infrastructure. 11 black-headed gulls were recorded flying over the site.	Bunlicky WWTP	08/10/2020	Protected EU Birds Directive Annex I Bird Species. SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Amber listed
	112 Black-headed gulls roosting on site infrastructure.	Bunlicky WWTP	30/11/2020	
	78 Black-headed gulls roosting on site infrastructure.	Bunlicky WWTP	18/12/2020	
	118 Black-headed gulls roosting on site infrastructure. 3 Black-headed gulls fly over site.	Bunlicky WWTP	21/12/2020	
	26 Black-headed gulls roosting on site infrastructure. 6 Black-headed gulls fly over site.	Bunlicky WWTP	15/01/2021	
	101 Black-headed gulls roosting on site infrastructure.	Bunlicky WWTP	25/01/2021	
	87 Black headed gulls roosting on site infrastructure. 14 Black-headed gulls fly over site.	Bunlicky WWTP	23/02/2021	
	77 Black-headed gulls roosting on site infrastructure.	Bunlicky WWTP	17/02/2021	
	20 Black-headed gulls roosting on site infrastructure.	Bunlicky WWTP	16/03/2021	
	24 Black-headed gulls roosting on site infrastructure.	Bunlicky WWTP	29/03/2021	
	2 Black-headed gulls in flight over site.	Corcanree	15/01/2021	
	4 Black-headed gulls in flight over site.	Corcanree	25/01/2021	
	3 Black-headed gulls in flight over site.	Corcanree	17/02/2021	
	3 Black-headed gulls in flight over site.	Corcanree	29/03/2021	
Mallard (*Anas platyrhynchos*)	1 individual flies over site towards Bunlicky Lake.	Bunlicky WWTP	21/12/2021	BoCCI Amber listed
	2 individuals fly over site	Corcanree	17/02/2021	

Species	Number of Individuals recorded	Location	Date of survey	Conservation Status
Cormorant (*Phalacrocorax carbo*)	A flock of six cormorant were recorded flying over the proposed development site during the survey.	Bunlicky WWTP	08/10/2020	SCI listed species of the River Shannon and River Fergus Estuaries SPA. BoCCI Amber listed
	1 Cormorant flies over the site towards the River Shannon.	Bunlicky WWTP	30/11/2020	
	1 Cormorant flies over the site towards the River Shannon.	Corcanree Pump Station	30/11/2020	
	1 Cormorant flies over the site towards the River Shannon.	Corcanree Pump Station	18/12/2020	
	1 Cormorant in flight over the site.	Corcanree Pump Station	16/03/2021	
Kestrel (*Falco tinnunculus*)	1 individual hunting over wet grassland in the western section of the site.	Bunlicky WWTP	08/10/2020	BoCCI Red listed
	1 individual hunting briefly over wet grassland in the north-western section of the site.	Bunlicky WWTP	17/02/2021	
Snipe (*Gallinago gallinago*)	Flushed from wet grassland in western section of the site	Bunlicky WWTP	08/10/2020	BoCCI Red listed
Common Gull (*Larus canus*)	1 individual flying over the site towards the River Shannon.	Corcanree Pump Station	18/12/2020	BoCCI Amber listed
	1 individual flying over the site.	Corcanree Pump Station	25/01/2021	
	1 individual flying over the site.	Corcanree Pump Station	17/02/2021	
Curlew (*Numenius arquata*)	3 individuals fly over site	Corcanree Pump Station	29/03/2021	BoCCI Red listed

BoCCI – Birds of Conservation Concern in Ireland 2020 - 2026


Map Legend
Site Boundary
Flightlines
Kestrel
Mallard
Snipe
Flocks
Black-headed gull
N
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Bird Survey 08/10/2020
Project Title
Limerick WWTP Upgrade
Drawn By
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Project No.
200826
Drawing No.
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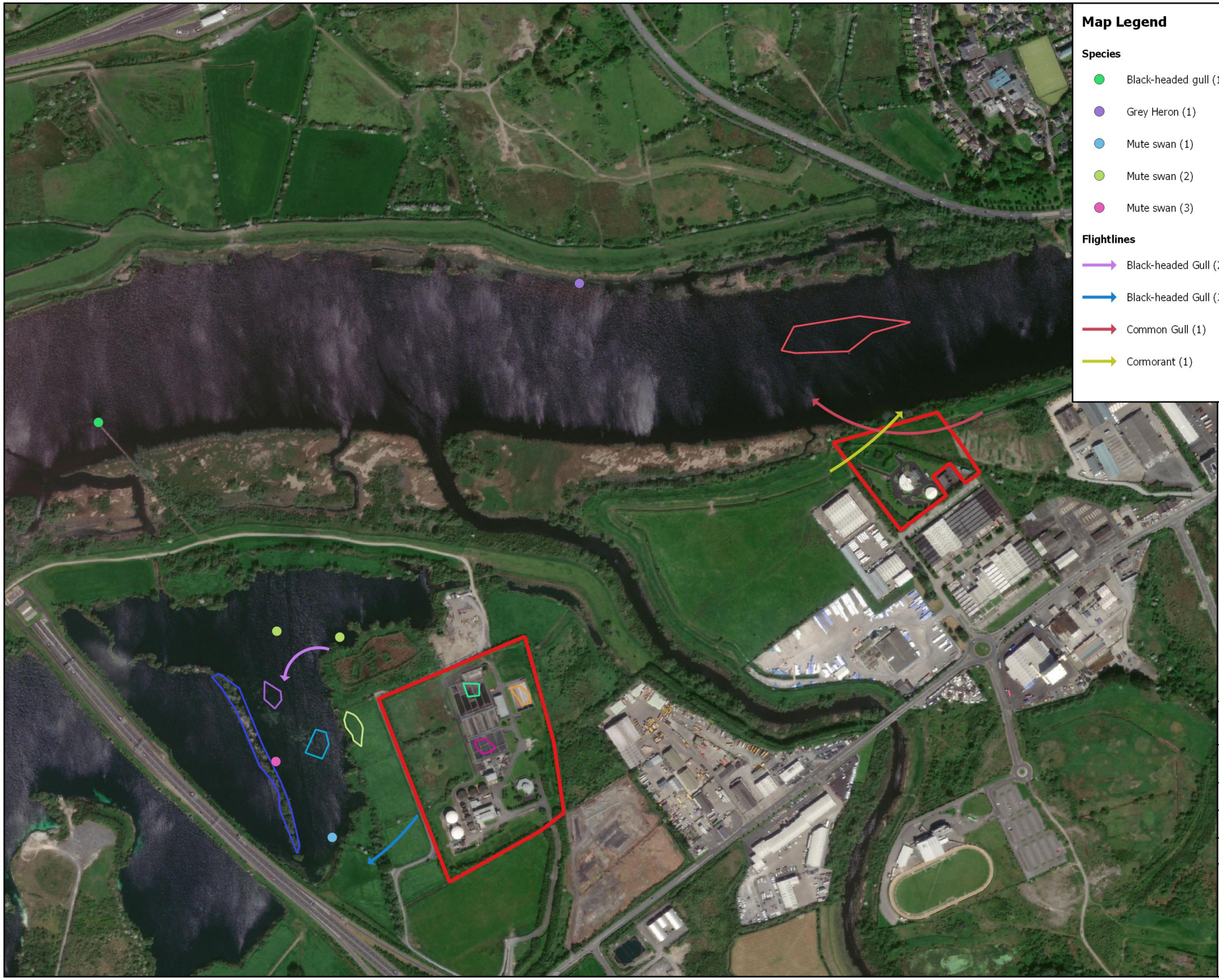
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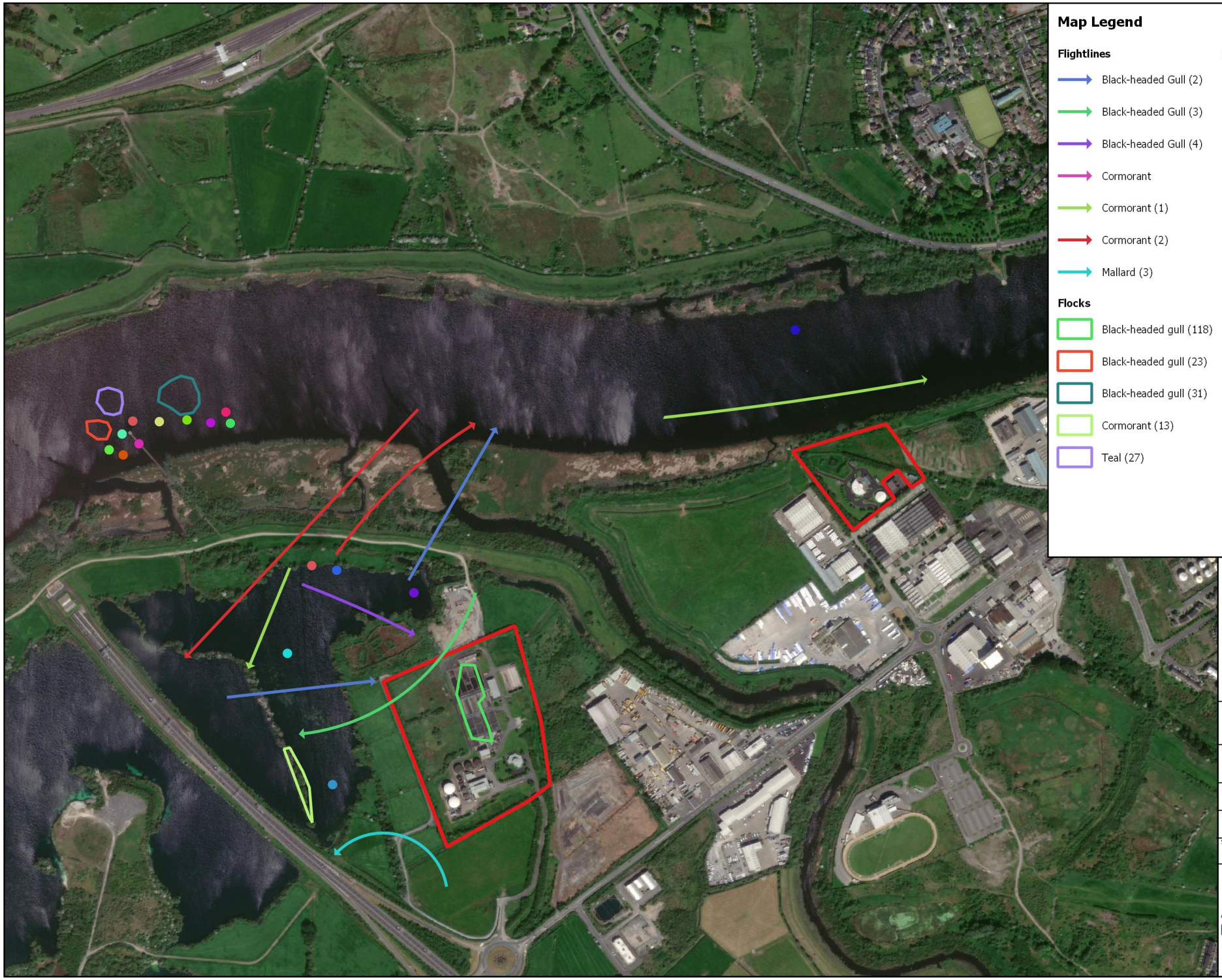
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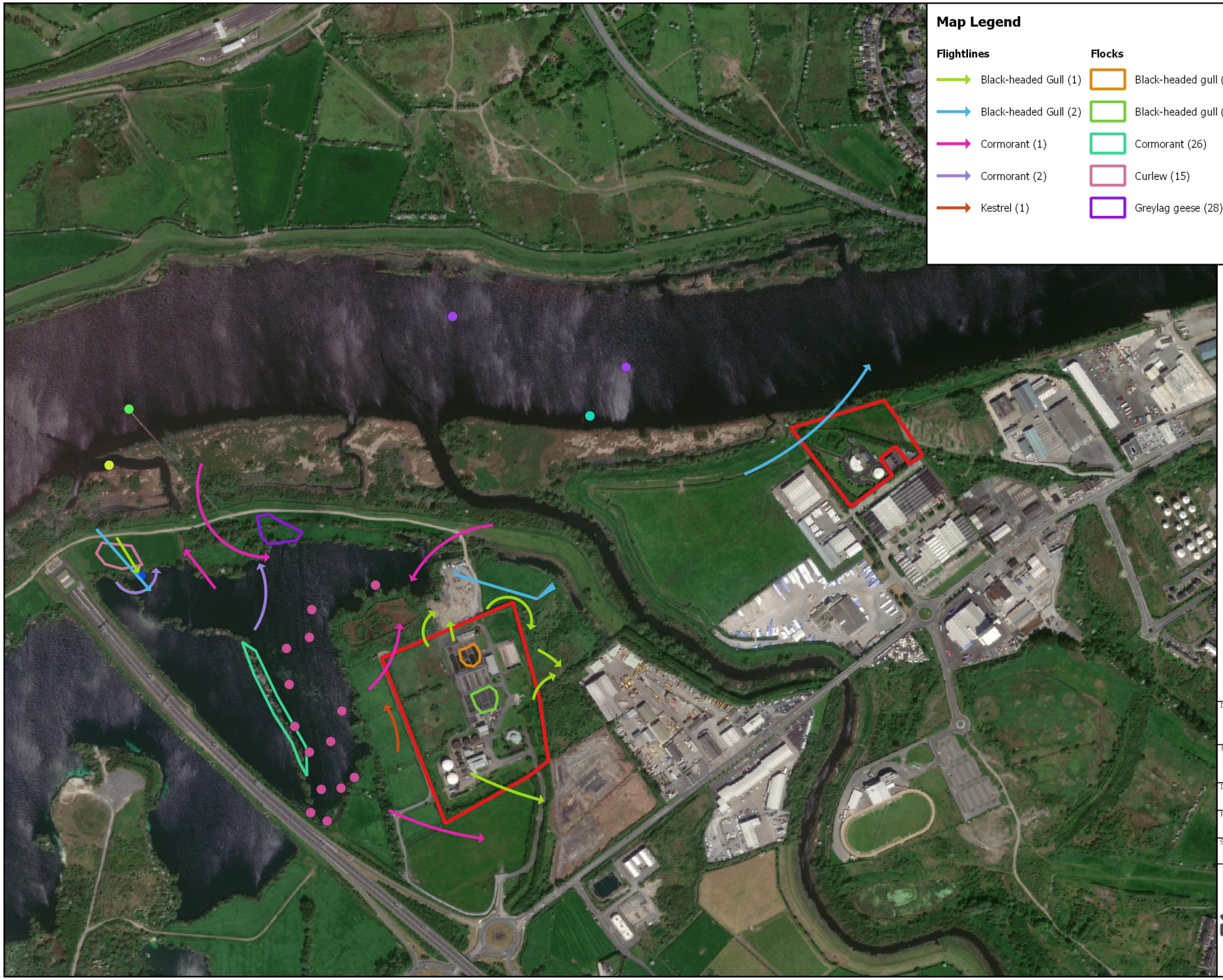
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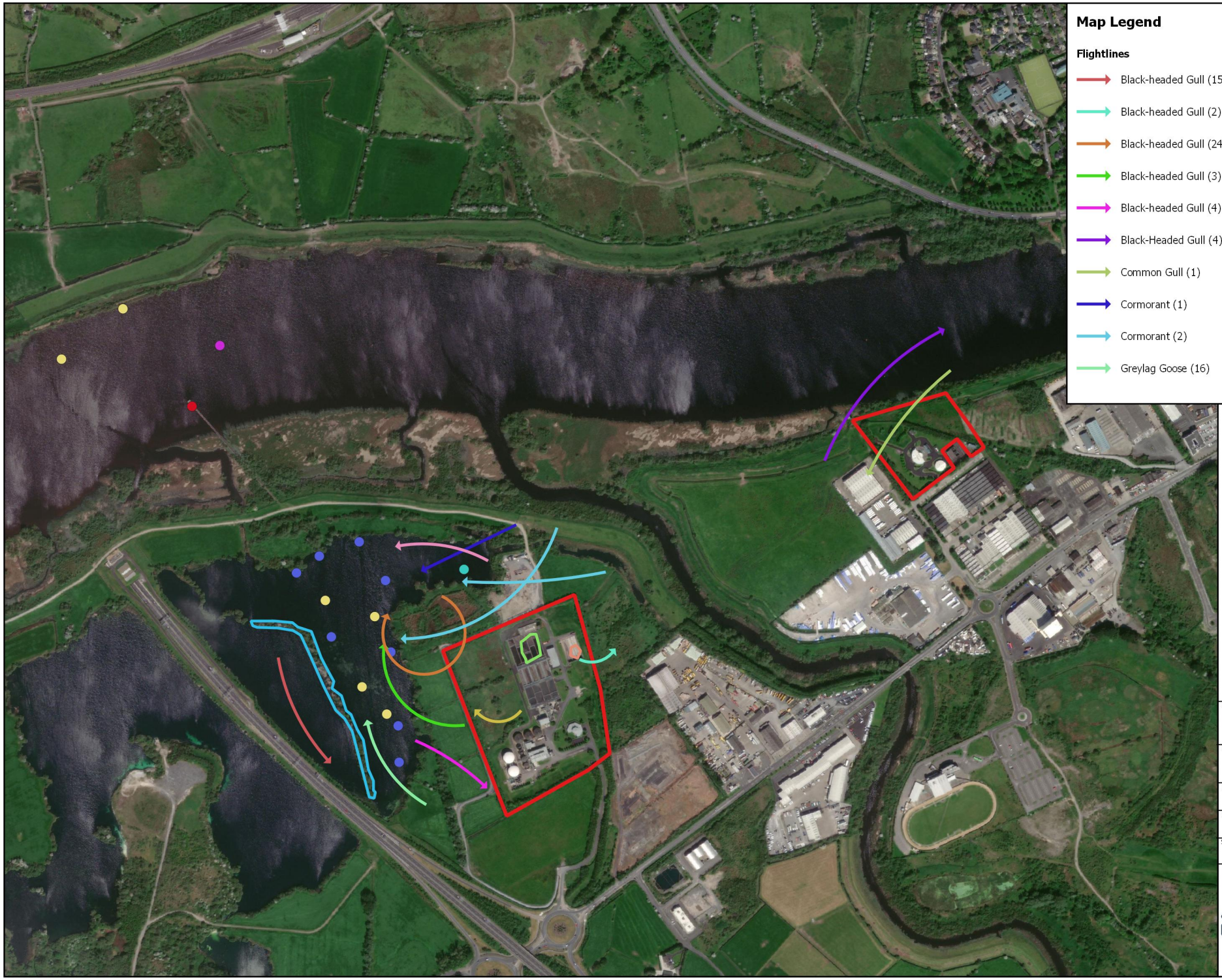


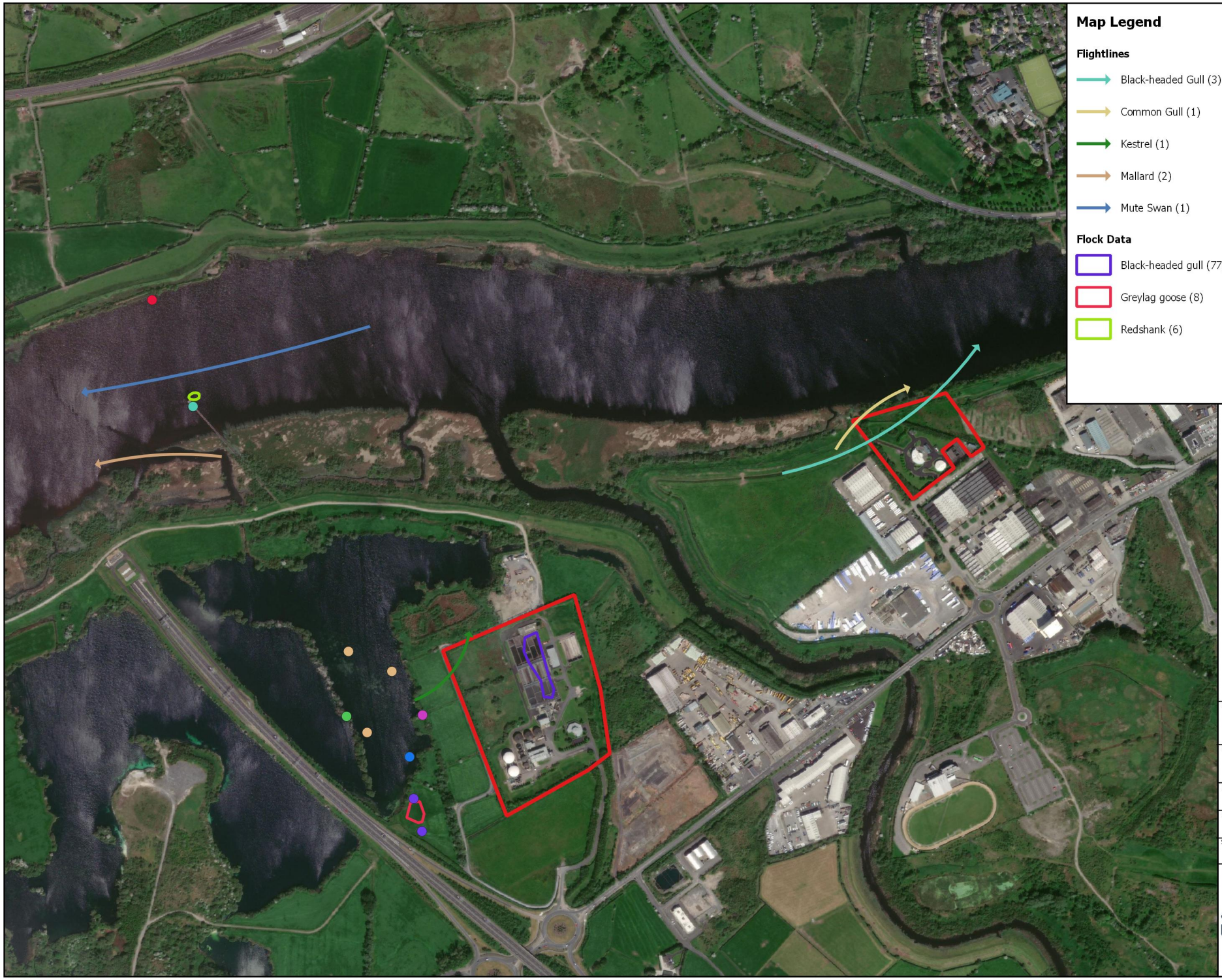
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Map Legend
Flightlines
Black-headed Gull (15)
Black-headed Gull (2)
Black-headed Gull (24)
Black-headed Gull (3)
Black-headed Gull (4)
Black-Headed Gull (4)
Common Gull (1)
Cormorant (1)
Cormorant (2)
Greylag Goose (16)
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Cormorant (1)
Grey Heron (1)
Mute swan (1)
Flocks
Black-headed gull (11)
Black-headed gull (90)
Cormorant (118)
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Bird Survey 25/01/2021
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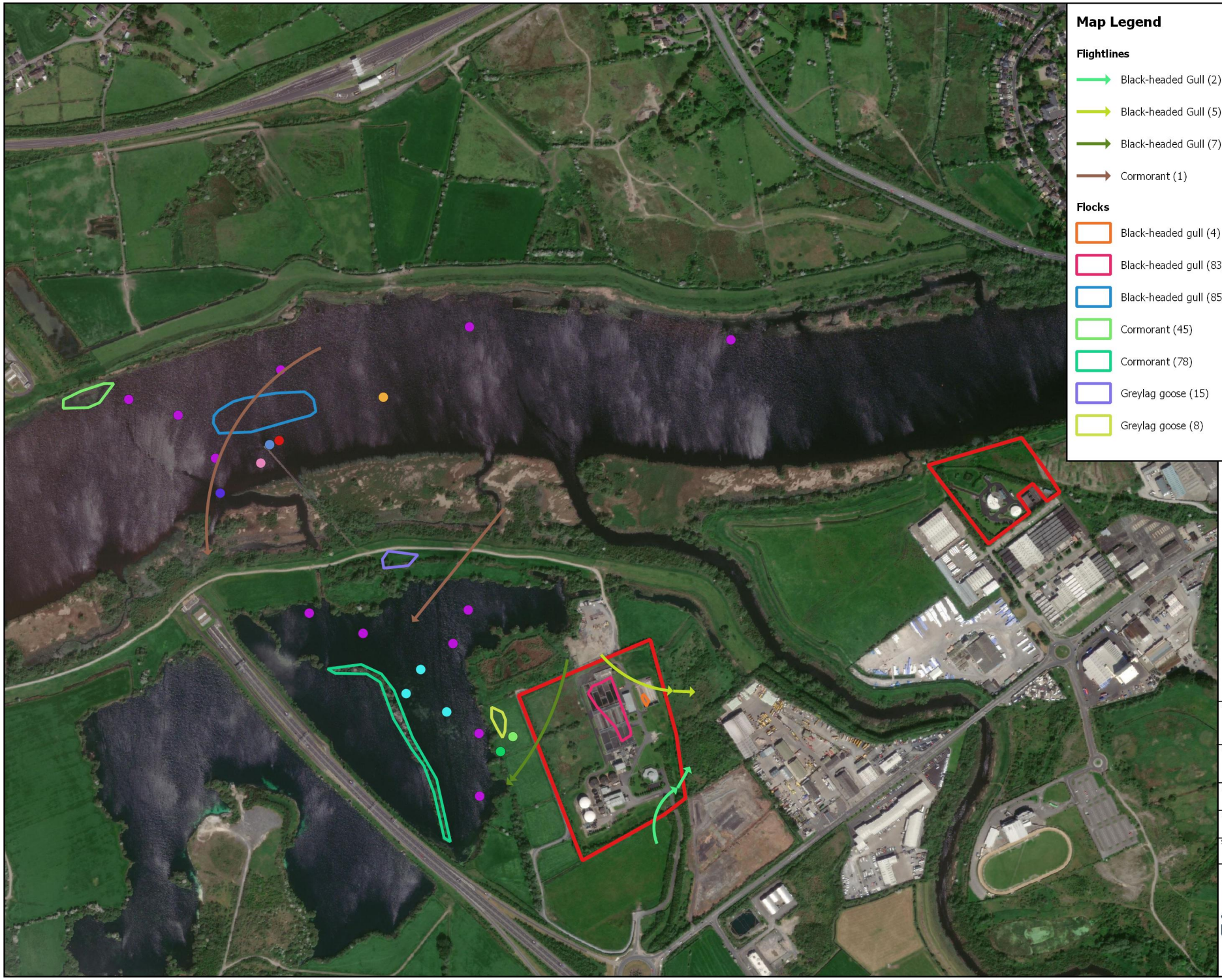
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Bird Survey 17/02/2021

Project Title
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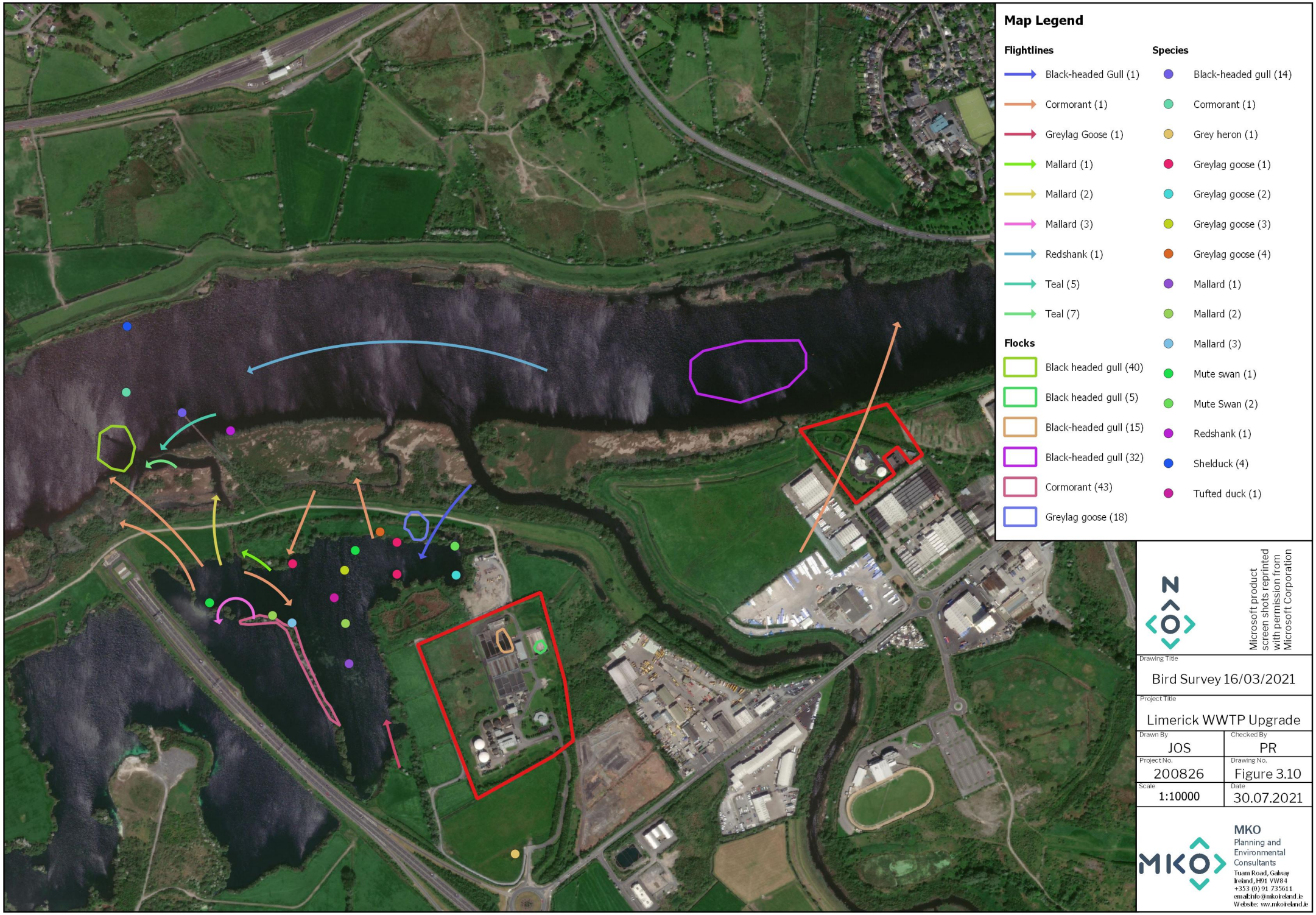
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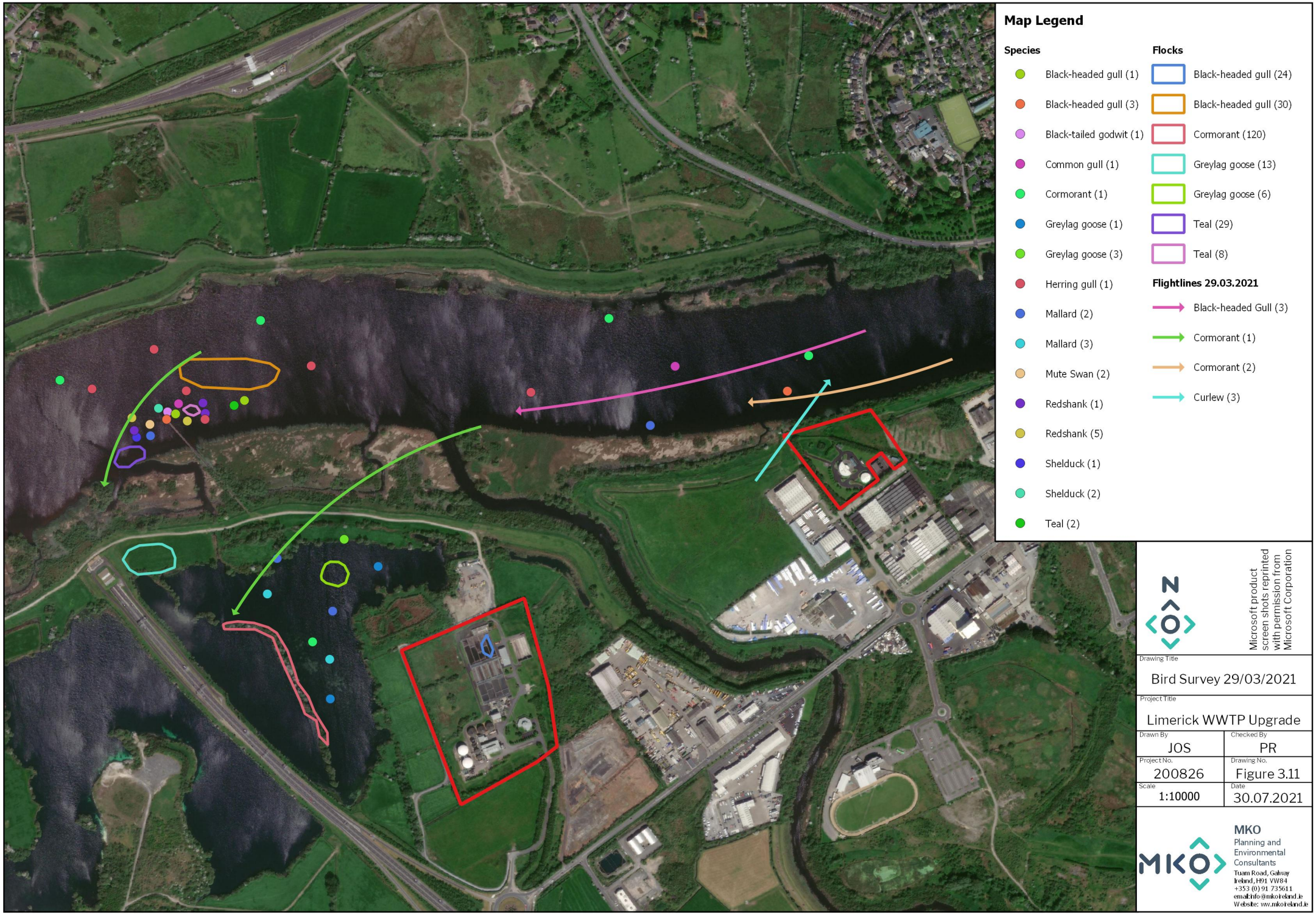
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Map Legend
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Cormorant (1)
Greylag Goose (1)
Mallard (1)
Mallard (2)
Mallard (3)
Redshank (1)
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Mallard (3)
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Redshank (1)
Shelduck (4)
Tufted duck (1)
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Map Legend
Species
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Black-headed gull (3)
Black-tailed godwit (1)
Common gull (1)
Cormorant (1)
Greylag goose (1)
Greylag goose (3)
Herring gull (1)
Mallard (2)
Mallard (3)
Mute Swan (2)
Redshank (1)
Redshank (5)
Shelduck (1)
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Teal (2)
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Black-headed gull (30)
Cormorant (120)
Greylag goose (13)
Greylag goose (6)
Teal (29)
Teal (8)
Flightlines 29.03.2021
Black-headed Gull (3)
Cormorant (1)
Cormorant (2)
Curlew (3)
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4. SUMMARY OF FIELD SURVEY AND DISCUSSION

The surveys undertaken over the period winter period October 2020 to March 2021 provide an understanding of the usage of the proposed development site by wintering bird species. A total of six target bird species were recorded within or flying over the proposed development site boundary during the winter site visits. The majority of the birds recorded within the development site boundary during the site visit were an assemblage of common birds that are typical of the amenity grassland, agricultural grassland and urban habitats found within the wider area.

Only one Annex I SCI listed species of the River Shannon and River Fergus Estuaries SPA, black-headed gull, was recorded using the habitats within the site boundary, with flocks of this species recorded roosting on site infrastructure at Bunlicky WWTP during each of the winter surveys undertaken. The number of black-headed gulls recorded roosting ranged between 24 and 118, with an average of 71 individuals. This species was recorded roosting on the storm tank, aeration tanks and settlement tanks within the WWTP. No works are proposed on these elements of the site infrastructure. The black-headed gulls appear to be habituated to the activity within the WWTP and were not disturbed by human activity and noise generated by the plant.

Cormorant, also a listed SCI species, of the nearby River Shannon and River Fergus Estuaries SPA, was recorded on several occasions in flight over the proposed development site. This species was not recorded using the habitats within the proposed development site boundary during any of the surveys undertaken. No other SCI species of the River Shannon and River Fergus Estuaries SPA was recorded within or flying over the site boundary during the surveys.

Two species listed as a red list species on the Bird of Conservation Concern in Ireland (BoCCI) (Gilbert et, al., 2021) were recorded from within the proposed development site at Bunlicky WWTP. An individual snipe was recorded on a single occasion, flushed from wet grassland in the western section of the site. A kestrel was also recorded on two occasions hunting over the wet grassland in the western section of the site.

The remaining target species recorded flying over the site included common gull and mallard. Neither species landed in the habitats within the proposed development site. Neither of these species are listed SCI species of the nearby River Shannon and River Fergus Estuaries SPA.

5. CONCLUSION

Based on the wintering bird assemblages recorded over the six surveys carried out between October 2020 and March 2021, it can be concluded that the site does not support important assemblages of wintering wildfowl, waders or SCI species for which the River Shannon and River Fergus estuaries SPA has been designated.

Small flocks of the SCI species black-headed gull were recorded roosting on site infrastructure at Bunlicky WWTP, all of which will be retained as part of the proposed development. There is no potential for loss of supporting habitat for the SCI species of River Shannon and River Fergus Estuaries SPA.

Habitats within the site primarily consist of amenity grassland, wet grassland, buildings and artificial surfaces, and treeline. Species listed as SCIs for the River Shannon and River Fergus Estuaries SPA are unlikely to depend on these habitats within the proposed development site.

According to the site-specific conservation objectives document the SCI species of the River Shannon and River Fergus Estuaries SPA, are primarily associated with intertidal sheltered and shallow subtidal, sand and mud flats habitats. None of these habitats occur within the development boundary or in the immediate surrounding habitats.

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NPWS (2012) Appendix 9. River Shannon and River Fergus Estuaries SPA 004077 Conservation Objectives Supporting Document Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht



APPENDIX 1

NON- TARGET BIRD SPECIES

Species	Scientific name	BoCCI Status	Date recorded
Magpie	*Pica pica*	Green	30/11/2020 21/12/2020 15/01/2021 17/02/2021 23/02/2021 16/03/2021
Robin	*Erithacus rubecula*	Green	08/10/2020 30/11/2020 18/12/2020 21/12/2020 15/01/2021 25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Dunnock	*Prunella modularis*	Green	18/12/2020 15/01/2021 16/03/2021
Wood pigeon	*Columba palumbus*	Green	30/11/2020 21/12/2020 15/01/2021 17/02/2021 23/02/2021 29/03/2021
Wren	*Troglodytes troglodytes*	Green	08/10/2020 30/11/2020 18/12/2020 21/12/2020 15/01/2021 25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Great tit	*Parus major*	Green	08/10/2020 30/11/2020 18/12/2020 21/12/2020 15/01/2021 25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Hooded crow	*Corvus cornix*	Green	08/10/2020 30/11/2020 18/12/2020 21/12/2020 15/01/2021

Species	Scientific name	BoCCI Status	Date recorded
			25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Blackbird	*Turdus merula*	Green	08/10/2020 30/11/2020 18/12/2020 21/12/2020 15/01/2021 25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Bullfinch	*Pyrrhula pyrrhula*	Green	30/11/2020
Starling	*Sturnus vulgaris*	Amber (breeding population)	08/10/2020 30/11/2020 18/12/2020 21/12/2020 15/01/2021 25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Pied wagtail	*Motacilla alba yarrellii*	Green	30/11/2020 29/03/2021
Mistle thrush	*Turdus viscivorus*	Green	25/01/2021 23/02/2021
Jackdaw	*Corvus monedula*	Green	08/10/2020 30/11/2020 15/01/2021 16/03/2021
Chaffinch	*Fringilla coelebs*	Green	08/10/2020 30/11/2020 18/12/2020 21/12/2020 15/01/2021 25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Rook	*Corvus frugilegus*	Green	30/11/2020
Blue tit	*Cyanistes caeruleus*	Green	08/10/2020 30/11/2020 18/12/2020

Species	Scientific name	BoCCI Status	Date recorded
			21/12/2020 15/01/2021 25/01/2021 17/02/2021 23/02/2021 16/03/2021 29/03/2021
Goldfinch	*Carduelis carduelis*	Green	08/10/2020 25/01/2021 29/03/2021
Greenfinch	*Carduelis chloris*	Amber (breeding population)	30/11/2020 29/03/2021
Long tailed tit	*Aegithalus caudatus*	Green	30/11/2020 15/01/2021 23/02/2021 16/03/2021
Goldcrest	*Regulus regulus*	Green	16/03/2021

APPENDIX 2

Estuarine Ecological Survey, Limerick WWTP, Shannon Estuary, Co. Limerick



Produced by

AQUAFACT International Services Ltd. (APEM Group)

On behalf of

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May 2024

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AQUAFACT
APEM Group

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Appendix 2 Sediment Analysis Methodology

1. Introduction

AQUAFACT International Services Ltd. (part of the APEM Group) was commissioned by JB Barry and Partners (on behalf of Uisce Éireann) to undertake a biological assessment of the estuarine environment in the vicinity of Limerick Waste Water Treatment Plant (WWTP) prior to an upgrade of the facility.

Figure 1.1 below indicates the location of the Limerick WWTP and outfall within the Shannon Estuary area. The outfall is located in the Lower Shannon Estuary SAC and River Shannon and River Fergus Estuaries SPA, specifically in a freshwater tidal area called Limerick Docks. The Limerick Docks water body comprises the main channel of the River Shannon as it passes through Limerick City as well as the Ballincurra Creek on the south side of the city. The water body stretches from the bridge east of Corbally on Limerick's north side, down as far as Coonagh Point, just below the Limerick Tunnel on the N18. This water body covers a total area of 2.49km^2. Most of this water body is bordered by urban development (Kelly *et al.,* 2015).

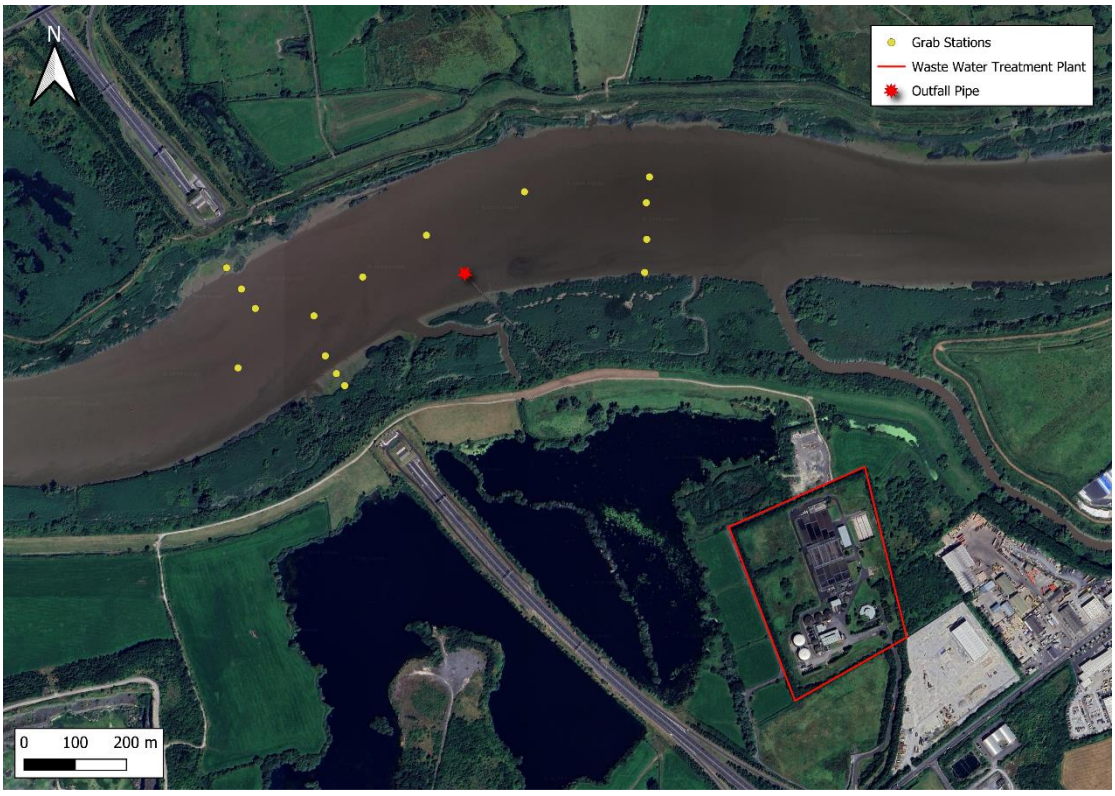


Figure 1.1: Location of the Limerick WWTP and discharge points within the study area of Shannon Estuary, Co. Limerick.

2. Ecological Surveys

2.1. Materials and Methods

2.1.1. Subtidal Survey Procedure

To carry out the subtidal benthic assessment of the area in question, AQUAFACT sampled a total of 6 stations. Sampling took place on the 18th January 2024 from AQUAFACT's 6.8m Lencraft RIB. The weather on both days was clear and frosty. There was a force 1 north-westerly wind blowing. High water was at 12pm (5.32m) at Limerick Docks. The locations of all subtidal stations sampled can be seen in Figure 2.1. Table 2.1 shows the station coordinates.

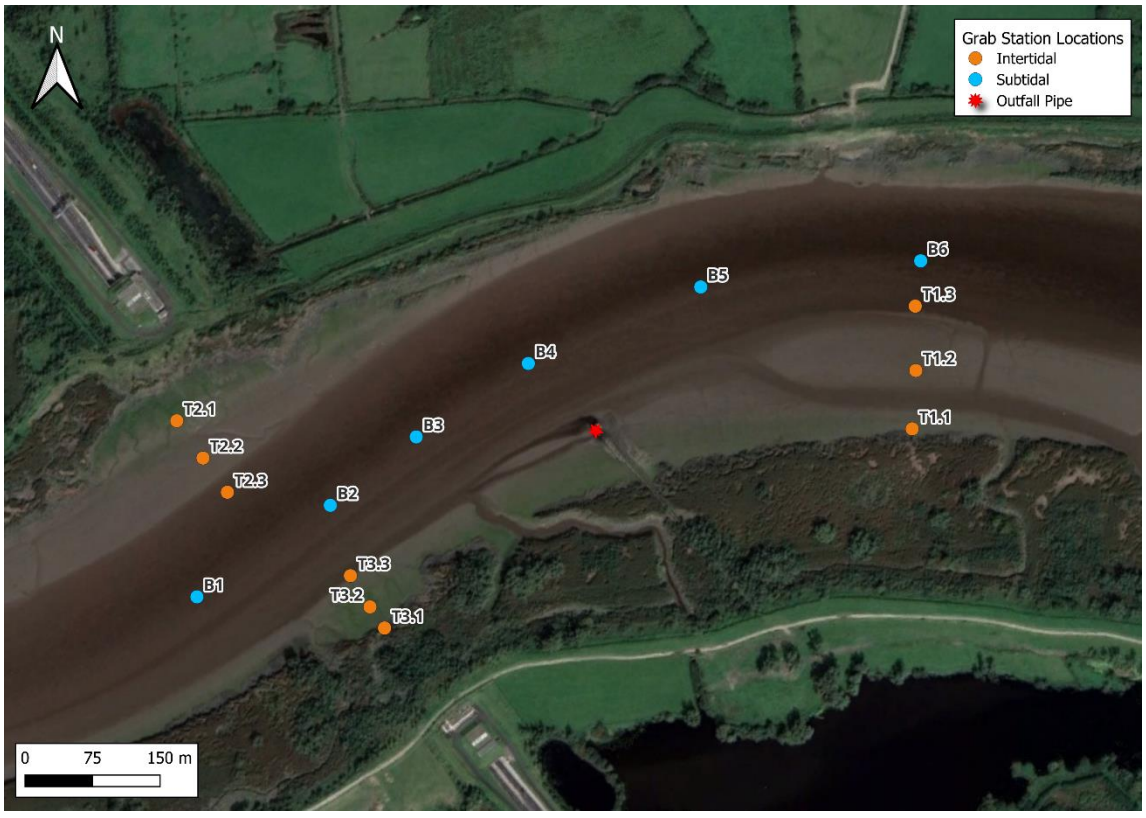


Figure 2.1: Location of grab stations sampled on the 18th January 2024.

Table 2.1: Station coordinates of all 6 subtidal stations sampled on the 18th January 2024.

Station	Latitude	Longitude
B1	52.65426	-8.68785
B2	52.65517	-8.68566
B3	52.65585	-8.68425
B4	52.65658	-8.68241
B5	52.65734	-8.67958
B6	52.65760	-8.67597

AQUAFACT has in-house standard operational procedures for benthic sampling and these were followed for this project. Additionally, the NMBAQC report "Guidelines for processing marine macrobenthic invertebrate samples: a processing requirements protocols" (Worsfold and Hall, 2010) was adhered to.

A 0.025m^2 van Veen grab was used to sample each station and two replicate grab samples were collected at each site. On arrival at each sampling station, the vessel location was recorded using DGPS (Lat/Long & ING). The grab deployment and recovery rates did not exceed 1 metre/sec and were <0.5 m/sec for the last 5 metres for water depths up to 30m and for the last 10m for depths greater than 30m.

A digital image of each sample (including sample label) was taken and its reference number entered in the sample data sheet. These images can be made available on request. The grab sampler was cleaned between stations to prevent cross contamination.

Each grab sample was carefully and gently sieved on a 1mm mesh sieve as a sediment water suspension for the retention of fauna. Great care was taken during the sieving process in order to minimise damage to taxa such as spionids, scale worms, phyllodocids and amphipods. The sample residue was carefully flushed into a pre-labelled (internally and externally) container from below. Each label contained the sample code and date. The samples were stained immediately with Eosin-briebrich scarlet and fixed with 4% w/v buffered formaldehyde solution (10% w/v buffered formaldehyde solution for very organic mud).

An additional grab sample was collected at each station for sediment analysis (organic carbon and granulometry). Each sediment sample was placed in plastic sampling bags and labelled internally and externally. These samples were frozen (<-18ºC) as soon as possible after acquisition.

2.1.2. Sample Processing

All faunal samples were placed in an illuminated shallow white tray and sorted first by eye to remove large specimens and then sorted under a stereo microscope (x 10 magnification). Following the removal of larger specimens, the samples were placed into Petri dishes, approximately one-half teaspoon at a time and sorted using a binocular microscope at x25 magnification.

The faunal samples were sorted into four main groups: Polychaeta, Mollusca, Crustacea, and others. The 'others' group consisted of echinoderms, nematodes, nemerteans, cnidarians, and other lesser phyla. The fauna were maintained in stabilised 70% industrial methylated spirit (IMS) following retrieval and identified to species level where practical using a binocular microscope, a compound microscope and all relevant taxonomic keys. After identification and enumeration, specimens were separated and stored at/to species level.

The sediment granulometric analysis was carried out by AQUAFACT using the traditional granulometric approach. The traditional analysis involved the dry sieving of approximately 100g of sediment using a series of Wentworth graded sieves. The process involved the separation of the sediment fractions by passing them through a series of sieves. Each sieve retained a fraction of the sediment, which were later weighed, and a percentage of the total was calculated. Table 3.2 shows the classification of sediment particle size ranges into size classes. Sieves, which corresponded to the range of particle sizes were used in the analysis. Refer to Appendix 2 for a detailed methodology of this procedure.

Table 2.2: The classification of sediment particle size ranges into size classes (adapted from Buchanan, 1984)

Range of Particle Size	Classification	Phi Unit
<63µm	Silt/Clay	>4 Ø
63-125 µm	Very Fine Sand	4 Ø, 3.5 Ø
125-250 µm	Fine Sand	3 Ø, 2.5 Ø
250-500 µm	Medium Sand	2 Ø, 1.5 Ø
500-1000 µm	Coarse Sand	1 Ø, 1.5 Ø
1000-2000 µm (1 – 2mm)	Very Coarse Sand	0 Ø, -0.5 Ø
>2000 µm (> 2mm)	Gravel	< -1 Ø

Organic carbon analysis was carried out by the by INAB certified ALS Labs in Loughrea using the Loss on Ignition technique.

2.1.3. Intertidal Survey Procedure

AQUAFACT carried out 3 intertidal transects (T1 to T3) on the 18th January 2024. Table 2.3 lists the transect station locations. Transect 1 was upstream of the WWTP outfall and Transects 2 and 3 were downstream of the outfall on opposites banks of the river. Figure 2.1 illustrates their locations. The weather on both days was clear and frosty. There was a force 1 north-westerly wind blowing. High water was at 12pm (5.32m) at Limerick Docks.

A grab survey was necessary to carry out the intertidal survey as the substrate was fine soft mud and it was not possible or safe to stand on the substrate at low water. Instead, the same procedure used for the subtidal benthic survey was employed. A 0.025m^2 Van Veen grab was deployed from AQUAFACT's RIB at high water at each of the of the transects' locations (Upper Shore, Mid Shore and Lower Shore). Replicate grabs were collected at each station as well as an additional grab for sediment analysis. The grabs were preserved and returned to the lab for identification and analysis. The full methodology for the collection and analysis of grab samples is outlined in Sections 2.1.1 and 2.1.2 above.

Table 2.3: Station coordinates of all intertidal transect stations sampled on the 18th January 2024.

Station	Latitude	Longitude
T1.1	52.65593	-8.67611
T1.2	52.65651	-8.67605
T1.3	52.65715	-8.67606
T2.1	52.65601	-8.68818
T2.2	52.65564	-8.68775
T2.3	52.6553	-8.68735
T3.1	52.65395	-8.68477
T3.2	52.65416	-8.68501
T3.3	52.65447	-8.68533

2.2. Data analysis

2.3. Sediment Data

Organic content of sediment samples was determined for each sample by expressing it as a percentage the sediment weight loss following combustion over the initial weight of the sediment. In general, Loss Of carbon Ignition (LOI) correlates with sediment particle size with fine-grained sediments typically containing higher levels of organic matter than coarse sediments.

For the granulometric analysis of sediment samples, the <63 µm (Silt-Clay) fraction was determined by weight loss following wet sieving. Coarser fractions comprising the sediment samples were determined by mechanical dry sieving through a series of Wentworth sieves; >4mm (Fine Gravel), 2-4mm (Very Fine Gravel), 1-2mm (Very Coarse Sand), 0.5-1mm (Coarse Sand), 0.25-0.5mm (Medium Sand), 125-250µm (Fine Sand), 62.5-125µm (Very Fine Sand). For each station, the weight of each fraction of the sediment retained on the sieve was expressed as a percentage of the total sample. The relative proportion of sediments in each fraction was used to classify sediments at the station *sensu* Folk (1954).

2.4. Faunal Data

Uni- and multi-variate statistical analysis of the faunal data was undertaken using PRIMER v.6 (Plymouth Routines in Ecological Research).

2.4.1. Univariate Indices

Using PRIMER the faunal data was used to produce a range of univariate indices. Univariate indices are designed to condense species data in a sample into a single coefficient that provides quantitative estimates of biological variability (Heip *et al.*, 1998; Clarke and Warwick, 2001). Univariate indices can be categorised as primary or derived indices.

Primary biological indices used in the current study include:

number of taxa (S) in the samples and

number of individuals (N) in the samples.

Derived biological indices, which are calculated based on the relative abundance of species in samples, used in the study include:

Margalef's species richness index (D) (Margalef, 1958),

$$D = \frac{S - 1}{\log_2 N}$$

where: N is the number of individuals and S is the number of species

Margalef's species richness (D) is a measure of the total number of species present for a given number of individuals.

Pielou's Evenness index (J) (Pielou, 1977)

$$J = \frac{H'(observed)}{H'_{max}}$$

where: H'_{max} is the maximum possible diversity, which could be achieved if all species were equally abundant (= $\log_2 S$)

Pielou's evenness is a measure of how evenly the individuals are distributed among different species.

Shannon-Wiener diversity index (H') (Pielou, 1977)

$$H' = -\sum_{i=1}^{S} p_i (\log_2 p_i)$$

where: p_l is the proportion of the total count accounted for by the i^{th} taxa

Shannon-Wiener diversity index takes both species abundance and species richness into account quantify diversity (Shannon & Wiener, 1949).

The Shannon-Wiener based Effective Number of Species (ENS) (Hill, 1973; Jost, 2006)

$$H = \exp(H')$$

where H' is the Shannon-Wiener diversity index.

The Shannon-Wiener index diversity index is converted to ENS to reflect 'true diversities' (Hill, 1973, Jost, 2006) that can then be compared across communities (MacArthur, 1965; Jost, 2006). The ENS is equivalent to the number of equally abundant species that would be needed in each sample to give the same value of a diversity index, *i.e.,* Shannon-Wiener Diversity index. The ENS behaves as one might? intuitively expect when diversity is doubled or halved, while other standard indices of diversity do not (Jost, 2006). If the ENS of one community is twice that of another, then it can be said that the community is twice as diverse as the other.

2.4.2. Multivariate Analysis

The PRIMER programme (Clarke & Warwick, 2001) was used to carry out multivariate analyses on the station-by-station faunal data. All species abundance data from the grab surveys was square root transformed and used to prepare a Bray-Curtis similarity matrix in PRIMER. The square root transformation allows some of the less abundant species to play a part in the similarity calculation. Various ordination and clustering techniques can then be applied to the similarity matrix to determine the relationship between the samples.

Multidimensional scaling (MDS) is a technique that ordinates samples as points in 2D or 3D space based on similarity in species distribution data. MDS performed on the Bray-Curtis similarity matrix produce ordination maps whereby the placement of samples reflects the similarity of their biological communities, rather than their simple geographical location (Clarke & Warwick, 2001). An indication of how well the similarity matrix is represented by the ordination is given by stress values calculated by comparing the interpoint distances in the similarity matrix with the corresponding interpoint distances on the ordinations. Perfect or near perfect matches are rare in field data, especially in the absence of a single overriding forcing factor such as an organic enrichment gradient. Stress values increase, not only with the reducing dimensionality (lack of clear forcing structure), but also with increasing quantity of data (it is a sum of the squares type regression coefficient). Clarke & Warwick (2001) have provided a classification of the reliability of MDS plots based on stress values, having compiled simulation studies of stress value behaviour

and archived empirical data. This classification generally holds well for ordinations of the type used in this study. Their classification is given below:

- Stress value < 0.05: Excellent representation of the data with no prospect of misinterpretation.
- Stress value < 0.10: Good representation, no real prospect of misinterpretation overall structure, but very fine detail may be misleading in compact subgroups.
- Stress value < 0.20: This provides a useful picture, but detail may be misinterpreted, particularly nearing 0.20.
- Stress value 0.20 to 0.30: This should be viewed with scepticism, particularly in the upper part of the range, and discarded for a small to moderate number of points such as < 50.
- Stress values > 0.30: The data points are close to being randomly distributed in the ordination and not representative of the underlying similarity matrix.

Each stress value must be interpreted both in terms of its absolute value and the number of data points. In the case of this study, the moderate number of data points indicates that the stress value can be interpreted more or less directly. While the above classification is arbitrary, it does provide a framework that has proved effective in this type of analysis.

Hierarchical Agglomerative Clustering (HAC) is used to cluster samples based on between-sample similarities into groups in dendrograms. Similarity Profiling (SIMPROF) is used to test if differences between HAC derived similarity-based clusters are significant. Similarity Percentages (SIMPER) analysis can be used to determine the characterising species of each cluster of stations identified either arbitrarily (by eye) from HAC dendrograms or statistically using SIMPROF testing (Clarke and Warwick, 2001; Clarke and Gorley, 2006; Anderson *et al*., 2008).

The species, which are responsible for the grouping of samples in CLUSTER analyses, were identified using the PRIMER programme SIMPER (Clarke & Warwick, 1994). This programme determined the percentage contribution of each species to the dissimilarity/similarity within and between each sample group.

3. Results

3.1. Faunal Results

The taxonomic identification of the benthic infauna across all 6 subtidal benthic stations and 9 intertidal transect stations sampled in the Shannon Estuary yielded a total count of 23 taxa ascribed to 4 phyla. Of the 23 taxa identified, 6 were identified to species level. The remaining 17 could not be identified to species level because they were juveniles, damaged or indeterminate. The full faunal abundance species list can be seen in Appendix 1.

Of the 23 taxa recorded, 7 were annelids (segmented worms), 11 were arthropods (crabs, shrimps, insects *etc.*), 4 were molluscs (mussels, cockles, snails etc.) and 1 was a nematode (round worm).

3.1.1.1. Univariate Analysis

In order to carry out the univariate analyses all replicate data were combined to give a total for each station prior to statistical analysis. Univariate statistical analyses were carried out on the station-by-station faunal data. As the same survey method and replication were used in both the intertidal and subtidal survey, all data was analysed together. The following parameters were calculated and can be seen in Table 3.4; species numbers, number of individuals, richness, evenness, Shannon-Wiener diversity, and Effective Species Number (ENS). Species numbers ranged from 3 (B6) to 14 (T1.1). Number of individuals ranged from 3 (B2 and B6) to 1,385 (T2.1). Richness ranged from 0.54 (T2.1) to 2.06 (T1.1). Evenness ranged from 0.27 (T3.1) to 1.0(B2 and B6). Shannon-Wiener diversity ranged from 0.59 (T3.1) to 1.63 (T1.1). Effective number of species ranged from 1.8 (T3.1) to 5.1 (T1.1), indicating that station T1.1 is over 2.8 times more diverse than T3.1. ENS also indicates that the diversity is broadly similar throughout the stations surveyed. Figure 3.1 shows these community indices in graphical form.

Table 3.1: Univariate measures of community structure.

Station	No. Taxa	No. Individuals	Richness	Evenness	Shannon-Wiener Diversity	Effective Number of Species
	S	N	d	J'	H'(loge)	EXP(H')
B1	7	49	1.54	0.65	1.26	3.51
B2	3	3	1.82	1.00	1.10	3.00
B3	5	36	1.12	0.66	1.06	2.88
B4	5	24	1.26	0.78	1.25	3.49
B5	4	16	1.08	0.87	1.21	3.36
B6	3	3	1.82	1.00	1.10	3.00
T1.1	14	549	2.06	0.62	1.63	5.10
T1.2	5	577	0.63	0.41	0.66	1.93
T1.3	7	566	0.95	0.43	0.84	2.32
T2.1	5	1385	0.55	0.47	0.76	2.15
T2.2	4	269	0.54	0.43	0.59	1.81
T2.3	5	286	0.71	0.57	0.92	2.51
T3.1	9	1094	1.14	0.27	0.59	1.80
T3.2	7	404	1.00	0.38	0.75	2.11
T3.3	5	481	0.65	0.62	1.00	2.71

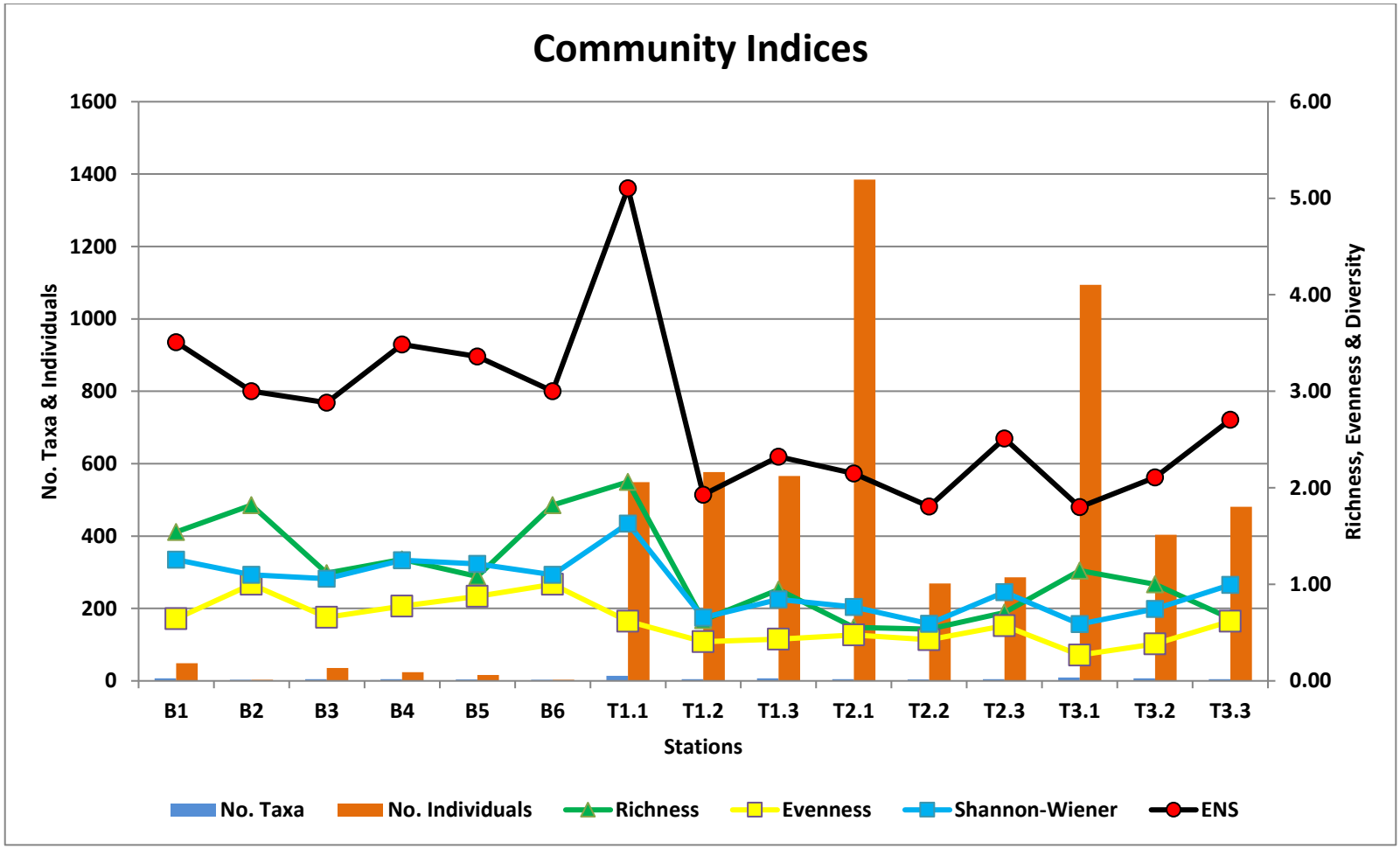


Figure 3.1: Subtidal community diversity indices. Diversity is expressed in Effective Number of Species (ENS) and Shannon-Wiener Diversity index.

3.1.1.2. Multivariate Analysis

The same data set used above for the univariate analyses was also used for the multivariate analyses. The dendrogram and the MDS plot can be seen in Figures 3.2 and 3.3, respectively. SIMPROF analysis revealed 3 statistically significant groupings between the 15 stations (the samples connected by red lines cannot be significantly differentiated). The stress level on the MDS plot indicates an excellent representation of the data with no prospect of misinterpretation of the overall structure.

A clear divide (24.64% similarity) can be seen between the Intertidal Groups (**Groups a** and **b**) and the subtidal **Group c**. A similarly clear divide (43.59% similarity) can be seen between **Group a** and **Group b**.

Group a consisted of station T1.1 (Upper Shore). This group separated from the other intertidal group (**Group b)** at a 56.41% dissimilarity level. T1.1 contained 14 taxa comprising 549 individuals. Of the 14 taxa, five of the taxa were present twice or less. SIMPER analysis could not be undertaken on this group as it only contained one station. Four taxa accounted for over 93% of the faunal abundance: the oligochaetes *Limnodrilus* spp. (183 individuals, 33.33% abundance) and Enchytraeidae (97 individuals, 17.67% abundance), the gastropod *Potamopyrgus antipodarum* (123 individuals, 22.4% abundance) and the amphipod *Corophium multisetosum* (109 individuals, 19.85% abundance). SIMPER analysis could not be carried out on this group as it only contained one station. *Potamopyrgus antipodarum* is indifferent to enrichment and is typically present in low densities with non-significant variations over time. *Corophium multisetosum* are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. *Limnodrilus* spp. and Enchytraeidae are first order opportunistic species which proliferate in reduced sediments with high organic content. Species richness and diversity were highest at this station.

Group b consisted of intertidal stations T1.2, T1.3, T2.1, T2.2, T2.3, T3.1, T3.2, and T3.3. This group separated from Group a at 56.41% dissimilarity level and had a within group similarity level of 72.38%. Group b contained 14 taxa comprising 5,062 individuals. Of the 14 taxa, 5 were present twice or less. Three taxa accounted for over 98% of the faunal abundance: *Limnodrilus* spp. (3,083 individuals, 60.9% abundance) and *Tubifex tubifex* (1,815 individuals, 35.86% abundance), and the gastropod *Potamopyrgus antipodarum* (74 individuals, 1.6% abundance). SIMPER analysis

revealed the same three species as the characterising species within this group. *Potamopyrgus antipodarum* is indifferent to enrichment and is typically present in low densities with non-significant variations over time. *Limnodrilus* spp. and *Tubifex tubifex* are first order opportunistic species which proliferate in reduced sediments with high organic content.

Group c contained all 6 subtidal stations (B1 – B6). This group separated from the intertidal groups (**Groups a & b)** at a 75.36% dissimilarity level and had a within group similarity of 46.66%. This group contained 11 taxa comprising 131 individuals. Of the 11 taxa, 5 were present twice or less. Five species accounted for almost 94% of the faunal abundance: the oligochaetes *Tubifex tubifex* (56 individuals, 42.75% abundance) and *Limnodrilus* spp. (47 individuals, 35.88% abundance), the amphipods *Corophium multisetosum* (8 individuals, 6.11% abundance) and *Gammarus zaddachi* (5 individuals, 3.82% abundance), and the gastropod *Potamopyrgus antipodarum* (7 individuals, 5.34% abundance). SIMPER analysis revealed *Tubifex tubifex, Limnodrilus* spp., and *Corophium multisetosum* as the characterising taxa. *Potamopyrgus antipodarum* is indifferent to enrichment and is typically present in low densities with non-significant variations over time. *Corophium multisetosum* and *Gammarus zaddachi* are tolerant of disturbance, occurring under normal conditions, but their populations are stimulated by organic enrichment. *Limnodrilus* spp. and *Tubifex tubifex* are first order opportunistic species which proliferate in reduced sediments with high organic content.

Analysis of the fauna from the subtidal grab stations indicates that these stations can be classified as belonging to one of the seven common benthic community habitat types occurring within the Estuaries Qualifying Interest [1130] within the Lower Shannon Estuary SAC (NPWS, 2012) namely the habitat 'Estuarine subtidal muddy sand to mixed sediment with gammarids community complex'. This community complex occurs at the eastern extreme of the SAC site from Cock Rock to Scarlet Reach in water depths between 2.5 and 7m. The sediment of this community complex is that of muddy sand (silt-clay ranging from 50.7% to 34.4% and very fine sand from 29.3% to 11.2%) with patches of gravel (ranging from 24.1% to 0.5%). This fauna community complex consists of Gammaridae amphipods with *Bathyporeia* sp. *Bathyporeia pelagica*, *Leptocheirus* sp., *Gammarus* sp. and *Gammarus zaddachi* all recorded in low abundances here (NPWS, 2012).

Analysis of the fauna from the intertidal grab stations indicates that these stations cannot be assigned to one of the seven common benthic community habitat types occurring within the

Estuaries Qualifying Interest [1130] within the Lower Shannon Estuary SAC (NPWS, 2012). All intertidal stations (**Group a** and **Group b**) can be classified as belonging to the JNCC biotope 'SS.SMu.SMuVS.LhofTtub – *Limnodrilus hoffmeisteri, Tubifex tubifex* and *Gammarus* spp. in low salinty infralittoral muddy sediment' (EUNIS code A5.327). This community is found in upper estuary muddy sediments with very low fluctuating salinity, characterized by the oligochaetes *Limnodrilus hoffmeisteri* and *Tubifex tubifex.* Other taxa may include *Marenzellaria* spp. *Gammarus zaddachi, Paranais litoralis* and *Baltidrilus costatus.* The biotope contains elements of both freshwater and brackish communities. It is found in the transitional zone between the freshwater and brackish environments where the tidal currents are sufficiently reduced to allow the deposition of fine silt and the establishment of an infaunal community (Tillin *et al.,* 2023).

Interstitial salinity is an important factor determining the occurrence of the IMU.LimTtub community. Although tidal, the uppermost part of an estuary may predominantly experience freshwater conditions (salinity in Limerick Docks area has been measured between 0.833 psu to 3.2 psu (Kelly *et al.,* 2015)). The infauna consists almost exclusively of the freshwater oligochaetes, *Limnodrilus hoffmeisteri* and *Tubifex tubifex*. Stczynska-Jurewicz (1972) reported that the maximum salinity at which *Tubifex tubifex* could survive was 9 psu and the maximum at which natural egg laying and development occurred was 4 psu. Kennedy (1965) stated that salinity controlled the distribution of *Limnodrilus hoffmeisteri but* gave no precise limits. McLusky *et al.* (1980) found *Tubifex tubifex* in localities with a maximum salinity of 4.1 psu, and *Limnodrilus hoffmeisteri* occurred at salinities of up to 7.7 psu. (Tillin *et al.,* 2023).

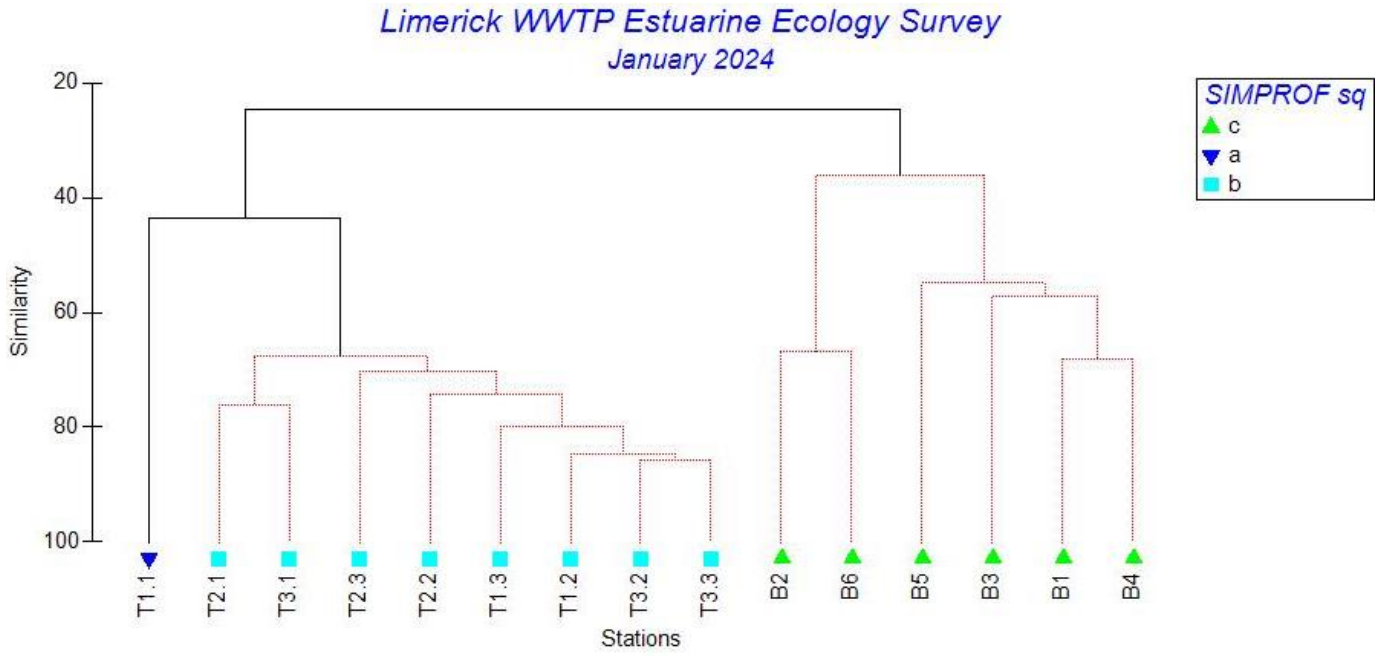


Figure 3.2: Dendrogram produced from Cluster analysis.

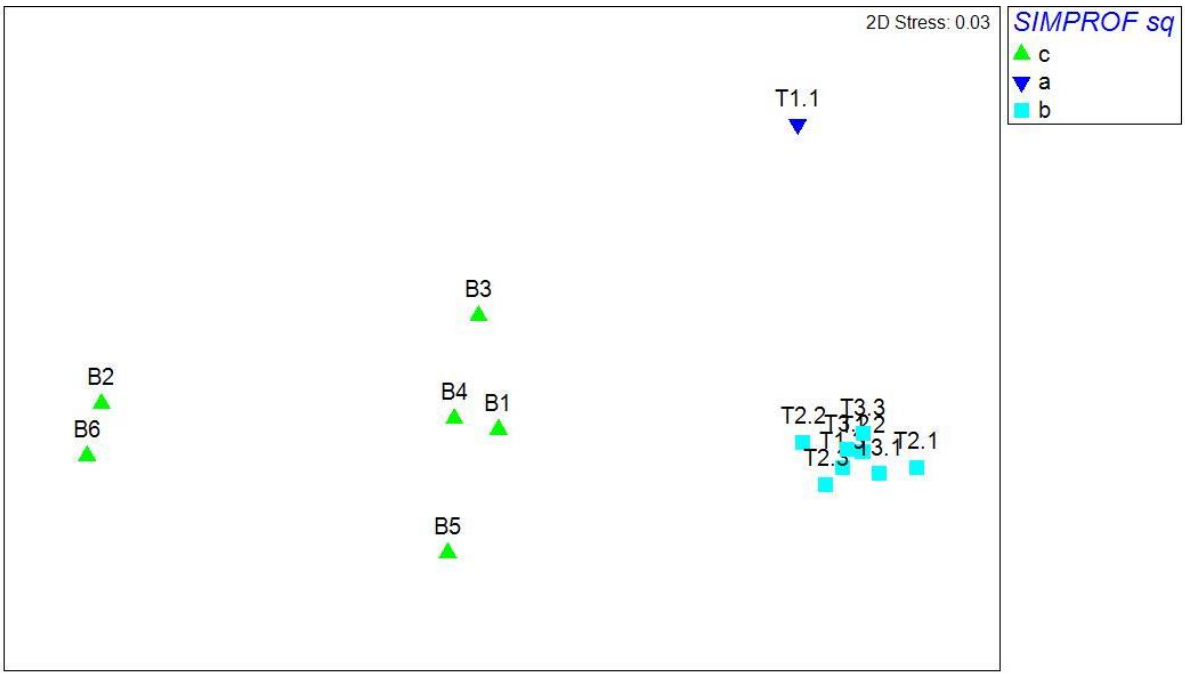


Figure 3.3: MDS plot.

3.2. Sediment Results

Table 3.4 shows the sediment characteristics of the subtidal and intertidal stations surveyed including the granulometry and the percentage organic carbon.

The sediment sampled within the study area was classified as muddy sand, sandy mud, slightly gravelly muddy sand, and slightly gravelly sandy mud, according to Folk (1954). No medium gravel-boulders were recorded. Highest levels of fine gravel were observed at T3.1 and T3.2 (0.4%). Highest levels of very fine gravel and very coarse sand were observed at T3.2 (1% and 20.2 % respectively). Highest levels of coarse sand and medium sand were found at T3.1 (18.1% and 13% respectively). Highest levels of fine sand were found at B6 (10.8%). Highest levels of very fine sand were found at T2.2 (18.9%) and highest levels of silt-clay were found at T2.3 (56.5%). Figure 3.4 shows the breakdown of sediment composition at each station and. Figure 3.5 illustrates the sediment type according to Folk (1954).

Organic matter values ranged from 3.66% (B3) to 6.78% (B1) in the subtidal stations and from 2.59% (T2.3) to 5.31% (T3.1) in the intertidal.

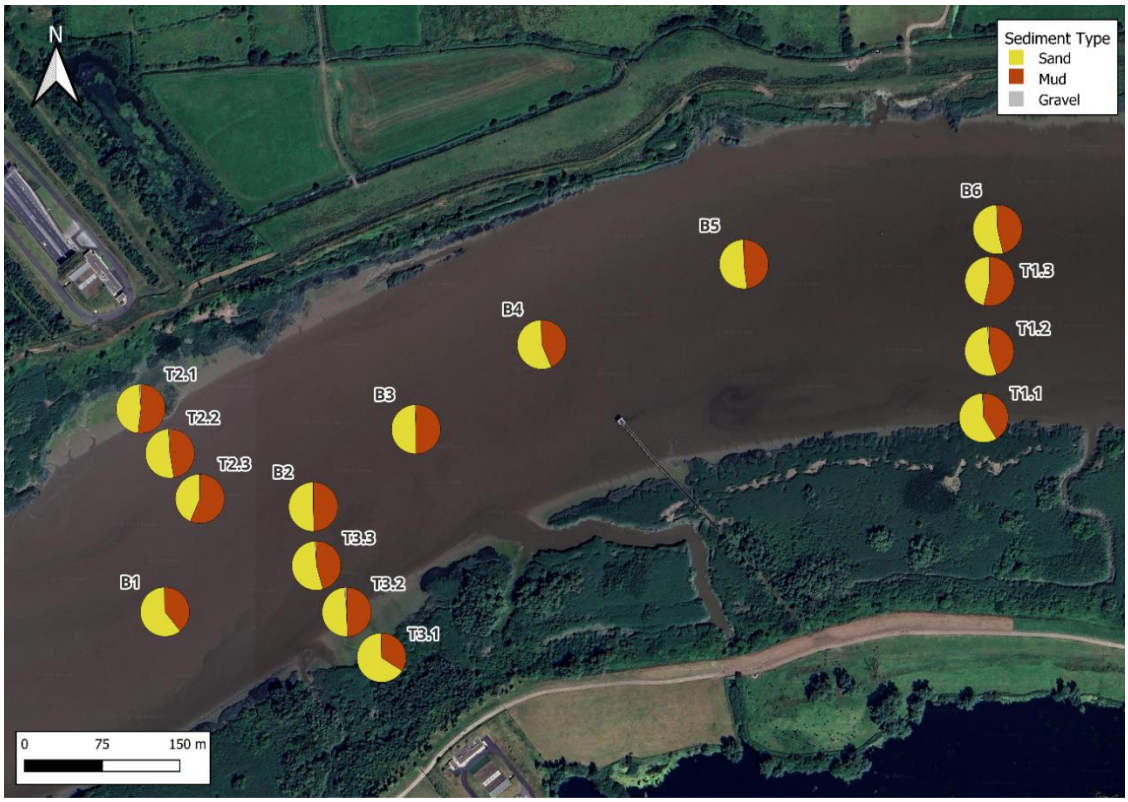


Figure 3.4: A breakdown of sediment type at each station.

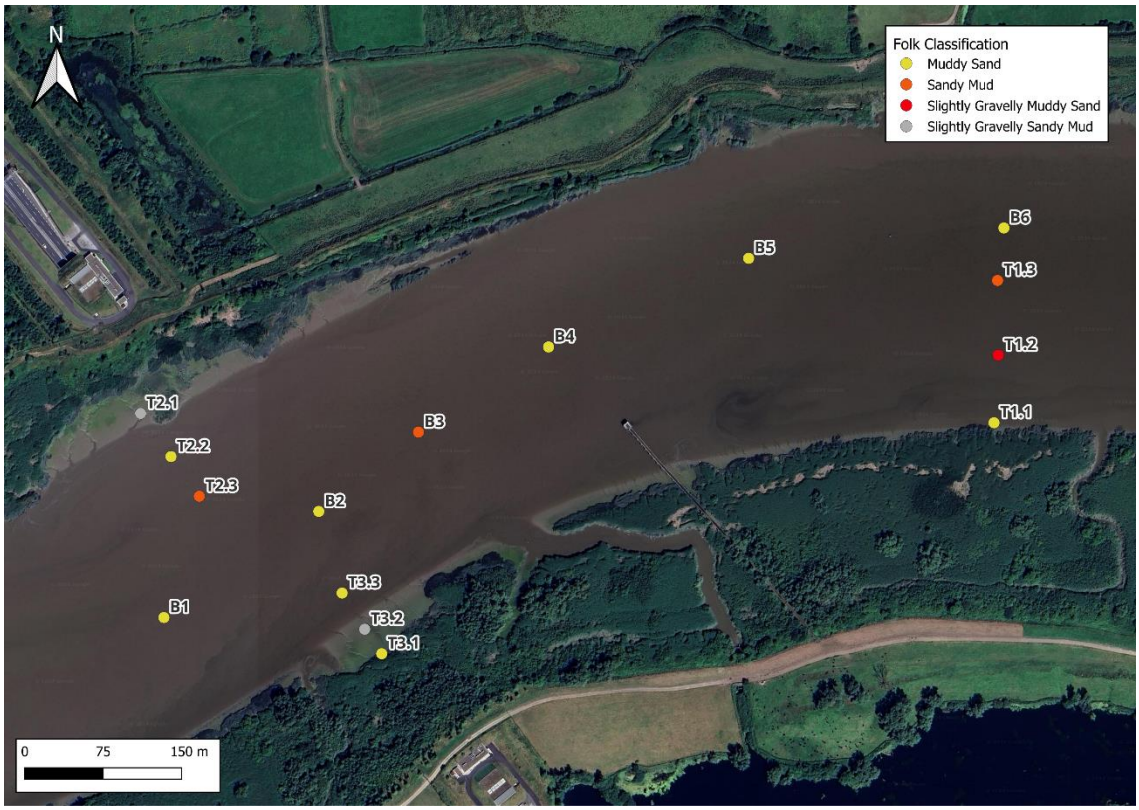


Figure 3.5: Sediment type at each of the subtidal and intertidal stations according to Folk (1954).

Table 3.2: Sediment characteristics of the benthic faunal stations sampled. LOI refers to the % organic carbon loss on ignition.

Station	>8mm	Fine Gravel (4-8mm)	Very Fine Gravel (2-4mm)	Very Coarse Sand (1-2mm)	Coarse Sand (0.5-1mm)	Medium Sand (0.25-0.5mm)	Fine Sand (125-250mm)	Very Fine Sand (62.5-125mm)	Silt-Clay (<63mm)	Folk (1954)	LOI
B1	0	0	0.3	18.7	14.6	8.5	3.7	14.9	39.3	Muddy Sand	6.78
B2	0	0	0.2	19.3	11.3	7.7	5.8	6.2	49.6	Muddy Sand	4.92
B3	0	0.1	0.5	15	10.1	8.2	3	13.1	50	Sandy Mud	3.66
B4	0	0	0.5	17.1	13.4	9.5	6	9.9	43.6	Muddy Sand	4.48
B5	0	0.1	0.3	10.2	9.5	9.3	8.2	14.5	48	Muddy Sand	3.89
B6	0	0.2	0.5	10.4	10.7	9.4	10.8	11.7	46.4	Muddy Sand	4.78
T1.1	0	0	0.9	17.1	15.3	11.2	2.4	11.8	41.3	Muddy Sand	3.92
T1.2	0	0.2	0.9	9.9	14	10.4	3.2	16.2	45.2	Slightly Gravelly Muddy Sand	4.08
T1.3	0	0	0.4	11.6	10.1	6.7	5.2	12.2	53.7	Sandy Mud	2.93
T2.1	0	0.3	0.8	12.8	12.5	8.7	1.7	11.3	51.9	Slightly Gravelly Sandy Mud	4.15
T2.2	0	0.1	0.8	10.7	10	7.4	4.7	18.9	47.4	Muddy Sand	3.79
T2.3	0	0	0.2	7.2	5.3	5.1	5.8	20	56.5	Sandy Mud	2.59
T3.1	0	0.4	0	20.2	18.1	13	6.4	7.8	34.1	Muddy Sand	5.31
T3.2	0	0.4	1	8.3	11.8	11.7	4.9	12.5	49.5	Slightly Gravelly Sandy Mud	4.48

4. Discussion

In order to assess the estuarine biological environment in the vicinity of Limerick Waste Water Treatment Plant (WWTP), prior to an upgrade of the facility, AQUAFACT carried out a series of biological surveys of the intertidal and subtidal estuarine communities upstream and downstream of the Limerick WWTP outfall. This area of the Lower Shannon SAC is known as Limerick Docks and is a freshwater tidal environment with salinity ranging from 0.833 psu to 3.2 psu. The fauna of such areas in upper estuaries is that of a tidal freshwater zone, which leads to a stressed freshwater-seawater interface. Such areas have a reduced faunal composition compared to rivers or the higher salinity upper reaches of an estuary (McLusky *et al.,* 1993).

Multivariate analysis of the fauna identified two distinct biological communities. The subtidal stations are classified as belonging to one of the seven common benthic community habitat types occurring within the Estuaries Qualifying Interest [1130] within the Lower Shannon Estuary SAC namely the habitat 'Estuarine subtidal muddy sand to mixed sediment with gammarids community complex'. This community complex occurs at the eastern extreme of the SAC site from Cock Rock to Scarlet Reach in water depths between 2.5 and 7m (NPWS, 2012). Within this community, the number of species and their abundance was low which is typical of this estuarine community (AQUAFACT, 2011a). Five species accounted for almost 94% of the faunal abundance: the oligochaetes *Tubifex tubifex* and *Limnodrilus* spp., the amphipods *Corophium multisetosum* and *Gammarus zaddachi,* and the gastropod *Potamopyrgus antipodarum.* The oligochaetes and gastropods at these stations are more a reflection of the freshwater influence here than a characteristic of this fauna poor benthic community. The subtidal sediment type was muddy sand and sandy mud according to Folk (1954) classification. Organic carbon values ranged from 3.66% (B3) to 6.78% (B1). The characterising surveys carried out by AQUAFACT (2011a) for the Lower Shannon SAC recorded an organic carbon content range from 17.26% to 18.65% for stations in the same biological community and close vicinity.

The second distinct biological community was recorded at all the intertidal stations. Analysis of the fauna from the intertidal grab stations indicates that these stations cannot be assigned to one of the seven common benthic community habitat types occurring within the Estuaries Qualifying

Interest [1130] within the Lower Shannon Estuary SAC (NPWS, 2012). They can be classified as belong to the JNCC biotope 'SS.SMu.SMuVS.LhofTtub – *Limnodrilus hoffmeisteri, Tubifex tubifex* and *Gammarus* spp. in low salinity infralittoral muddy sediment' (EUNIS code A5.327). This community is found in upper estuary muddy sediments with very low fluctuating salinity, characterized by the oligochaetes *Limnodrilus hoffmeisteri* and *Tubifex tubifex.* Two statistically significant groups can be classified as belonging to this biotope (**Group a** (T1.1) and **Group b** (all other intertidal stations)), with the differences being because of slight species composition variance. However, all intertidal stations are dominated (>90% abundance) by the oligochaetes *Limnodrilus* spp. and *Tubifex tubifex.* Additional species important to note are the gastropod *Potamopyrgus antipodarum* and the amphipod *Corophium multisetosum.* Organic carbon ranged from 2.59% (T2.3) to 5.31% (T3.1).

Limnodrilus spp. and *Tubifex tubifex* were the two most dominant taxa in both the subtidal and intertidal stations, accounting for over 90% of the faunal abundance. *Limnodrilus* spp. has a wide ecological range and inhabits cohesive muds in all types of waters including polluted, but it cannot tolerate oxygen deficiency. Although it is a freshwater species it is found further seaward than any other freshwater aquatic oligochaete species and is found in habitats likely to be exposed to very low salinity, *e.g.,* upper estuaries where interstitial salinity is less than 5 psu (Budd, 2003). *Tubifex tubifex* inhabits cohesive muds in a variety of habitats and is tolerant of oxygen deficiency. It is especially abundant in polluted sediments and marginal habitats not occupied by many other species, *e.g.,* upper estuaries where interstitial salinity is less than 5 psu (Budd, 2005).

In a study on the intertidal and subtidal soft sediment macrofauna of the upper Forth estuary, Scotland, McLusky *et al.* (1993) recorded very high abundances of these taxa in an area which historically received large quantities of organic waste from both sewage and industrial discharge. In 1977, areas in the upper Forth Estuary with comparable salinity and grain size as the intertidal stations in the Limerick Dock area had *Limnodrilus* spp. recorded at 217,600 per m^2, and *Tubifex tubifex* recorded at 127,400 per m^2 with organic carbon levels from 8% to 19.8%. In 1988/89 surveys in the same locations, following substantial sewage treatment works upstream at Stirling and Alloa, the organic carbon levels had reduced to between 3.6% and 8.6% and a corresponding near 10-fold reduction in the density of oligochaetes.

In a similar study of the spatial distribution of oligochaetes in the tidal freshwater and brackish parts of the Schelde Estuary, Belgium, Seys *et al.* (1999) record densities of oligochaetes in similar oligohaline to freshwater zones at between 3,750 per m^2 to 216,032 per m^2 respectively. They report that in addition to organic content the total density and total biomass of these oligochaetes are significantly correlated with sediment and preferring fine silt sediments.

Within the present study, highest densities of oligochaetes were *Limnodrilus* spp. recorded at 11,610 per m^2 (T3.1) and *Tubifex tubifex* recorded at 10,397 per m^2 (T2.1), with organic carbon levels ranging from 2.59% (T2.3) to 5.31% (T3.1).

5. Conclusion

The Estuarine subtidal muddy sand to mixed sediment with gammarids community complex is a species poor biotope reflective of its location in the upper estuary with a freshwater tidal influence. In the Limerick Docks area in the vicinity of the Limerick WWTP outfall there is a slighter higher diversity than recorded for this biotope for the Lower Shannon SAC (AQUAFACT, 2011a) and this is due to the presence of freshwater species of oligochaetes that may not be present further downstream. Changes in water quality by the Limerick WWTP upgrade are unlikely to have a negative effect on the biotope at this location.

The intertidal biotope SS.SMu.SMuVS.LhofTtub – *Limnodrilus hoffmeisteri, Tubifex tubifex* and *Gammarus* spp. in low salinity infralittoral muddy sediment present in the survey area is dominated by the oligochaetes *Limnodrilus* spp. and *Tubifex tubifex.* This biotope is not negatively affected by changes in nutrient or organic enrichment however the population density may decrease with reduction in organic enrichment.

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Appendix I

Species Lists

P12420 Limerick WWTP- Subtidal																	
Phylum	**Class**	**Order**	**Family**		**AphiaID**	**B1a**	**B1b**	**B2a**	**B2b**	**B3a**	**B3b**	**B4a**	**B4b**	**B5a**	**B5b**	**B6a**	**B6b**
Nematoda				Nematoda	799							1					
Annelida	Clitellata			Oligochaeta	2036							pres					
Annelida	Clitellata	Haplotaxida	Naididae	Naididae	2039					3							
Annelida	Clitellata	Haplotaxida	Naididae	*Limnodrilus*	137388	17	11	1			5	8			5		
Annelida	Clitellata	Haplotaxida	Naididae	*Tubifex tubifex*	137569	5	7		1	10	14	11		3	4		1
Annelida	Clitellata	Haplotaxida	Naididae	*Tubificoides pseudogaster*	137582					1							
Annelida	Clitellata	Enchytraeida	Enchytraeidae	Enchytraeidae	2038	1											
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammaridae juvenile	101383									1			
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus zaddachi*	102299	2							3				
Arthropoda	Malacostraca	Amphipoda	Corophiidae	Corophiidae	101376				pres								
Arthropoda	Malacostraca	Amphipoda	Corophiidae	*Corophium multisetosum*	102096		2	1			3		1			1	
Mollusca	Gastropoda	Cycloneritida	Neritidae	*Theodoxus fluviatilis*	153558		1										
Mollusca	Gastropoda	Littorinimorpha	Tateidae	*Potamopyrgus antipodarum*	147123	2	1								3	1	

P12420 Limerick WWTP – Intertidal Transect 1											
Phylum	**Class**	**Order**	**Family**		**AphiaID**	**T1.1a**	**T1.1b**	**T1.2a**	**T1.2b**	**T1.3a**	**T1.3b**
Nematoda				Nematoda	799						
Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae	981		3				
Annelida	Clitellata			Oligochaeta	2036		3				
Annelida	Clitellata	Haplotaxida	Naididae	Naididae	2039						
Annelida	Clitellata	Haplotaxida	Naididae	*Limnodrilus*	137388	77	106	273	166	165	128
Annelida	Clitellata	Haplotaxida	Naididae	*Tubifex tubifex*	137569	5	11	62	58	146	111
Annelida	Clitellata	Enchytraeida	Enchytraeidae	Enchytraeidae	2038	95	2				
Arthropoda	Arachnida			Acari	292684	1					
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammaridae	101383						1
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus zaddachi*	102299					4	
Arthropoda	Malacostraca	Amphipoda	Corophiidae	*Corophium*	101489			1			
Arthropoda	Malacostraca	Amphipoda	Corophiidae	*Corophium multisetosum*	102096	20	89			3	
Arthropoda	Insecta	Diptera		Diptera	118088						
Arthropoda	Insecta	Diptera		Diptera larva	118088	1	2				
Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogonidae	150940		1				
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae	118100			1			
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae larva	118100	3	4			3	
Arthropoda	Insecta	Diptera	Psychodidae	Psychodidae	391173						
Arthropoda	Insecta	Ephemeroptera		Ephemeroptera	235812	1					
Arthropoda	Collembola			Collembola	118086	1					
Mollusca	Gastropoda			Gastropoda	101		1				
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae	120						
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae juvenile	120						
Mollusca	Gastropoda	Littorinimorpha	Tateidae	*Potamopyrgus antipodarum*	147123	6	117	9	7	5	

P12420 Limerick WWTP – Intertidal Transect 2											
Phylum	**Class**	**Order**	**Family**		**AphiaID**	**T2.1a**	**T2.1b**	**T2.2a**	**T2.2b**	**T2.3a**	**T2.3b**
Nematoda				Nematoda	799	6	11			2	
Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae	981						
Annelida	Clitellata			Oligochaeta	2036						
Annelida	Clitellata	Haplotaxida	Naididae	Naididae	2039			4			
Annelida	Clitellata	Haplotaxida	Naididae	Limnodrilus	137388	256	327	117	99	9	103
Annelida	Clitellata	Haplotaxida	Naididae	Tubifex tubifex	137569	339	441	23	23	9	147
Annelida	Clitellata	Enchytraeida	Enchytraeidae	Enchytraeidae	2038						
Arthropoda	Arachnida			Acari	292684						
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammaridae	101383						
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus zaddachi	102299						
Arthropoda	Malacostraca	Amphipoda	Corophiidae	Corophium	101489						
Arthropoda	Malacostraca	Amphipoda	Corophiidae	Corophium multisetosum	102096					11	2
Arthropoda	Insecta	Diptera		Diptera	118088						
Arthropoda	Insecta	Diptera		Diptera larva	118088						
Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogonidae	150940						
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae	118100	1					2
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae larva	118100		2			1	
Arthropoda	Insecta	Diptera	Psychodidae	Psychodidae	391173						
Arthropoda	Insecta	Ephemeroptera		Ephemeroptera	235812						
Arthropoda	Collembola			Collembola	118086						
Mollusca	Gastropoda			Gastropoda	101						
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae	120						
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae juvenile	120						
Mollusca	Gastropoda	Littorinimorpha	Tateidae	Potamopyrgus antipodarum	147123		2	1	2		

P12420 Limerick WWTP – Intertidal Transect 3											
Phylum	**Class**	**Order**	**Family**		**AphiaID**	**T3.1a**	**T3.1b**	**T3.2a**	**T3.2b**	**T3.3a**	**T3.3b**
Nematoda				Nematoda	799		2		1	2	
Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae	981						
Annelida	Clitellata			Oligochaeta	2036	1					
Annelida	Clitellata	Haplotaxida	Naididae	Naididae	2039			2			
Annelida	Clitellata	Haplotaxida	Naididae	*Limnodrilus*	137388	607	264	199	78	162	130
Annelida	Clitellata	Haplotaxida	Naididae	*Tubifex tubifex*	137569	160	45	60	57	38	96
Annelida	Clitellata	Enchytraeida	Enchytraeidae	Enchytraeidae	2038						
Arthropoda	Arachnida			Acari	292684						
Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammaridae	101383						
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus zaddachi*	102299						
Arthropoda	Malacostraca	Amphipoda	Corophiidae	*Corophium*	101489						
Arthropoda	Malacostraca	Amphipoda	Corophiidae	*Corophium multisetosum*	102096						pres
Arthropoda	Insecta	Diptera		Diptera	118088		1				
Arthropoda	Insecta	Diptera		Diptera larva	118088						
Arthropoda	Insecta	Diptera	Ceratopogonidae	Ceratopogonidae	150940						
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae	118100	1	2				1
Arthropoda	Insecta	Diptera	Chironomidae	Chironomidae larva	118100			2		17	
Arthropoda	Insecta	Diptera	Psychodidae	Psychodidae	391173		1				
Arthropoda	Insecta	Ephemeroptera		Ephemeroptera	235812						
Arthropoda	Collembola			Collembola	118086						
Mollusca	Gastropoda			Gastropoda	101						
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae	120	1					
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae juvenile	120				1		
Mollusca	Gastropoda	Littorinimorpha	Tateidae	*Potamopyrgus antipodarum*	147123	4	5	2	2	35	

Appendix 2

Sediment Analysis Methodology

Particle size analysis (PSA)

AQUAFACT will carry out the Particle Size Analysis using the traditional granulometric technique. We have all of the necessary equipment required *e.g.,* Wentworth graded sieves, Easysize and GRADISTAT computer software, hydrogen peroxide, sodium hexametaphosphate, drying oven, beakers, mixers, electronic scales. We have carried out sediment analysis for all subtidal sampling programmes that we have been involved in.
AQUAFACT will employ the following methodology for the granulometric analysis:

1. Approximately 100g of dried sediment (previously washed in distilled water and dried) is weighed out and placed in a labelled 1L glass beaker to which 100ml of a 6 percent hydrogen peroxide solution is then added. This is allowed to stand overnight in a fume hood.
2. The beaker is placed on a hot plate and heated gently. Small quantities of hydrogen peroxide are added to the beaker until there is no further reaction. This peroxide treatment removes any organic material from the sediment which can interfere with grain size determination.
3. The beaker is then emptied of sediment and rinsed into a 63µm sieve. This is then washed with distilled water to remove any residual hydrogen peroxide. The sample retained on the sieve is then carefully washed back into the glass beaker up to a volume of approximately 250ml of distilled water.
4. 10ml of sodium hexametaphosphate solution is added to the beaker and this solution is stirred for ten minutes and then allowed to stand overnight. This treatment helps to dissociate the clay particles from one another.
5. The beaker with the sediment and sodium hexametaphosphate solution is washed and rinsed into a 63µm sieve. The retained sampled is carefully washed from the sieve into a labelled aluminium tray and placed in an oven for drying at 100ºC for 24 hours.
6. The dried sediment should then be passed through a Wentworth series of analytical sieves (>8,000 to 63µm; single phi units). The weight of material retained in each sieve is weighed and recorded. The material passing through the 63µm sieve is also weighed and the value added to the value measured in Point 5 above.
7. The total silt/clay fraction is determined by subtracting all weighed fractions from the initial starting weight of sediment as the less than 63µm fraction was lost during the various washing stages.
8. The reporting of sediment samples will be as percentages within the following range of particle sizes:
    - PSA % <63
    - PSA % 63<125
    - PSA % 125<250
    - PSA % 250<500
    - PSA % 500<1000
    - PSA % 1000<2000
    - PSA % 2000<4000
    - PSA % 4000<8000
    - PSA % ≥8000

APPENDIX 3

LIST OF PLANS AND PROJECTS

Projects

Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the Proposed Development in March 2026. The material was gathered through a search of relevant online Planning Registers, reviews of relevant documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts. All relevant projects were considered in relation to the potential for in-combination effects. All relevant data was reviewed (e.g. individual EISs/EIARs, NISs, layouts, drawings etc.) for all relevant projects where available.

The detailed assessment of the potential for cumulative adverse effects to occur as a result of the Proposed Development is contained within the main NIS report.

- Permission for a 7-year planning permission for demolition of 3 no. commercial buildings and removal/demolition of a number of sheds/outbuildings, refurbishment of Block B an existing warehouse building (1,140sqm), provision of 3 no. retail warehouse units (total 2,593sqm) in Block D fronting onto Dock Road, provision of 2 no. logistics warehouse units in Block H (2,790sqm) with an optional mezzanine floor which has the potential to increase floorspace by 350sqm, provision of 34 no. commercial/enterprise units delivered in 5 no. blocks (A, B1, E, F & G) with a total floor area of 9547sqm and an optional mezzanine floor area which has the potential to increase the overall floor area by 1,870sqm, if constructed, totem and building signage and all associated site works including provision of an ESB substation, pumping station and emergency storage, PV panels, mechanical ventilation mounting plant and external condenser units. Primary access to the site will be through the Corcanree Business Park via the Greenpark Roundabout. The existing access serving the site from Dock Road will be restricted to a left in left out junction. An Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) has been prepared in respect of the proposed development and accompanies the planning application (pl. ref.: 221280).
- 1. Demolition of existing unoccupied industrial buildings and associated site works along with site clearance. 2. Construction of a motor service station which will include service station building with convenience shop, food court, staff facilities, canopy, fuel facilities, parking and circulation space, access provision with new entrance and exit arrangements off N69 & R510. The development also includes site infrastructural works, public lighting, signage, landscaping, electrical substation, electric car charging points, roof mounted solar panels, storm water runoff petrol interceptors attenuation system and surface water drainage, connection to public foul sewer, underground fuel storage tanks, rain water harvesting system, connection to public water supply, underground storage tanks for fire-fighting purposes, underground rain water harvesting tanks (pl. ref.: 201310).
- Permission for a Large-Scale Residential Development (LRD) comprising amendments to a previously permitted Strategic Housing Development (SHD) (An Bord Pleanála Reg. Ref. 311588-21) with a total application site area of c. 10.5Ha (with a substantive residential site development area of c. 7.9Ha), on lands at the Former Greenpark Racecourse, Dock Road, Limerick, principally bounded by existing undeveloped lands to the north, south, and west and the adjoining Log na gCapall Housing Estate and Greenpark Avenue to the east. The proposed amendments relate solely to the previously permitted Apartment Blocks A and B, and the areas between and immediately surrounding these Blocks. The development will consist of: the relocation of bin stores within permitted service area located between Apartment Blocks A and B; provision of ESB substation with associated switch room within service area; omission of bicycle parking within service area; associated amendments to footprint and elevational arrangement of service area; change of use of 2 no. permitted Ground Floor units within Apartment Block A from ancillary residential amenity use to residential use (to provide 2 no. 2-bedroom apartments with associated private terraces);

change of use of permitted plant rooms at Ground Floor Level of Apartment Blocks A and B for use as bicycle storage; provision of cleaners store and smoke shaft at Ground Floor Level of Apartment Block A; minor internal design revision at Ground Floor Level at Apartment Block A; minor elevational amendments to Apartment Blocks A and B; minor revisions to hard and soft landscaping; minor revisions to cycle parking arrangements; cabling and ducting; and all associated site development and excavation works above and below ground. The proposed amendments will not result in any changes to the Gross Floor Area of Apartment Blocks A and B (pl. ref.: 2560162).

- Application for a 10-year permission to construct the dev. of waste transfer facility in two phases and all associated works. An E.I.S was received with the application (pl. ref.: 247983).
- Permission for the construction of new bulk store warehouse and associated service yard, upgrade of existing site services and all ancillary works associated with the site development.
- The Proposed Limerick City & Environs Flood Relief Scheme, which is currently in the development stage. Limerick City & County Council as the Lead Authority, in partnership with the Office of Public Works (OPW) are now advancing with the Limerick City & Environs Flood Relief Scheme. The OPW has recommended the development of a Flood Relief Scheme for Limerick City & Environs as a result of the work completed in the Shannon Catchment Flood Risk Assessment and Management (CFRAM).
- Ground investigation works to inform the option selection and design of the proposed Limerick City and Environs Flood Relief Scheme (pl. ref.: 312559).
- the development comprises construction of 1 no. high technology logistics warehouse unit with ancillary office use at ground and first floor level; 1 no. security kiosk; 1 no. waste management compound and all associated site works including raising of land; 2 no. totem signage units; elevational signage; PV panels; external mechanical plant area; and realignment works to existing rounadabout junction. Primary access to the site will be through the Alandale Road via the Alandale Roundabout, but access will also be possible via Courtbrack Avenue. A natura Impact Statement has been prepared in respect of the proposed development and accompanies the planning application (pl. ref.: 2360623).

Other WWTP Discharges and Proposed Upgrades

The potential for cumulative adverse effects via water quality deterioration has been considered. The following projects in the wider area have been considered in the assessment.

Castletroy WWTP is located approximately 10 km upstream of Limerick WWTP. It currently treats a collected organic load of c. 35,000 PE with a design DWF of 6,050 m^3/day. Because Castletroy WWTP is located upstream of Limerick WWTP, the effluent release may affect the concentrations around the Limerick WWTP outfall location.

The proposed upgrade of Castletroy WWTP will be required to cater for 81,000 PE. In addition, it is proposed to construct a new c. 3,750 m^3 stormwater storage tank to limit the no. of annual overflow events. The proposed upgrade works will make provision for a new stormwater storage tank, increased aeration capacity by retrofitting the existing aeration tanks IFAS process, increased capacity of the existing Salsnes filter units with 2 no. additional units incl. forward feed pump arrangement and additional sludge storage capacity. The existing primary discharge point will be retained. This project has been granted and is currently in its construction phase.

The Shannon Town WWTP is located at Tradaree Point approximately 3.8 km south east of Shannon Town and has a primary discharge outfall about 200 m south of the shoreline. It has a domestic capacity of 12,500 PE and a total capacity, including industrial water, of 22,043 PE. The WWTP provides secondary treatment before the effluent is released into the Shannon Estuary. In early 2020, the next phase of the upgrades to the WWTP commenced which will improve the wastewater treatment performance, increase the capacity at the plant and ensure compliance with the Wastewater Treatment Regulations. The Shannon Town WWTP capacity will be upgraded to 28,000 PE.

With the proposed improvements in treatment processes in place for all three WWTPs, no potential for cumulative adverse effects on any European Site has identified.

Plans

The following Development Plans have been reviewed and taken into consideration as part of this assessment:

- Limerick Development Plan 2022-2028
- Limerick Biodiversity Action Plan 2025-2030
- National Biodiversity Action Plan 2023-2030
- Regional Spatial and Economic Strategy for the Southern Region

The review of these Plans is provided below in Table 3-2.

*Table **Error! No text of specified style in document**.-1 Review of Plans.*

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
Limerick Development Plan 2022-2028	**Policy EH P1** Protection of Natural Heritage and Biodiversity. It is a policy of the Council to: a) Protect and conserve Limerick's natural heritage and biodiversity, in particular, areas designated as part of the European Sites Natura 2000 network, such as Special Protection Areas (SPAs) and Special Areas of Conservations (SACs), in accordance with relevant EU Directives and national legislation and guidelines. b) Maintain the conservation value of all Natural Heritage Areas and proposed Natural Heritage Areas (pNHAs) for the benefit of existing and future generations.	The Proposed Development has been designed so that there is no potential for residual adverse effect on any European Site including Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. The Site-Specific Conservation Objectives for the relevant QIs and SCIs of these sites have been reviewed in light of the proposed development. Appropriate mitigation measures have been included in order to ensure the integrity of the Natura 2000 Network.
	Objective EH O1 Designated Sites and Habitats Directive. It is an objective of the Council to ensure that projects/plans likely to have significant effects on European Sites (either individually or in combination with other plans or projects) are subject to an appropriate assessment and will not be permitted under the Plan unless they comply with Article 6 of the Habitats Directive. The Council, will through the planning enforcement process where applicable, seek to restore the ecological functions of designated sites, where they have been damaged through inappropriate development.	The precautionary principle has been applied in the design of the Proposed Development with precautionary mitigation included to avoid adverse effect on European Sites and wider biodiversity through water quality deterioration, and disturbance during construction and operation.
Limerick Biodiversity Action Plan 2025-2030	Action B.2. Ring fence a percentage of development contribution specifically for biodiversity	A Landscape Plan is in place for the Proposed Development which includes measures for biodiversity enhancement, including meadow management, tree planting and creation of faunal habitat.
	Action B.15. Promote native/local provenance for trees, shrubs plants etc. and LCCC to include this as a criteria for procurement	All trees and shrubs proposed as part of landscaping measures will be of native provenance.

	Action B.18. Promote the prevention of fragmentation of ecological corridors including hedgerows and riverine features	Enhancement of ecological corridors is a key objective of the Proposed Development with landscaping measures proposed to ensure continued and enhanced wildlife connectivity
	Action C.1. Protect and enhance Biodiversity on all developments in Limerick including new, existing and refurbished developments along with Greenways and all infrastructural developments - New measures introduced to be highlighted in new developments and progress implementation of the Greenway Biodiversity Action Plan	The Proposed Development has been designed to avoid loss of high value habitat. It has also been designed to incorporate biodiversity enhancement proposals as part of a Landscape Plan.
	Action C.3 - In line with LCCC Tree Policy increase the planting of suitable trees and hedgerows of local provenance	All trees and shrubs proposed as part of landscaping measures will be of native provenance.
National Biodiversity Action Plan 2023-2030	Objective 1: Adopt a Whole-of Government, Whole of-Society Approach to Biodiversity. Proposed actions include capacity and resource reviews across Government; determining responsibilities for the expanding biodiversity agenda providing support for communities, citizen scientists and business; and mechanisms for the governance and review of this National Biodiversity Action Plan.	The Proposed Development will not contravene the proposed objectives of the NBAP. On review of the NBAP, no potential for cumulative effect when considered in-combination with the Proposed Development was identified.
	Objective 2: Meet Urgent Conservation and Restoration Needs. Supporting actions will build on existing conservation measures. Efforts to tackle Invasive Alien Species will be elevated. The protected area network will be expanded to include the Marine Protected Areas. The ambition of the EU Biodiversity Strategy will be considered as part of an evolving work programme across Government.	
	Objective 3: Secure Nature's Contribution to People. Actions highlight the relationship between nature and people in Ireland. These include recognising the tangible and intangible values of biodiversity, promoting nature's importance to our culture and heritage and recognising how biodiversity supports our society and our economy.	

	Objective 4: Enhance the Evidence Base for Action on Biodiversity. This objective focuses on biodiversity research needs, as well as the development and strengthening of long-term monitoring programmes that will underpin and strengthen future decision-making. Action will also focus on collaboration to advance ecosystem accounting that will contribute towards natural capital accounts.	
	Objective 5: Strengthen Ireland's Contribution to International Biodiversity Initiatives. Collaboration with other countries and across the island of Ireland will play a key role in the realisation of this Objective. Ireland will strengthen its contribution to international biodiversity initiatives and international governance processes, such as the United Nations Convention on Biological Diversity.	
Regional Spatial and Economic Strategy for the Southern Region	RPO 1 **b.** The RSES seeks to protect, manage, and through enhanced ecological connectivity, improve the coherence of the Natura 2000 Network in the Southern Region. c. RSES support for other plans/ programmes (and initiatives arising) is on the basis of appropriate SEA, SFRA, EIA and AA processes being undertaken in order to ensure the avoidance of adverse effects on European Sites and ensure implementation of mitigation measures where required.	The site-specific conservation objectives for Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA were comprehensively reviewed in undertaking this assessment. The surveys undertaken in the preparation of this application, the design of the development and the proposed mitigations in place, demonstrate that the Proposed Development will not adversely affect the Qualifying Interests/Special Conservation Interests associated with any European Site, during construction or operation of development. The proposed upgrades will help Uisce Éireann to meet the aims of the Strategy with regard to improvement in wastewater infrastructure and avoiding adverse impacts on the integrity of the Natura 2000 network. The design of the Proposed Development and associated landscaping plan aims to maintain and enhance wildlife commuting corridors and retain and enhance existing features of ecological value.