East Limerick Substation Development

Natura Impact Statement

08/09/2026

Prepared for: Harmony Solar East Limerick Ltd.

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Contract

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This report describes work commissioned by Harmony Solar East Limerick Ltd by an instruction dated 07/08/2026. The Client's representative for the contract was Gravis Planning.

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Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in issuing this Report.

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Abbreviations

AA	Appropriate Assessment
ADR	Agreement Concerning the International Carriage of Dangerous Goods by Road.
BOCCI	Birds of Conservation Concern in Ireland
CIEEM	Chartered Institute of Ecology and Environmental Management
DEHLG	Department of Environment, Heritage and Local Government
EC	European Communities
ECJ	European Court of Justice
EPA	Environmental Protection Agency
GIS	Geographic Information Systems
GSI	Geological Survey Ireland
IAQM	Institute of Air Quality Management
INNS	Invasive Non-Native Species
IROPI	Imperative Reasons of Over-riding Public Interest
NBDC	National Biodiversity Data Centre
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
OPW	Office of Public Works
QI	Qualifying Interest
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SCI	Site of Community Importance
SPA	Special Protection Area
WFD	Water Framework Directive
ZoI	Zone of Influence

Executive Summary

JBA Consulting Engineers and Scientists Ltd. (hereafter JBA) has been commissioned by Harmony Solar East Limerick Ltd to prepare a Natura Impact Statement (NIS) for a proposed substation development (hereafter Proposed Substation Development).

The Proposed Substation Development comprises an area of 17.02 ha. The site is located south-west of the village of Hospital and north-west of Knocklong village.

The Proposed Substation Development land is in agricultural use at present. There is an existing agricultural building located within the south-east corner of the parcel, and a derelict shed structure located in the northern area of the parcel. The parcel benefits from existing hedgerows along the field boundaries.

This NIS has been prepared in accordance with European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011), as amended. This report provides information on and assesses the potential in view of best scientific knowledge for the development to have adverse effects, either individually or in combination with other plans or projects, on any Natura 2000 site. This report assesses the potential for adverse effects on European site integrity, alone and in-combination, in view of the conservation objectives and best scientific knowledge.

A suite of surveys was carried out between December 2024 and October 2025, including habitats, birds, mammals, and bats, and the results of these are used to inform this report as well as accompanying ecology reports.

The Lower River Shannon SAC was retained due to a direct hydrological connection between the SAC site and the Proposed Substation Development. Specific mitigation measures to ensure water quality are put forward to protect fish species, Otter and the rivers themselves. Further mitigation measures to protect riparian habitats, and to prevent Otter disturbance are also presented.

On closer inspection, Glen Bog SAC was not retained as not realistic and viable pathway between the Proposed Substation Development and the SAC exist.

With the strict application of the mitigation measures, no reasonable scientific doubt remains as to the absence of adverse effects on the integrity of the Lower River Shannon SAC, ex-situ supporting habitats or QI species.

1 Introduction

1.1 Background

This Natura Impact Statement (NIS) has been prepared for proposed works to be carried out for the installation of a substation and all associated works in and around Hospital, Co. Limerick.

JBA Consulting Engineers and Scientists Ltd. (hereafter JBA) has been commissioned by Harmony Solar East Limerick Ltd to prepare this NIS, which has been prepared in accordance with European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011), as amended. A Screening for Appropriate Assessment (AA) for the Proposed Substation Development has been carried out (JBA, 2026). The assessment concluded that potential likely significant effects from the Proposed Substation Development may negatively affect local Natura 2000 sites, notably the Lower River Shannon SAC.

The Zone of Influence (ZoI) within which potential impacts from any proposed project must be considered for significance, depends on a variety of factors. This includes the nature, location and extent of the proposed works, the ecological receptors present within the Natura 2000 sites as well as within the site and surrounding environs, as well as the potential for in- combination effects on the Natura sites (DEHLG 2010).

1.2 Legislative Context

Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora, known as the 'Habitats Directive' - provides a framework for legal protection for habitats and species of European importance which is implemented by member states through national legislation. Article 2 of the Directive requires the maintenance or restoration of habitats and species of European Community interest, at a favourable conservation status. Articles 3 - 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000 sites. Natura 2000 sites are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79 / 409 / EEC).

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans or projects affecting Natura 2000 sites.

Article 6(3) establishes the requirement for Appropriate Assessment:

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

Article 6(4) deals with the steps that should be taken when it is determined, as a result of Appropriate Assessment, that a plan/project will adversely affect a European site. Issues dealing with alternative solutions, imperative reasons of overriding public interest and compensatory measures need to be addressed in such a case.

1.3 Appropriate Assessment Process

Guidance on the AA process was initially produced by the European Commission in 2002, which was subsequently developed into guidance specifically for Ireland by the Department of Environment, Heritage and Local Government (DEHLG 2010). Office of the Planning Regulator (OPR) produced a Practice Note in 2021, PN01 - Appropriate Assessment Screening for Development Management (OPR 2021). More recent guidance is contained in Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (Commission 2021). These guidance documents identify a staged approach to conducting an AA.

1.3.1 Screening for AA

The initial, screening stage of the Appropriate Assessment is to determine:

- whether the proposed plan or project is directly connected with or necessary for the management of the European designated site for nature conservation (Natura 2000 site)
- if it is likely to have a significant effect on the European designated site, either individually or in combination with other plans or projects

For those sites where potential likely significant effects are identified, either alone or in combination with other plans or projects, further assessment is necessary to determine if the proposals will have an adverse impact on the integrity of a European designated site, in view of the site's conservation objectives (i.e., the process proceeds to Stage 2).

1.3.2 AA

This stage requires a more in-depth evaluation of the plan or project, and the potential direct and indirect impacts of them on the integrity and interest features of the European designated site(s), alone and in-combination with other plans and projects, taking into account the site's conservation objectives. Where required, mitigation or avoidance measures will be suggested.

The competent authority can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site(s) concerned. If this cannot be determined, and where mitigation cannot be achieved, then alternative solutions will need to be considered (i.e., the process proceeds to Stage 3).

1.3.3 Derogation - Procedure under Article 6(4)

Article 6(4) allows for exceptions to the general rule of 6(3). It is up to the authority to decide whether a derogation from Article 6(3) can be applied.

The provisions of Article 6(4) entail three key requirements that must be met and documented:

- Step 1- Identification of alternative solutions

- Step 2- Comparative assessment of the alternatives considered
- Step 3- Examining imperative reasons of overriding public interest (IROPI)

1.3.4 Court of Justice of the European Union (CJEU) Rulings

The CJEU has been asked to issue rulings on development plans, which are used to inform this assessment.

In the *Sweetman v An Bord Pleanála (C-258/11)* (2013) judgment the CJEU ruled that *authorisation for a plan or project, as referred to in Article 6(3) of the Habitats Directive, may therefore be given only on condition that the competent authorities – once all aspects of the plan or project have been identified which can, by themselves or in combination with other plans or projects, affect the conservation objectives of the site concerned, and in the light of the best scientific knowledge in the field – are certain that the plan or project will not have lasting adverse effects on the integrity of that site. That is so where no reasonable scientific doubt remains as to the absence of such effect.*

The CJEU issued a ruling on the consideration of avoidance and reduction measures as a result of the case known as *People over Wind, Peter Sweetman v Coillte Teoranta (C-323/17)* (2018). This judgement stated that:

"…*in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site*."

Therefore, measures intended to reduce or avoid effects on a European site should only be considered within the framework of an AA. In practice, this means that any activities that are not integral to the project (i.e. the project could conceivably take place without them) and have the effect of avoiding or reducing an impact on a European site, cannot be considered at the screening stage.

The decision of the CJEU in case C-721/21 (*Eco Advocacy CLG* 2023), delivered in June 2023, found that Article 6(3) of the Habitats Directive must be interpreted as meaning that:

"*in order to determine whether it is necessary to carry out an appropriate assessment of the implications of a plan or project for a site, account may be taken of the features of that plan or project which involve the removal of contaminants and which therefore may have the effect of reducing the harmful effects of the plan or project on that site, where those features have been incorporated into that plan or project as standard features, inherent in such a plan or project, irrespective of any effect on the site*." (Para. 53(3) of the Judgement). This clarification narrows down features that are standard i.e. will be implemented regardless of ecological features, inherent to the project, i.e. part of the project regardless of ecological concerns, and included irrespective of any Natura 2000 concerns can be considered in the screening stage.

Whilst *People over Wind, Peter Sweetman v Coillte Teoranta (C-323/17)* (2018) remains the rule, the *Eco Advocacy CLG Case (C-721/21)* (2023) judgement clarifies that features which have been incorporated into a project as standard features, inherent in that project, and irrespective of any effect on any European site may be taken into account for the purposes of a Stage 1 Screening for Appropriate Assessment under Article 6(3) of the directive.

The CJEU ruling in *Grace & Sweetman (C-164/17)* (2018) clarified the difference between avoidance and reduction (mitigation) measures and compensation. Measures intended to compensate for the negative effects of a project cannot be taken into account in the assessment of the implications of a project and instead are considered under Article 6(4). This means that any project where an effect on the integrity of a Natura 2000 site remains and can only be offset by compensation, would need to proceed under Article 6(4), demonstrating “imperative reasons of overriding public interest”.

The CJEU ruling in the case of *Holohan v An Bord Pleanála (C-461/17)* (2018) also clarified the importance in Appropriate Assessment of taking into account habitat types and species outside the boundary of the Natura 2000 site where implications of the impacts on those habitat and species may impact the conservation objectives of the Natura 2000 site. In this assessment functionally linked and supporting habitat for species outside of Natura 2000 sites are assessed where they could potentially impact the conservation objectives of any Natura 2000 sites within the Zone of Influence (ZoI).

1.4 Methodology

The Screening for Appropriate Assessment has been prepared having regard to the Birds and Habitats Directives, the European Communities (Birds and Natural Habitats) Regulations 2011 as amended and relevant jurisprudence of the EU and Irish courts. The following documents have also been used to provide guidance for the assessment:

- DEHLG (2009 rev 2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government (DEHLG 2010);
- Office of the Planning Regulator (2021) OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management (OPR 2021);
- European Communities (EC) (2019) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission 2019);
- EC (2021/ C 437/01) Commission notice Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC ;
- EC (2022) Guidance document on assessment of plans and projects in relation to Natura 2000 sites - A summary (European Commission 2022);
- EC (2021) Guidance document on the strict protection of species of Community interest under the Habitats Directive 92/43/EEC; and
- CIEEM (2024). Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal, Second Ed.

This report has been produced using currently available information, with the most up-to-date version available at the time.

1.4.1 Desktop study

A desktop study was conducted of available published and unpublished information, along with a review of data available on the National Parks and Wildlife Service (NPWS), Botanical Society of Britain and Ireland (BSBI) and National Biodiversity Data Centre (NBDC) web-based databases, in order to identify key habitats and species (including legally protected and species of conservation concern) that may be present within ecologically relevant distances from the project as explained below. A baseline habitat assessment was performed using satellite imagery of the site. The data sources below (accessed October 2025) were consulted for the desktop study:

- Aerial photography available from www.osi.ie and ESRI World Imagery.
- NPWS website (www.npws.ie) where Natura 2000 site synopses, data forms and conservation objectives were obtained along with Annex I habitat distribution data and status reports.
- Catchment data (www.catchments.ie)
- NBDC Biodiversity Maps (maps.biodiversityireland.ie)
- Environmental Protection Agency Maps (https://gis.epa.ie/EPAMaps)
- Geological Survey Ireland (GSI) website (www.gsi.ie)
- GSI - Groundwater data viewer (https://dcenr.maps.arcgis.com)
- BSBI Plant Records (bsbi.org/maps)

- National Planning Application Database (myplan.ie)
- Inland Fisheries Ireland (IFI) (https://opendata-ifigeo.hub.arcgis.com/)

1.4.2 Ecological Site Surveys

To inform this report a suite of ecological surveys, including breeding bird, wintering bird, mammal, bat and habitat surveys, was carried out between December 2024 and October 2025. The surveys were carried out by Johanna Healy, Mia Heigh, Olly Lynch-Milner, Anne Mullen and Dominic Tilley. The results of the surveys are detailed in the associated EcIA with relevant information retained for this screening.

The ecological survey recorded habitats and protected species, following the methods outlined in the documents below:

- Best Practice Guidance for Habitat Survey and Mapping (Smith et al. 2011).
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA 2009).
- Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA 2006)
- Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins 2024).

Aerial photographs and site maps assisted the survey. Habitats have been named and described following Fossitt (2000). Nomenclature for higher plants follows that given in The New Flora of the British Isles 4th Edition (Stace 2019). Identification of Irish plants generally follows Webb's An Irish Flora (Parnell and Curtis 2012).

Bird nomenclature and taxonomy follows guidance from the BOU (British Ornithologists' Union 2022) and AviList (AviList Core Team 2025). Species status was checked with reference to the Birds of Conservation Concern in Ireland list (Gilbert et al. 2021).

Survey Schedule

Date	Target
19/12/2024, 20/12/2024	Walkover, Birds, Mammals
22/01/2025, 23/01/2025	Birds, Mammals
18/02/2025, 21/02/2025	Birds, Mammals
31/03/2025, 02/04/2025	Habitats, Birds
09/04/2025, 11/04/2025	Birds, Mammals
30/04/2025, 14/05/2025, 21/05/2025	Habitats, Birds
17/06/2025, 18/06/2025	Birds
31/07/2025, 01/08/2025, 08/08/2025	Birds, Bat statics
4/09/2025, 11/09/2025, 16/09/2025, 18/09/2025	Bats, notes on birds
7/10/2025	Cabling habitats; notes on birds

1.5 Assessment Criteria

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of qualifying interest. The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Upon the conclusion of the AA, the competent authority may grant consent to the plan or project only after having ascertained that it will not adversely affect the integrity of the Natura 2000 site(s) concerned.

1.5.1 The Zone of Influence

The ZoI was used to identify Natura 2000 sites that could be impacted by the project. For each of these sites, the Qualifying Interests (QI) or Site of Community Importance (SCI) features and their associated conservation objectives were identified, and the possibility of likely significant effect was determined by a combination of location, ecological and hydrological connectivity, sensitivity of receptor and magnitude of the source of impact.

1.5.2 The Adverse Effect on Site Integrity Test

An assessment of whether there could be an adverse effect on site integrity is done using the source-pathway-receptor model which is used to determine the risk of impact to a site or Qualifying Interests (OPR, 2021). Risk is the likelihood or expected frequency of a specified adverse consequence or impact.

Applied to the proposed project, it expresses the likelihood of an adverse impact arising because of the project activities. A hazard presents a risk when it is likely to affect something of value (i.e. the Natura 2000 sites and their QIs / SCIs). It is the combination of the probability of the hazard occurring and its consequences that is the basis of a risk assessment which an NIS essentially is:

Risk = probability of an event x consequential damage

The source-pathway-receptor model is a useful tool to determine if a risk is present, and to help quantify the risk to see if the threshold of an adverse effect on site integrity is reached. For a risk to be present, all three elements must be present.

Source: The source considered in this NIS is the proposed works or activity that will occur as a result of the proposed project. Key considerations in assessing the source are the nature and scale of the potential impacts that may arise, e.g. type of contaminants that may arise, the contaminant loading and other physical attributes. The point of occurrence is a critical reference point for assessing the attributes of the source of any potential adverse impacts.

Pathway: Pathways are established by surface water, ground water, and land and air connections. The pathway includes everything between the source and the receptor; from point of release of potential adverse impacts, such as contaminants, to the receptor. The location, nature, connectivity and extent of wells, groundwater dependent ecosystems, aquifers and faults can all influence the nature of a pathway. Rivers, streams and drainage ditches could all act as potential pathways for potential waterborne impacts. The pathway includes assessment of surface and groundwater bodies, and WFD status may be reviewed

as relevant. Land and air pathways to be considered include those that may transfer direct physical impacts, noise and visual disturbance (vibrations) and dust or other airborne particles.

Receptor: The receptor is the QI / SCI features of the relevant Natura 2000 sites, their Site-Specific Conservation Objectives (SSCOs) and the overall integrity of the Natura 2000 sites. To determine the significance of potential adverse impacts on the integrity of the Natura 2000 site, the SSCOs of each site are assessed relative to the potential impacts that may occur because of the proposed works. The conservation objectives are the fundamental unit on which the assessment is based. If the project were to undermine or make these objectives more difficult to achieve, the conservation status of the QI / SCI features becomes harder to achieve, and the quality and condition of the site will be reduced, reducing the 'integrity' of the Natura 2000 site. Each Natura 2000 site will either have specific or generic conservation objectives.

1.5.2.1 Site Specific Conservation Objectives

The assessment of the impacts from a project is measured against the Site-Specific Conservation Objectives (SSCOs). The SSCOs are specific measurable criteria which provide targets to achieve favourable status of the qualifying interest of a site e.g. for a habitat this normally includes include an area in hectares to be maintained – and, taken as a whole, constitute the site integrity. The overall aim of SSCOs is to maintain or restore the favourable conservation conditions of the Annex I habitats and/or the Annex II species for which a Natura 2000 site has been selected, under which the site-specific objectives contain more detailed attributes, measures and targets.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing;
- the specific structure 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.

The favourable conservation status of a species is achieved 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;
- 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.

The conservation objectives for SPAs are also to maintain or restore the favourable conservation condition of the bird species listed as SCIs for SPAs, which are defined by the following list of attributes and targets:

- Population trend: Measure of percentage change and whether the long-term population trend is stable or increasing; and
- Distribution: Number, range, timing and intensity of use of areas. There is to be no significant decrease in the range, timing or intensity of use of areas by specific or generic bird species, other than that occurring from natural patterns of variation.

The conservation objectives for non-breeding birds SCIs for SPAs are as follows:

- To maintain the favourable conservation condition of the non-breeding water bird Special Conservation Interest species listed for a SPA; and
- To maintain the favourable conservation condition of the wetland habitat for a SPA as a resource for the regularly occurring migratory water birds that utilise it.

Site integrity is assessed on the basis of each conservation objective of each qualifying interest feature. Should any conservation objective be undermined by the proposed project, the site integrity will therefore be adversely affected. Low-impact effects that are too small or short-lived to undermine the achievements of the conservation objectives are therefore not likely to adversely affect the site integrity.

1.5.3 In-Combination Effects

The in-combination impacts are considered only after the assessment of the project alone. Where there is no adverse effect on site integrity, but some adverse effect locally an assessment of this adverse effect in-combination with other plans or projects is carried out.

Where another plan or project is identified then initially a review is made of its AA Screening, or AA, and if the Competent Authority for the plan or project has made a final determination of no effect on the integrity of any European site, either alone or in combination, this determination is used in this assessment. Where there is not a full AA, or the findings are unclear or out of date, the plan or project documentation is checked for credible evidence of real (not hypothetical) risk to a Natura 2000 site. Where these are identified then a detailed assessment is carried out. Each of these plans or projects are examined in a pairwise basis first to assess whether there is the potential for cumulative or in-combination effects between the proposed Project and the plan or project under examination. Following this an assessment of proposed Project and all of the identified plans and projects as a whole are examined, in order to assess whether they all have the capacity to act in a cumulative or in-combination manner.

Potential sources of cumulative impacts were identified based on the plans and projects respective ZoIs and the ecology of valued ecological features that are physically linked with Natura 2000 sites, as well as any ex-situ supporting habitats, as identified in Section 3.

1.6 Competent Persons

The assessment was prepared by Senior Ecologist Dominic Tilley BSc MSc PhD.

The assessment has been reviewed by Anne Mullen BSc MSc. Anne is Senior Ecologist with JBA Consulting, with over 10 years' experience in ecological consultancy. Anne is a full Member of the Chartered Institute of Ecological and Environmental Management (CIEEM).

1.7 Limitations and Constraints

This NIS is based on ecological site surveys and existing data from the above-mentioned sources. The assessment necessarily relies on some assumptions and is inevitably subject to some limitations as detailed below. The following points are recorded in order to ensure the basis of the assessment is clear:

- The precautionary principle is utilised when determining potential ecological sensitivities within the proposed projects Zone of Influence (ZoI).
- Information on the works and conditions on site are based on the current knowledge at the time of writing. Changes to the site since this report was drafted cannot be accounted for. However, due to the nature of the site and the type of land use (agricultural), significant changes to the site are not foreseen to happen prior to the start of the project.
- This assessment is based on methodology for proposed works as described in this report. Where changes to methodology occur, an ecologist will need to be consulted to determine if the changes are likely to alter the ecological impacts and would therefore need reassessment.
- Data from biological record centres or online databases is historical information, datasets may be incomplete, inaccurate or missing. The absence of records for an area may be due to the under recording in the area and not necessarily imply the absence of species. These records are therefore to be treated as minimum information available for the area.
- Some of the site surveys were undertaken during suboptimal survey periods. Hence numbers/species recorded may not be representative of activity or diversity during the optimal surveying period. However, the site was visited periodically over a 10-month period allowing for a comprehensive overview of all ecological receptors, in all land parcels.
- Not all fields were accessible at all times as these form part of activate farms with cattle out grazing; due to repeated visits over a 10-month period, all land parcels were visited, and ecological assessment of all land parcels was carried out.
- Access to Parcel 4 was restricted during the main habitats survey period (May) due to the presence of a bull; however, access was available in the winter and early spring months, as well as in the July – September period, allowing for site assessment. These repeated site visit throughout the year allowed for a good understanding of the habitats on site.
- No in-stream surveys were carried out, however no in-stream works are anticipated.
- The NIS addresses issues around European designated sites and does not exempt works from responsibilities related to habitats and species covered under separate national legislation.

2 Project Description

2.1 Project Location

The site of the Proposed Substation Development is situated in the townlands of Gotoon, Coolscart, and Kilfrush in County Limerick. The Overall Project further extends to the townlands of Ballyhaukish, Millfarm, Coolalough, Ballycahill, Newtown and Knocklong, and corresponds to Parcel 4 in the Overall Project (Figure 2-1 and Figure 2-2).

The Proposed Substation Development is not directly connected with, or necessary to the management of any Natura 2000 site. However, likely significant effects upon the Natura 2000 sites cannot be excluded and therefore the Proposed Substation Development is subject to the requirements of the AA process.

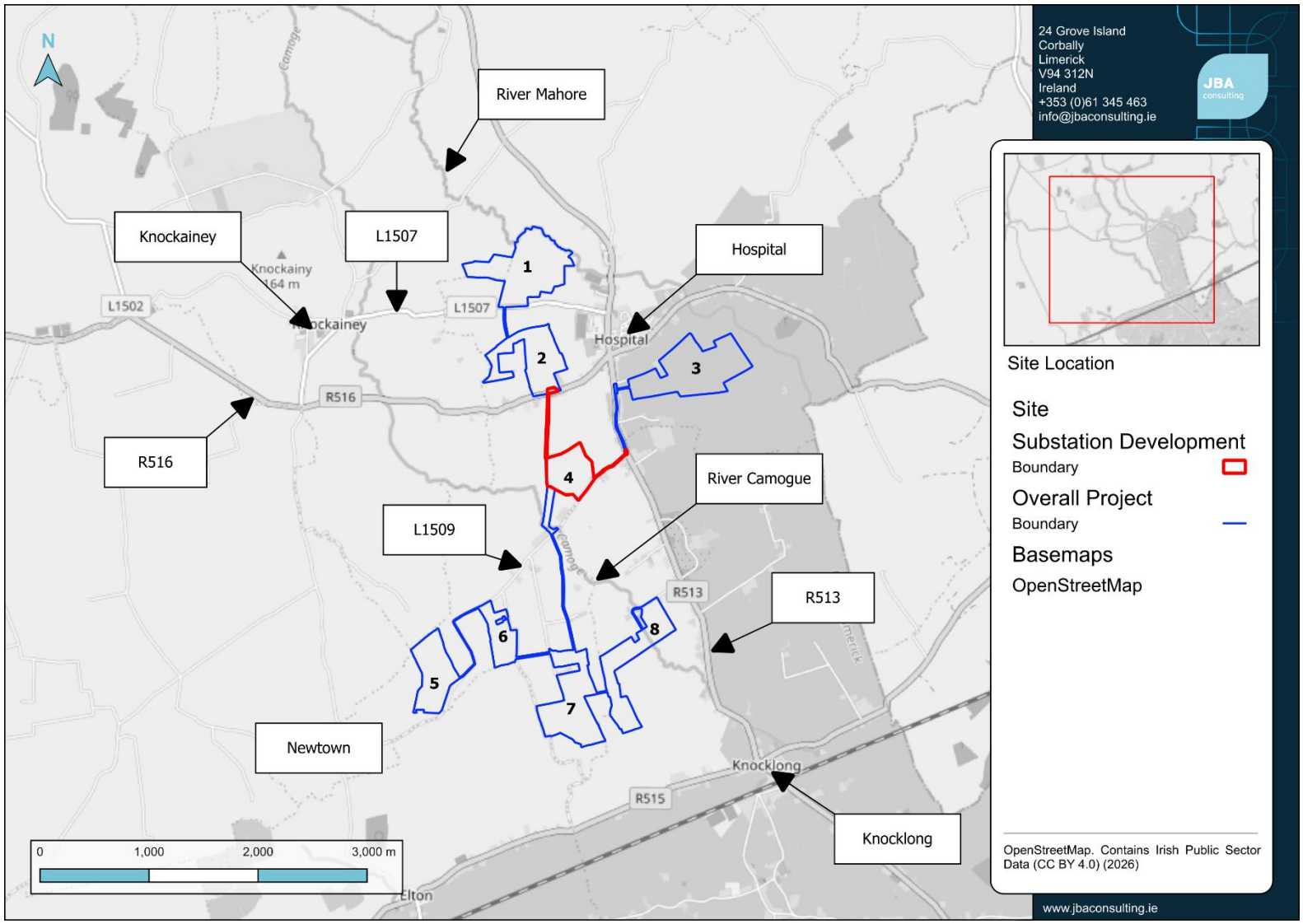

Figure 2-1: Overall Project site location.

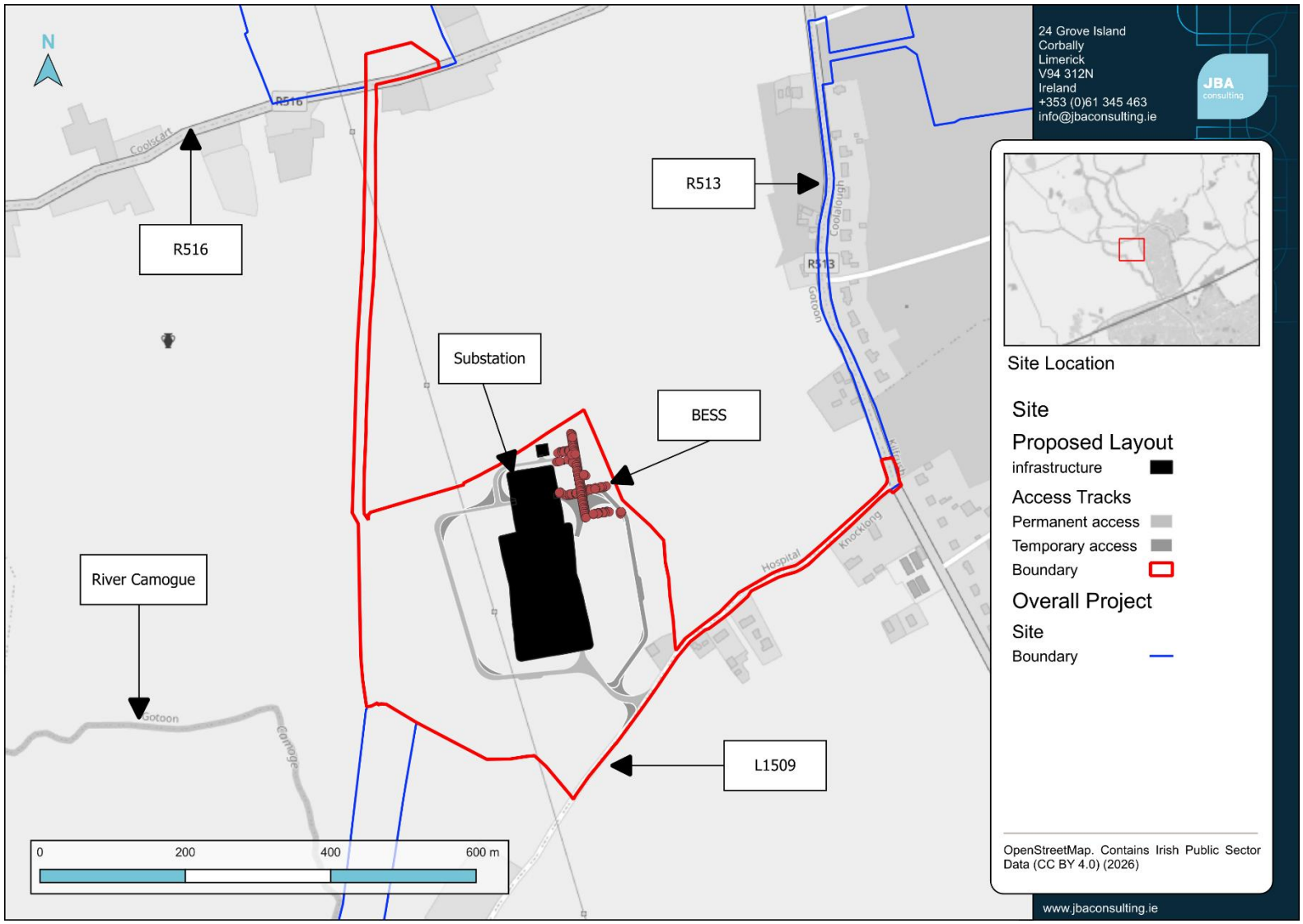

Figure 2-2: Proposed Substation Development.

2.2 Project Description

The site of the Proposed Substation Development is situated in the townlands of Gotoon, Coolscart, and Kilfrush in County Limerick. The Overall Project further extends to the townlands of Ballyhaukish, Millfarm, Coolalough, Ballycahill, Newtown and Knocklong.

The Proposed Substation Development comprises an area of 17.02 ha. The site is located south-west of the village of Hospital and north-west of Knocklong village.

The Proposed Substation Development land is in agricultural use at present. There is an existing agricultural building located within the south-east corner of the parcel, and a derelict shed structure located in the northern area of the parcel. The parcel benefits from existing hedgerows along the field boundaries.

The site lies entirely within the 'Agricultural Lowlands' Landscape Character Area (LCA) as designated within the Limerick Development Plan 2022-2028.

There are no residential dwellings within the red line boundary for the Proposed Substation Development. There are, however, residential properties and farm holdings within the surrounding area, including properties located along the L1509 public road to the south of the site and within the wider rural area between Hospital and Knocklong.

The site associated with the Proposed Substation Development is within four private landownerships. Agreements are in place between the landowners and the Applicant to facilitate the construction and operation of the Proposed Substation Development on these lands. Letters of consent from the landowners have been provided to the Applicant and will be submitted with the SID application.

2.2.1 220kV GIS Substation and Compounds

The Proposed Substation Development will comprise a new 220 kV loop-in/loop-out substation, including a Transmission System Operator (TSO) compound and a Customer compound.

The TSO compound will include a 220kV GIS substation building with a total floor area of 3,550.8m² and a height of 20.7m. It will also include 220kV electrical infrastructure, including switchgear, gantries, insulators, conductors, protection and control equipment, and all associated electrical plant and apparatus required to facilitate the loop-in/loop-out connection to the existing 220kV overhead line.

The Customer compound will include a customer building with a total floor area of 311.8m² and a height of 7.62m, accommodating a switchgear room, SCADA room, office, storeroom, hall, mess room and WC. The Customer compound will include a 220kV customer transformer positioned within a bunded enclosure, with a height of 9.5m above finished ground level, together with associated electrical plant, switchgear, control equipment and cabling.

The compounds will include internal access tracks to the two buildings, areas of gravel and hardstanding, service and maintenance access, drainage infrastructure, security fencing and gates. Parking will also be provided within the compounds. Wastewater from the on-site

washroom and toilet facilities will be collected in a sealed holding tank and periodically removed by a licensed waste management contractor. Potable water will be delivered to the site as required.

Construction details are provided in the Outline Construction Methodology document accompanying this application.

2.2.2 Battery Energy Storage System (BESS)

The Proposed Substation Development will include a Battery Energy Storage System (BESS), providing up to 75 MW / 300 MWh of electricity storage capacity. The BESS will be located within a dedicated BESS compound forming part of the Proposed Substation Development.

The BESS compound will include 55 no. containerised battery storage modules, each measuring 6.06 m long, 2.44 m wide and 2.9 m high. It will also include 28 no. containerised transformer and power conversion / conditioning units, each measuring 6.06 m long, 2.44m wide and 2.9 m high. The BESS units will generally be supported on concrete rails, with localised concrete slabs provided where required.

The BESS compound will include ancillary BESS infrastructure, including inverters, transformers, switchgear, control equipment, thermal management systems, fire detection and suppression systems, acoustic screening, cabling, ducting and associated electrical plant.

Each BESS unit will be equipped with a comprehensive fire detection and mitigation system, including in-cell temperature monitoring, unit-level off-gas detection, and smoke detection to provide early warning of abnormal battery conditions. Active fire suppression systems, such as aerosol or clean-agent suppression, will be included alongside off-gas ventilation and explosion relief measures designed in accordance with relevant NFPA guidance. The selected BESS technology will have undergone testing to UL 9540A or CSA TS800 standards, demonstrating its capability to limit thermal runaway propagation and reduce the potential for fire spread beyond the affected unit. Water is not proposed to be used on site for fire suppression or boundary cooling as the testing completed on the BESS units has shown this not necessary to prevent fire propagation to other units.

2.2.3 Overhead Line and Loop In Loop Out (LILO) Works

A 220 kV overhead line currently traverses the Proposed Substation Development site. To facilitate the Proposed Substation Development, the existing overhead line will be reconfigured to provide a LILO connection to the proposed 220 kV substation.

Two new 220kV steel towers will be fitted onto the existing overhead line. These towers will deviate the overhead line for 52m onto two new steel gantries within the EirGrid TSO compound. Associated cable sealing ends and post insulators will transition the overhead line to two circuits of 220 kV underground cable, which will connect into the proposed 220 kV GIS Substation. There will be three associated power cables within a single circuit, this cable trench will enclose 2 no. communication ducts and a single ECC duct. A communication chamber will be required beside the proposed gantry structures to transition the communications link between the overhead line and the underground cable.

2.2.4 Underground Cabling

From the cable sealing ends at the two new gantries, 69m of 220 kV underground cabling will continue to the proposed 220 kV GIS Substation. Associated infrastructure will include ducting, communications link, marker posts and other ancillary works.

Underground cabling and ducting will also be provided within the Proposed Substation Development site to connect the TSO compound, Customer compound, BESS compound, transformer infrastructure and associated electrical plant.

The Proposed Substation Development will be connected to the Proposed Solar Farm Development by way of underground electrical cabling routed across private lands. This solar farm connection cabling is located within the Red Line Boundary for the Proposed Solar Farm Development and is subject to the separate planning application to Limerick City and County Council.

2.2.5 Lightning Protection

The Proposed Substation Development will include 4 no. lightning protection masts, with a height of 18m. Lightning protection will be provided to protect the substation compounds, BESS compound and associated electrical infrastructure.

2.2.6 Telecommunications Infrastructure

The Proposed Substation Development will include 1 no. telecommunications mast with a height of 37.52m. The telecommunications mast will support the operational, control and communications requirements of the Proposed Substation Development.

2.2.7 Site Access

A new access point will be provided from the L1509 public road to serve the Proposed Substation Development. The access will facilitate construction, operation, maintenance and emergency access to the substation and BESS compounds. Internal access tracks will be constructed within the site to provide access to the TSO compound, Customer compound, BESS compound and other operational areas.

The L1509 will also provide the principal route for delivery of the 220kV customer transformer. Localised widening of the L1509 within the public road boundary will be undertaken where required to accommodate the transformer delivery vehicle, together with localised works at its junction with the R513. Any temporary alterations required to the existing footpath or roadside signage at the junction will be reinstated following completion of the transformer delivery.

A contingency transformer delivery route is also included within the Red Line Boundary, extending northwards across agricultural lands to the R516. This follows the same corridor as the underground cable route associated with the Proposed Solar Farm Development and is included as an alternative delivery option should it be required. No additional hedgerow removal or ground disturbance is anticipated in association with this route, as any necessary works would be undertaken in conjunction with the cable installation. Any works required

solely to facilitate the transformer delivery would be temporary and the affected lands would be reinstated following delivery.

2.2.8 Parking and Maintenance Access

Service and maintenance parking facilities will be provided within the Proposed Substation Development site. The site will not be open to the public and will be accessed only by authorised personnel for operational, maintenance, inspection and emergency purposes.

2.2.9 Lighting

Lighting will be provided within the Proposed Substation Development. Lighting will ordinarily remain switched off and will only be activated when required for operational, maintenance, switching or emergency purposes. Lighting will be manually activated at the entrance gate and is expected to be required only intermittently during the year

2.2.10 Fencing and Security Gate

The Proposed Substation Development will include security gates, boundary fencing and all associated security infrastructure. The TSO compound, Customer compound and BESS compound will be secured by perimeter fencing, including palisade fencing, together with post and rail / stockproof fencing.

2.2.11 Closed-Circuit Television (CCTV)

CCTV cameras will be installed and will be directed internally within the development and will therefore not monitor lands outside of the boundary. The CCTV will operate using passive infra-red technology.

2.2.12 Temporary Construction Compound

The Proposed Substation Development will include a temporary construction compound located within the red line boundary (2,700 m^2). Given the confined area and constraints within the Proposed Substation Development site, construction sequencing will need to be considered at the detailed design phase to facilitate the temporary construction compound, the construction of the cable route and the construction of the substation.

The temporary construction compound will include a ‘portacabin’ site office with employee parking, welfare facilities that comply with Safety, Health and Welfare at Work (Construction) Regulations 2013-Part 14 Construction Site Welfare Facilities (Construction Site Welfare Facilities) and shall be used for storage of all construction materials and machinery. The compound may also include:

- Bunded fuel storage area.
- Potable water supply.
- Contractor lock-up facility.
- Water tanker.
- Diesel generator.

- First aid facilities.

A layer of granular material will be spread and lightly compacted within the temporary construction compound to provide hardstanding for site offices and storage containers. Areas of the compound may be used as vehicle hardstanding.

The temporary construction compound will be removed on completion of the construction phase, and the area will be reinstated to its original condition.

2.2.13 Landscaping and Hedgerows

Existing hedgerows and field boundaries will be retained where possible. Some hedgerow and vegetation removal will be required to facilitate the substation compound which includes site access, internal access tracks, electrical infrastructure, cabling, drainage infrastructure and visibility splays.

Landscaping and biodiversity enhancement measures will be provided as part of the Proposed Substation Development. These measures will include new native hedgerow planting, reinforcement of retained existing field boundaries, grassland enhancement and other biodiversity measures as required.

2.2.14 Removal of Existing Structures

The Proposed Substation Development will include the removal of a derelict farm building within the site. The development will also include the removal of 1 no. existing 25m steel lattice tower and any associated redundant infrastructure required to facilitate the proposed 220kV loop-in/loop-out connection works.

2.2.15 Ancillary Development

The Proposed Substation Development will include all associated and ancillary development, site works and services, including earthworks, localised alterations to the landscape, underground services, ducting, cabling, drainage, signage, lighting, fencing, access infrastructure, landscaping and site reinstatement.

2.2.16 Proposed Solar Farm Development

The Proposed Solar Farm Development is the subject of a separate application to Limerick City and County Council and comprises ground-mounted solar photovoltaic panels and associated infrastructure, including electrical plant, internal access tracks, underground cabling, site access works, and landscaping and biodiversity measures. The Proposed Solar Farm Development lands extend to 210 hectares across eight land parcels in County Limerick.

2.3 Excavation Depths

Different elements of the development will require different specific excavations. Fencing is not expected to require excavations with posts being driven in; Posts around gateways may need some excavations to afford more stability and solidity to the gate.

- Cabling will require excavations and trenching to a depth of approximately 1.25m.
- Mast foundations will require foundations of 3.6m
- Cut and fill will require excavation of approximately 3.1m

2.4 Construction Duration

The planning permission for the construction is to last 10 years.

Construction is expected to last 18 months.

2.5 Drainage

A drainage management plan has been prepared for the Proposed Substation Development. The drainage strategy has been developed in accordance with SuDS principles and the site-specific drainage assessment. It is intended to preserve existing overland flow pathways outside the formal drainage catchment, manage the additional runoff generated by the proposed hardstanding areas and avoid increasing flood risk to downstream or third-party receptors.

The strategy comprises two complementary drainage systems:

- Outside the formal hardstanding drainage catchment, shallow interception trenches, trackside drains, check dams, cross-underdrains and diffusers will maintain the continuity of existing overland flow pathways across the access tracks. These measures will limit localised ponding and prevent the access infrastructure from creating new barriers to flow or concentrating runoff towards adjacent land.
- Within the formal drainage catchment, runoff from the buildings and hardstanding areas will be collected through surface grading, gullies, and vegetated swales. The swales will convey runoff to the proposed attenuation pond, which will operate as a detention basin and discharge at a controlled maximum rate of 5.1 l/s to the receiving watercourse. The pond will provide attenuation storage and a dedicated interception zone for the first 5 mm of rainfall.

2.6 Zone of Influence

The work is primarily anticipated to only impact the footprint of the Proposed Substation Development. However, as watercourses and drainage ditches are located throughout the Proposed Substation Development area, impacts may be carried further afield.

The Zone of Influence (ZoI) is considered using the SPR model (OPR, 2021), therefore only designated sites that are connected to the project site are recorded and assessed. This ZoI uses the precautionary principle, and consequently if there is any doubt, a designated site will be assumed to have a pathway to the project.

The project will primarily affect the site only, but a wider ZoI is used for impacts relating to the following:

- Surface water – any downstream hydrological connections to Natura 2000 site(s).

- Groundwater - determined by the underlying aquifer but generally 5km to 10km.
- Air (disturbance) - noise disturbance to supporting *ex-situ* habitat(s) of QI and/or SCI species within or adjacent to the site (500m) (Cutts et al. 2013).
- Air (emissions and dust) - air pollution (250m) using IAQM guidance (IAQM 2024).
- Land – physical disturbance to supporting *ex-situ* habitat(s) of QI and/or SCI species within or adjacent to the site.

3 Natura 2000 Sites

This section provides baseline information on the retained Natura 2000 sites within the Zone of Influence of the proposed works using the SPR model. A short description of the Natura 2000 sites is provided, along with details of the QIs and SCIs, their respective site-specific conservation objectives, and the attributes used to define favourable conservation status and site vulnerabilities.

3.1 Natura 2000 Screening Summary

The AA screening provisionally recorded eight Natura 2000 sites present within a hypothetical ZoI. On further inspection five were excluded due to the lack of pathway (see Section 4 of the AA screening report). These are: Tory Hill SAC, Barrigone SAC, Askeaton Fen Complex SAC, Curraghchase Woods SAC, and Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA.

Three were retained for further assessment: Glen Bog SAC, the Lower River Shannon SAC, and the River Shannon and River Fergus Estuaries SPA (see Section 6 of the AA screening).

No meaningful pathways exist between the River Shannon and River Fergus Estuaries SPA and its associated waterbirds QIs and the Proposed Substation Development. The 42km hydrological connection does not provide a viable pathway in view of the size, scale, location and distance of the Proposed Substation Development, from the SPA. Furthermore, no meaningful habitat present at the Proposed Substation Development offer suitable habitat for the SPA QI species.

These Natura 2000 sites are shown in Table 3-1 and mapped in Figure 3-1 below. The Natura 2000 site descriptions, QI/SCI, respective project-relevant threats/pressures for the sites and Conservation Objectives are also discussed.

Table 3-1: Natura 2000 sites within the proposed project's ZoI.

Natura 2000 site	Site Code	Approximate distance from site	Hydrological distance from site
Lower River Shannon SAC	IE0002165	42km hydrological distance	Surface water connection; Shared Catchment
Glen Bog SAC	IE0002047	3.5km direct distance	Shared GWB

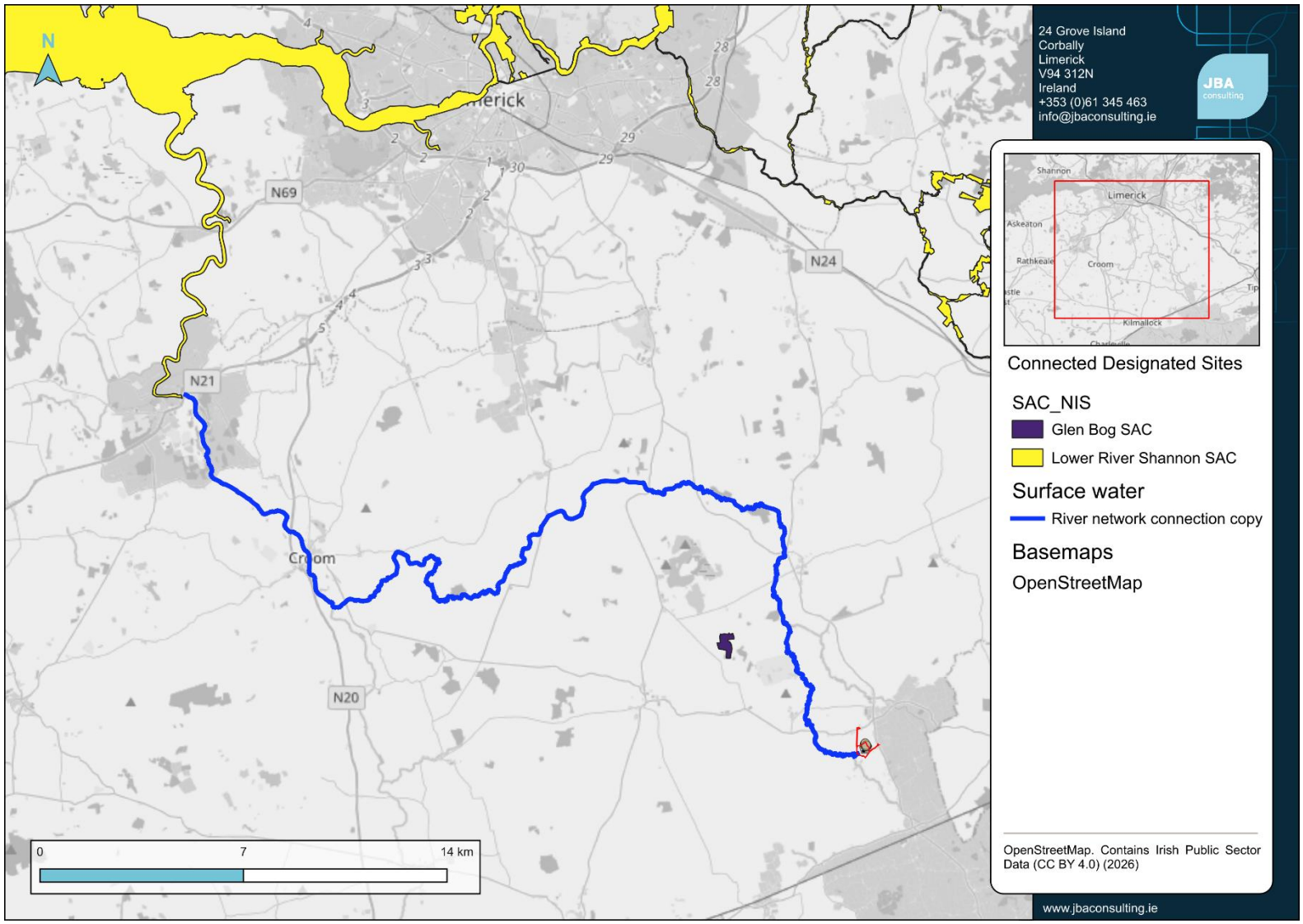

Figure 3-1: Natura 2000 sites in respect to the Proposed Substation Development and its ZoI.

3.2 Lower River Shannon SAC 002165

3.2.1 Site Summary

This site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon, the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive. The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country.

3.2.2 Site Vulnerability (Threats and Pressures)

Threats, pressures and activities with negative impacts on the SCIs of the Lower River Shannon SAC include Discharges, Invasive non-native species, Urbanised areas, human habitation, Air pollution, air-borne pollutants (EEA 2024).

Table 3-2: Threats and pressures and negative impacts on the QIs of the Lower River Shannon SAC

Rank	Code	Full Description	Occurrence	Project relevance
M	A04	Grazing	Inside	No
M	A08	Fertilisation	Outside	Yes
M	A08	Fertilisation	Inside	No
L	B	Forest and plantation management & use (broad category)	Inside	No
L	C01.01.02	Sand and gravel extraction (marine and estuarine)	Inside	No
L	C01.03.01	Peat extraction (commercial)	Inside	No
L	D01.01	Paths, tracks, cycling tracks	Inside	No
M	E01	Urbanised areas, human habitation	Outside	Yes
M	E03	Discharges from urban wastewater	Inside	No
M	E03	Discharges from urban wastewater	Outside	No
L	F01	Marine and freshwater aquaculture	Inside	No
L	F03.01	Fishing and harvesting aquatic resources – professional use	Inside	No
L	G01.01	Outdoor sports and leisure activities, recreational activities	Inside	No
M	H04	Air pollution, air-borne pollutants	Outside	Yes
L	I01	Invasive non-native species	Inside	No
M	J02.01.01	Modification of hydrological flow – drainage	Inside	No

Rank	Code	Full Description	Occurrence	Project relevance
M	J02.01.02	Modification of hydrological flow – groundwater abstraction	Outside	Yes
L	J02.10	Alteration of coastline, estuary and coastal conditions	Inside	No
L	J02.12.01	Dredging – removal of sediments	Inside	No
M	K02.03	Eutrophication (nutrient enrichment)	Outside	Yes

3.2.3 Retained Qualifying Interests

The screening retained the following qualifying interests:

- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
- 91E0 *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion*, Alnion incanae, Salicion albae)
- Sea Lamprey *Petromyzon marinus* [1095]
- Brook Lamprey *Lampetra planeri* [1096]
- River Lamprey *Lampetra fluviatilis* [1099]
- Salmon *Salmo salar* [1106]
- Otter *Lutra lutra* [1355]

3.2.4 Conservation Objectives

The conservation objectives for each qualifying interest specify key attributes, measures and targets that are used in order to achieve the conservation goals. These are set out in the site-specific documentation (NPWS 2012a). Broadly speaking, the conservation objectives are set to maintain the favourable conditions of the qualifying interests. These are detailed for each qualifying interests in the subsequent sections.

3.2.4.1 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]

Additional conservation objectives are specified in the supporting documentation for this QI (NPWS 2012b). This specifies measures for Opposite-leaved Pondweed *Groenlandia densa,* Triangular Club-rush *Schoenoplectus triqueter*, and bryophyte-rich streams and rivers. Triangular Club-rush occurs in the tidal reaches of the Maigue, and Opposite-leaved Pondweed occurs in the Maigue, and associated drainage channels (NBDC 2026).

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, which is defined by the following list of attributes and targets:

Table 3-3: Conservation Targets for Floating River Vegetation habitat. (NPWS 2012a)

Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	Three high-value sub-types occur in the site; rooted macrophytes should be absent.
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution shown on map 13; see supporting document.
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	See supporting document.
Hydrological regime: tidal influence	Daily water level fluctuations (m)	Maintain natural tidal regime	See supporting document.
Hydrological regime: freshwater seepages	Metres per second	Maintain appropriate freshwater seepage regimes	See supporting document.
Substratum composition: particle size range	Millimetres	Substratum dominated by particle sizes appropriate to sub-type (often sands, gravels, cobbles)	Some sub-types require fine sediments (e.g., *Schoenoplectus triqueter*, *Groenlandia densa*).
Water quality: nutrients	Milligrams per litre	Nutrient concentrations low enough to prevent changes in species composition or habitat condition	Targets vary among sub-types.
Vegetation composition: typical species	Occurrence	Typical species of the relevant sub-type present and in good condition	See supporting document.
Floodplain connectivity	Area	Active floodplain area at and upstream of habitat maintained	See supporting document.
Riparian habitat	Area	Riparian woodland area at and upstream of bryophyte-rich sub-type maintained	Linked to habitat 91E0 (Alluvial forests).

Opposite-leaved Pondweed: Maintain the favourable conservation condition of the habitat within the Lower River Shannon SAC, including the high-conservation-value *Groenlandia densa* sub-type, as defined by the attributes and targets below

Table 3-4: Specific Targets for 3260 Sub-type *Groelandia densa*. From (NPWS 2012d)

Conservation attribute	Target / Conservation objective	Rationale
Range	Maintain the known distribution of *Groenlandia densa* within the Lower River Shannon SAC, subject to natural processes.	Ensures the species continues to occupy its current locations.
River flow (hydrological regime)	Maintain the natural hydrological regime necessary to support the species.	Adequate flow is required for growth, reproduction and habitat stability.
Tidal influence	Maintain the existing tidal regime where the species occurs.	The species occupies freshwater reaches with limited tidal influence.
Freshwater seepages	Maintain groundwater seepages where they contribute to suitable habitat.	Seepages help provide stable, high-quality freshwater conditions.
Substratum composition (particle size)	Maintain the natural substrate composition suitable for establishment and growth.	*G. densa* requires stable gravelly or stony substrates with limited fine sediment.
Water quality (nutrients)	Maintain nutrient concentrations at levels that support the species and prevent eutrophication.	Excess nutrients encourage algal growth and competitive vegetation that can displace *G. densa*.
Vegetation composition (typical species)	Maintain the characteristic aquatic plant community associated with *Groenlandia densa*.	Preserves the ecological integrity of the habitat and associated flora.

Triangular Club Rush: Maintain the favourable conservation condition of the Water courses habitat (Annex I Habitat 3260), including the high-conservation-value *Schoenoplectus triqueter* sub-type, by maintaining the attributes and targets listed below.

Table 3-5: SpecificTargets for 3260 Sub-type *Schoenoplectus triqueter.* From (NPWS 2012d)

Conservation attribute	Target / Conservation objective	Purpose
Range	Maintain the known distribution of *Schoenoplectus triqueter* within the Lower River Shannon SAC, subject to natural processes.	Ensure the species continues to occupy its current estuarine locations.
River flow (hydrological regime)	Maintain the natural river flow regime that supports the species.	Preserves the hydrological conditions required for growth and regeneration.
Tidal influence	Maintain the existing tidal regime within the species' habitat.	*S. triqueter* is characteristic of the upper estuary where regular tidal inundation and salinity gradients are essential.
Freshwater seepages	Maintain freshwater inputs where they contribute to suitable habitat conditions.	Supports the brackish conditions required by the species.
Substratum composition (particle size)	Maintain the natural sediment composition suitable for establishment and persistence.	The species is associated with stable mud and fine sediment on sheltered estuarine margins.
Vegetation composition (typical species)	Maintain the characteristic plant community associated with *S. triqueter*.	Conserves the ecological integrity of the upper estuarine habitat and prevents replacement by invasive or competitive vegetation.

Bryophyte-rich streams and rivers: Maintain the favourable conservation condition of the Water courses habitat (Annex I Habitat 3260), including the bryophyte-rich streams and rivers sub-type, by maintaining the attributes and targets listed below From (NPWS 2012d).

Table 3-6: SpecificTargets for 3260 Sub-type *Bryophtye-rich Streams*

Conservation attribute	Target / Conservation objective	Purpose
Range	Maintain the known distribution of bryophyte-rich streams and rivers within the Lower River Shannon SAC, subject to natural processes.	Ensures the continued occurrence of this high-conservation-value sub-type throughout the SAC.
River flow (hydrological regime)	Maintain the natural river flow regime that supports the bryophyte community.	Sustains the flow velocities, water depths and seasonal variation required by aquatic bryophytes.
Freshwater seepages	Maintain groundwater seepages where they contribute to suitable habitat conditions.	Supports stable flows, cool water temperatures and water chemistry favourable to bryophyte communities.

Conservation attribute	Target / Conservation objective	Purpose
Substratum composition (particle size)	Maintain the natural composition of the river bed, including stable coarse substrates suitable for bryophyte colonisation.	Aquatic bryophytes require stable cobbles, boulders and bedrock with limited deposition of fine sediment.
Water quality (nutrients)	Maintain nutrient concentrations at levels that support the bryophyte community and prevent eutrophication.	Low nutrient levels minimise excessive algal growth and competition, allowing sensitive bryophyte species to persist.
Vegetation composition (typical species)	Maintain the characteristic assemblage of aquatic bryophytes and associated plant species.	Conserves the distinctive biological community that defines this high-conservation-value sub-type.
Floodplain connectivity	Maintain the natural hydrological connectivity between the river and its floodplain.	Supports natural ecological processes, sediment transport and habitat functioning.
Riparian habitat	Maintain the natural structure and function of the riparian zone adjacent to bryophyte-rich streams.	Provides shading, bank stability, nutrient regulation and protection from excessive sediment inputs.

3.2.4.2 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) 91E0

Additional conservation objectives are specified in the supporting documentation for this QI (NPWS 2012c). This specifies characteristics of the woodland types, including Gallery woodland (*Salicion albae*) (classified as WN5 by Fossitt (2000)) dominated by tree willows forming small, narrow stands on the riverbanks and islands where the trees are subject to frequent flooding and/or have their roots permanently in water.

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, which is defined by the following list of attributes and targets:

Table 3-7: Conservation Targets for Alluvial Woodland. (NPWS 2012a)

Attribute	Measure	Target	Notes
Habitat area	Hectares	*Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed. See map 14*	"Minimum area, based on 5 sites surveyed by Perrin et al. (2008). NB further areas are likely to be present within the SAC."
Habitat distribution	Occurrence	*No decline. Surveyed locations shown on map 14*	"Distribution based on Perrin et al. (2008). NB further areas are likely to be present within the SAC."
Woodland size	Hectares	*Area stable or increasing. Large woods ≥25ha; small*	"Sizes… need to be increased to reduce habitat fragmentation…

Attribute	Measure	Target	Notes
		woods ≥3ha	constraints may restrict expansion."
Woodland structure: cover and height	% and metres	*Diverse structure with closed canopy, sub-canopy, and well-developed herb layer*	"Described in Perrin et al. (2008)."
Woodland structure: community diversity and extent	Hectares	*Maintain diversity and extent of community types*	"Described in Perrin et al. (2008)."
Woodland structure: natural regeneration	Seedling : sapling : pole ratio	*Adequate proportions to ensure canopy survival*	"Alder and oak regenerate poorly; ash often regenerates but few seedlings reach pole size."
Hydrological regime	Metres	*Appropriate hydrological regime necessary for alluvial vegetation*	"Periodic flooding is essential to maintain alluvial woodlands."
Dead wood	m^3/ha; number/ha	*≥30 m^3/ha fallen timber >10cm; 30 snags/ha; include stems >40cm (or >20cm for alder)*	"Dead wood is a valuable resource and integral to a healthy woodland ecosystem."
Veteran trees	Number/ha	*No decline*	"Important habitats for bryophytes, lichens, saproxylic organisms and birds."
Indicators of local distinctiveness	Occurrence	*No decline*	Includes ancient woodland, archaeological features, rare species.
Native tree cover	Percentage	*Not less than 95%*	"Species reported in Perrin et al. (2008)."
Typical species	Occurrence	*Typical native species present (alder, willows, oak, ash)*	"Species reported in Perrin et al. (2008)."
Negative indicator species	Occurrence	*Non-native invasive species absent or under control*	"Common invasives: Himalayan balsam, giant hogweed, sycamore."

3.2.4.3 Sea Lamprey *Petromyzon marinus* [1095]

To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Table 3-8: Conservation Targets for Sea Lamprey. (NPWS 2012a)

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	>75% of main stem length of rivers accessible from estuary	Artificial barriers restrict upstream migration; barriers present in the Fergus, Mulkear, and Feale.
Population structure of juveniles	Number of age/size groups	At least 3 age/size groups present	Based on Harvey & Cowx (2003) and O'Connor (2007).
Juvenile density in fine sediment	Juveniles/m²	≥1 juvenile/m²	Juveniles burrow in fine sediment in still water; target based on Harvey & Cowx (2003).
Extent & distribution of spawning habitat	m² and occurrence	No decline in extent or distribution of spawning beds	Lampreys spawn in clean gravels; redds often accumulate below major weirs.
Availability of juvenile habitat	Number of positive sites in 3rd-order channels (and higher) downstream of spawning areas	>50% of sample sites positive	Despite spawning, ammocoetes often absent or in low numbers at many stations.

3.2.4.4 Brook Lamprey *Lampetra planeri* [1096]

To maintain the favourable conservation condition of Brook Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Table 3-9: Conservation Targets for Brook Lamprey. (NPWS 2012a)

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all water courses down to first-order streams	Artificial barriers can block or hinder migration both upstream and downstream, potentially isolating populations (Espanhol et al., 2007).
Population structure of juveniles	Number of age/size groups	At least 3 age/size groups of brook/river lamprey present	Juveniles of brook and river lamprey cannot be distinguished in the field (Gardiner, 2003), so they are assessed together. Based on Harvey & Cowx (2003).
Juvenile density in	Juveniles/m²	Mean catchment juvenile density ≥ 2/m²	Juveniles burrow in fine sediment in low-velocity water. Harvey & Cowx

Attribute	Measure	Target	Notes
fine sediment			(2003) report 10/m² in optimal conditions and >2/m² at catchment scale.
Extent & distribution of spawning habitat	m² and occurrence	No decline in extent or distribution of spawning beds	Spawning site and redd attributes established by IFI (Rooney et al., in press).
Availability of juvenile habitat	Number of positive sites in 2nd-order channels (and higher) downstream of spawning areas	>50% of sample sites positive	Many suitable sites lack larvae; occupancy >50% is considered reasonable for Irish catchments (King et al., unpublished data).

3.2.4.5 River Lamprey *Lampetra fluviatilis* [1099]

To maintain the favourable conservation condition of River Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Table 3-10: Conservation Targets for River Lamprey. (NPWS 2012a)

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all water courses down to first-order streams	Artificial barriers can block or hinder migration both upstream and downstream, potentially isolating populations (Espanhol et al., 2007).
Population structure of juveniles	Number of age/size groups	At least 3 age/size groups of river/brook lamprey present	Juveniles of river and brook lamprey cannot be distinguished in the field (Gardiner, 2003), so they are assessed together. Based on Harvey & Cowx (2003).
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density ≥ 2/m²	Juveniles burrow in fine sediment in low-velocity water. Harvey & Cowx (2003) report 10/m² in optimal conditions and >2/m² at catchment scale.
Extent & distribution of spawning habitat	m² and occurrence	No decline in extent or distribution of spawning beds	—
Availability of juvenile	Number of positive	>50% of sample sites positive	Many suitable sites lack larvae; occupancy >50% is considered

Attribute	Measure	Target	Notes
habitat	sites in 2nd-order channels (and higher) downstream of spawning areas		reasonable for Irish catchments (King et al., unpublished data).

3.2.4.6 Salmon *Salmo salar* [1106]

To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Table 3-11: Conservation Targets for Salmon. (NPWS 2012a)

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Major hydro-electric barriers at Ardnacrusha and Parteen restrict upstream migration; fish passes exist but remain problematic. Additional weirs upstream also restrict access. No major obstacles on the Feale or Mulkear.
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	CL defined by NASCO as the spawning stock level producing long-term maximum sustainable yield. Shannon stocks above the impoundments are well below CL; Feale and Mulkear exceed CL.
Salmon fry abundance	Number of fry / 5-min electrofishing	Maintain or exceed mean catchment-wide threshold of 17 fry per 5 minutes	Threshold applies to rivers currently exceeding CL. Shannon main channel fry counts above the hydro station are significantly below target.
Out-migrating smolt abundance	Number	No significant decline	Smolt survival affected by estuarine pollution, predation, sea lice, and turbine mortality in the Shannon system.
Number and distribution of redds	Number and occurrence	No decline due to anthropogenic causes	Salmon require clean gravels; artificial barriers currently prevent access to suitable spawning habitat on the Shannon main channel.
Water quality	EPA Q-value	At least Q4 at all EPA monitoring sites	Q-values come from EPA's triennial water-quality surveys.

3.2.4.7 Otter *Lutra lutra* [1355]

To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Table 3-12: Conservation Targets for Otter. (NPWS 2012a)

Attribute	Measure	Target	Notes
Distribution	Percentage of positive survey sites	No significant decline	Based on standard otter survey technique. Favourable Conservation Status (FCS) target is 88% in SACs (from 1980/81 survey). Current Shannon catchment estimate is 70.5% (Bailey & Rochford 2006).
Extent of terrestrial habitat	Hectares	No significant decline. 596.8 ha above HWM; 958.9 ha along riverbanks/ponds	No field survey; mapped using 10 m terrestrial buffer along shoreline and riverbanks, considered critical for otters (NPWS 2007).
Extent of marine habitat	Hectares	No significant decline. 4,461.6 ha mapped	Based on evidence that otters forage within 80 m of shoreline (NPWS 2007; Kruuk 2006).
Extent of freshwater (river) habitat	Kilometres	No significant decline. 500.1 km mapped	River length calculated assuming otters use freshwater habitats from estuary to headwaters (Chapman & Chapman 1982).
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. 125.6 ha mapped	Based on 80 m foraging buffer around lake/lagoon shorelines (NPWS 2007).
Couching sites and holts	Number	No significant decline	Otters require secure lying-up areas throughout their territory (Kruuk 2006; Kruuk & Moorhouse 1991).
Fish biomass available	Kilograms	No significant decline	Diet dominated by fish: salmonids, eels, sticklebacks in freshwater; wrasse and rockling in coastal waters (Bailey & Rochford 2006; Kingston et al. 1999).
Barriers to connectivity	Number	No significant increase	Otters regularly commute across open water up to 500 m; commuting routes must remain unobstructed (De Jongh & O'Neill 2010).

3.3 Glen Bog SAC 001430

3.3.1 Site Summary

Glen Bog comprises a wet woodland occupying the site of a former lake, as well as the summit and southern side of Knockderc, a low hill rising to 143 m. Knockderc is composed of an igneous intrusive porphyritic rock while the rest of the site is underlain by Lower Carboniferous limestone. Peregrine Falcon, an Annex I species of the E.U. Birds Directive, forage within the site (NPWS 2016).

Glen Bog is a site of considerable conservation importance because it includes a fine example of mature and relatively undisturbed wet woodland, a habitat that is listed with priority status on Annex I of the E.U. Habitats Directive.

3.3.2 Site Vulnerability (Threats and Pressures)

Threats, pressures and activities with negative impacts on the SCIs of Glen Bog SAC include shooting and change in hydraulic conditions (BISE, n.d.).

Table 3-13: Threats and pressures and negative impacts on the QIs of the Lower River Shannon SAC

Rank	Code	Full Description	Occurrence	Project relevance
H	A04	Human induced changes in hydraulic conditions	Inside / Outside	No
M	A08	Shooting	Inside	No

The Proposed Substation Development will not have an effect on known threats and pressures of the SAC.

3.3.3 Retained Qualifying Interests

The screening retained the following qualifying interests:

- 91E0 *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion*, Alnion incanae, Salicion albae)

3.3.4 Conservation Objectives

The conservation objectives for each qualifying interest specify key attributes, measures and targets that are used in order to achieve the conservation goals. These are set out in the site-specific documentation (NPWS 2012a). Broadly speaking, the conservation objectives are set to maintain the favourable conditions of the qualifying interests. These are detailed for each qualifying interests in the subsequent sections.

To maintain the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* in Glen Bog SAC, which is defined by the following list of attributes and targets:

Table 3-14: Conservation Targets for Alluvial Woodland at Glen Bog SAC (NPWS 2017)

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 9.07ha for the sub-site (Glen Bog, NSNW site code 1293) surveyed. See map 2 for surveyed area.	Alluvial forests with Alnus glutinosa and Fraxinus excelsior was surveyed within Glen Bog SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) in the sub-site Glen Bog (NSNW site code 1293). The minimum area of alluvial forest in the SAC is estimated to be 9.07ha. Map 2 shows the area surveyed classified as 91E0* (9.07ha). The woodland occupies the site of a former lake at the foot of a small hill (Perrin et al., 2008; NPWS internal files). Glen Bog (1293) was also included in a national monitoring survey (O'Neill and Barron, 2013).
Habitat distribution	Occurrence	No decline, subject to natural processes. The surveyed woodland location is shown on map 2.	Distribution based on Perrin et al. (2008).
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size.	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion.
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer.	Described in Perrin et al. (2008) and NPWS internal files.
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types.	Described in Perrin et al. (2008) and NPWS internal files. See also Kelly and Iremonger (1997).
Woodland structure: natural regeneration	Seedling:sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy.	Alder (Alnus glutinosa) and oak (Quercus spp.) tend to regenerate poorly. Ash (Fraxinus excelsior) often regenerates in large numbers although few seedlings reach

Attribute	Measure	Target	Notes
			pole size.
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation.	Periodic flooding is essential to maintain alluvial woodlands along river flood plains but not for woodland around springs/seepage areas.
Woodland structure: dead wood	m³ per hectare; number per hectare	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 (*Alnus glutinosa*)).	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem.
Woodland structure: veteran trees	Number per hectare	No decline.	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources.
Woodland structure: indicators of local distinctiveness	Occurrence	No decline.	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red data and other rare or localised species.
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%.	Species reported in Perrin et al. (2008) and NPWS internal files.
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (Alnus glutinosa), willows (Salix spp.), oak (Quercus spp.), ash (Fraxinus excelsior) and birch (Betula pubescens).	Species reported in Perrin et al. (2008) and NPWS internal files.
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control.	No non-native species were reported from the alluvial woodland in Glen Bog (NSNW site code 1293) by Perrin et al. (2008).

Glen Bog SAC, shares the groundwater body with the development site. This SAC is 3.8km away at the nearest point. Glen Bog SAC is not connected to the Proposed Substation Development through surface water pathways and is at distance from the Proposed Substation Development.

The Proposed Substation Development will not lead to water abstractions, or changes in surface or groundwater flows. The topography of the area mean that water flows from Glen Bog SAC eastwards and westward, with mapped streams in the area surrounding Glen Bog SAC flowing away from it (Figure 3-2). The natural flow paths mean that water is flowing away from Glen Bog SAC, and therefore that any runoffs from the Proposed Substation Development cannot reach Glen Bog SAC.

No alteration of surface water or groundwater flows are anticipated from the Proposed Substation Development.

Therefore, following examination of detailed information about the SAC; and considering the nature of the development, the distance to the SASC, as well as the topography and baseline groundwater details the risk of significant impacts to the SAC is considered negligible. This SAC cannot be impacted by the Proposed Substation Development, and is no longer considered in this assessment.

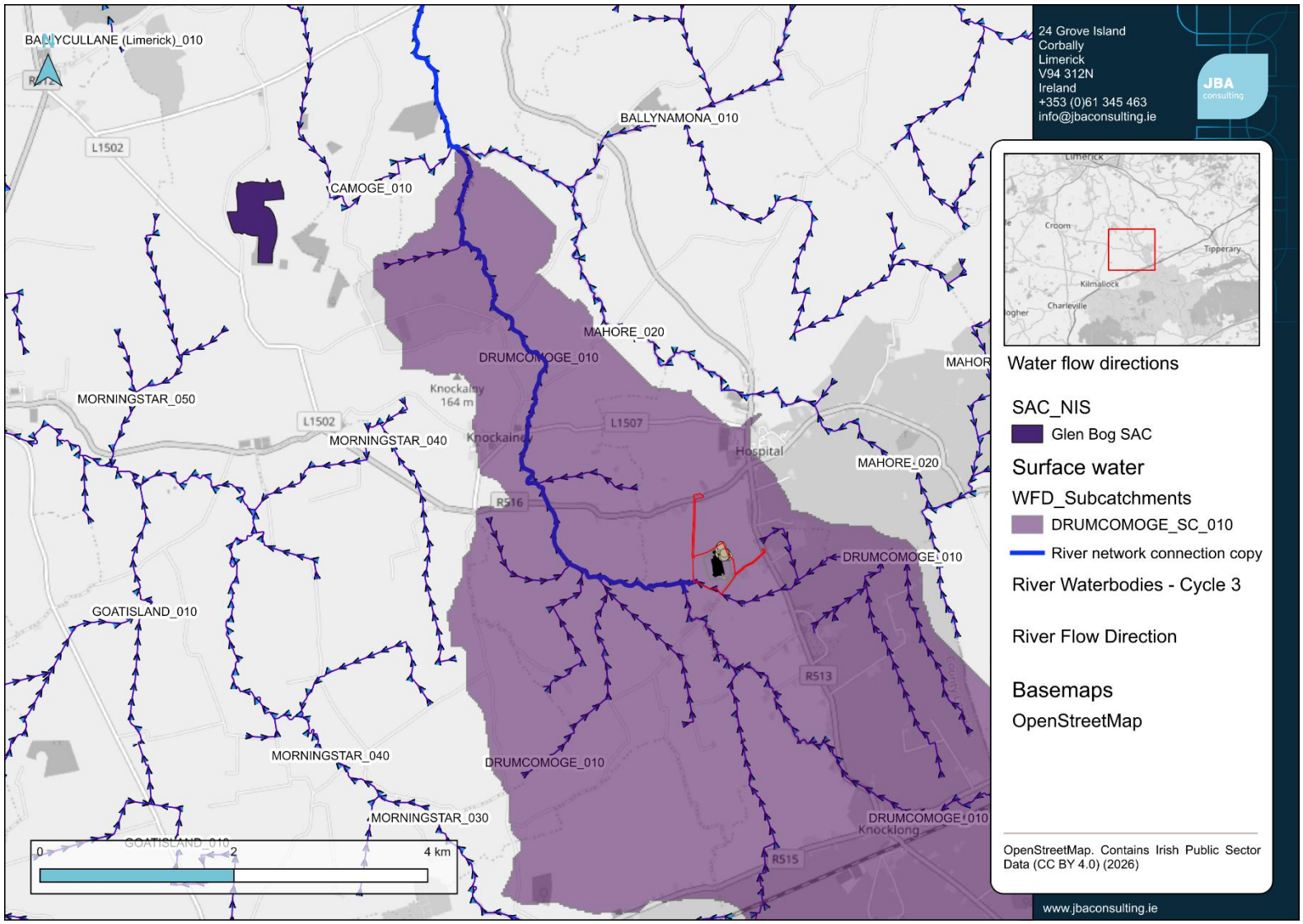

Figure 3-2: River flow direction around Glen Bog SAC

4 Existing Environment

4.1 Baseline Conditions

Site surveys were carried out between December 2024 and October 2025 covering seasonality and a suite of species that may be present. The area of the Proposed Substation Development consists of agricultural lands, with existing trackways and access lanes, and some agricultural buildings.

4.2 Habitats

The habitats recorded during the site survey are listed below in Table 4-1 and mapped in Figure 4-1. *Ex-situ* habitats for QIs of nearby Natura 2000 sites were found to be present within the site, with habitat description included here. All other habitats are described in the screening reports.

Table 4-1: Habitats recorded during the site visit.

Habitat Type	Fossitt Code	Annex I link?
Improved agricultural grassland	GA1	None
Wet grassland	GS4	Some examples can correspond with Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) 6410). **Not present at this site.**
Dry meadows and grassy verges	GS2	Some examples can correspond with Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) (6510). **Not present at this site.**
Treelines	WL2	None
Hedgerows	WL1	None
Drainage ditches	FW4	None
Depositing/lowland rivers	FW2	Water courses of plain to montane levels, with submerged or floating vegetation of the *Ranunculion fluitantis* and *Callitricho-Batrachion* (3260) (Parcel 1, Parcel 4, Parcel 8)

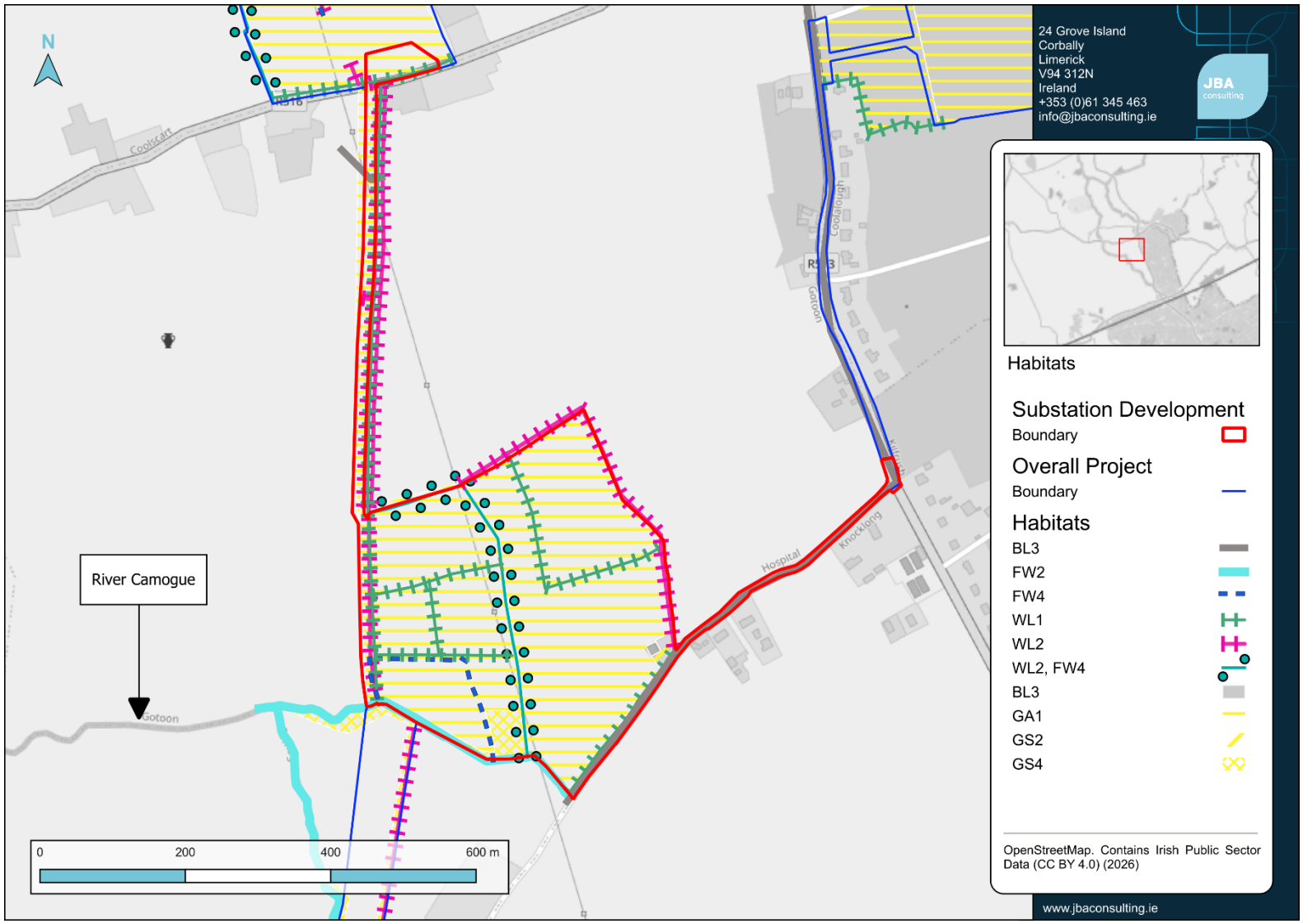

Figure 4-1: Habitats across parcel of the Proposed Substation Development.

4.2.1 Depositing/lowland rivers (FW2)

These are natural watercourses, unlike the drainage ditches which are manmade. This habitat encompasses river sections that are typically lowland and have reduced velocity that enables deposition of sediments. The Camogue flows along the southwestern aspect of the site (Figure 4-2), and has been channelised at some areas at this location (see Figure 3-6). This is a tributary of the River Maigue. Rivers in this area are characterised by a mix of exposed substratum of gravels to areas where aquatic river vegetation has developed. The banks of the river were dominated by herbaceous species, with no significant riparian habitat.

Figure 4-2: River Camogue adjacent to the land parcel

4.3 Protected Species

4.3.1 Desktop records

A 2km radius custom polygon was created through NBDC Biodiversity Maps (NBDC, 2025) in order to assess which Natura 2000 QI/SCI species were recorded in close proximity to the site within the last ten years.

A total of 80 entries were recorded in the area; this was filtered down to 26 entries after excluding species without specific legislative designations. Of note, all bird species are protected under the Wildlife Act, but only bird species which are covered by the EU Birds directive are considered in this assessment. Four invasive species, two Annex II species and two annex IV species of the EU Habitats Directive, and one Annex I species of the EU Birds Directive were recorded.

Table 4-2: NBDC records.

Species name	Date of last record	Designation	QI
Birds			
Golden Plover *Pluvialis apricaria*	11/01/2018	EU Birds Directive >> Annex I	yes
Mammals			
Otter *Lutra lutra*	11/01/2018	EU Habitats Directive >> Annex II, IV	yes
Common Pipistrelle *Pipistrellus pipistrellus sensu stricto*	04/09/2019	EU Habitats Directive >> Annex IV	no
Soprano Pipistrelle *Pipistrellus pygmaeus*	04/09/2019	EU Habitats Directive >> Annex IV	no
Invertebrates			
White-clawed Crayfish *Austropotamobius pallipes*	26/09/2017	EU Habitats Directive >> Annex II, V	no

4.3.2 Fishery Records

Fishery records from the River Maigue and the Camogue record the presence of Lamprey Spp. (*Petromyzon spp.* and/or *Lampetra spp.*), and Atlantic Salmon *Salmo salar* (IFI 2025), which are QIs of the Lower River Shannon SAC.

Atlantic Salmon require at least 30cm of water to be able to travel and spawn along the rivers; Lamprey require ~10cm of water to be able to spawn. Whilst no instream survey were carried out, the Camogue presents suitable habitat for Salmonids, but suffers from poor water quality (Maigue Rivers Trust 2019).

Instream works, and works on the riverbanks are not anticipated, nor are any works anticipated to interfere with water flows, stream morphology or the introduction of barriers. Therefore, no detailed instream surveys were carried out. Works are expected to be approximately 100m away from the watercourse

The Proposed Substation Development will not introduce barriers or obstructions to the normal river flow or the passage of fish, and no in stream works on the Camogue are anticipated and therefore impacts on Lamprey and Salmon at the site are not anticipated.

The Camogue presents small narrow channels of free-flowing water; in the section along Parcel 4 the stream banks are covered in herbaceous vegetation with some overbank flows during flood events. This area is unlikely to provide suitable spawning conditions for Lamprey or Salmonids due to the slow-moving water, and absence of pools and riffles. This section may be occupied by Lamprey ammocoetes, should Lamprey be spawning upstream from the site.

Overall, there is potential for Atlantic Salmon and Brook Lamprey to be present within the vicinity of the site, and IFI records confirm their presence upstream and downstream from the site.

4.3.3 Protected Fauna on Site

Protected mammals recorded on site Badger *Meles meles*, bats including Common Pipistrelle *Pipistrellus pipistrellus*, Soprano pipistrelle *P. pygmaneus*, Leisler's bat, *Nyctalus leislerei*. None of these mammals are QI species of the Lower River Shannon SAC or of any other SAC, and thus are not considered within this assessment, and will be considered further in the EcIA.

During the site surveys, no evidence of Otter was recorded along the Camogue running along the Proposed Substation Development site. Drainage ditches in this area hold negligible to no fisheries potential. Other than the most westerly drainage ditch which was noted as backfilling from the Camogue, and some fish fry was recorded, other drainage ditches were dry.

The river in this section is highly modified, with little riparian cover, and managed agricultural grasslands on the right bank.

The Maigue Rivers Trust surveys (Sweeney 2018) along the Camogue downstream from the site noted fair to little cover and no evidence of Otter.

The lack of evidence of Otter and the overall poor Otter habitat quality would indicate that Otter are unlikely to be present in this area.

4.3.4 Protected Flora on Site

During the site visits, no signs of flora listed on the Flora (Protection) Order 2022 were recorded. Species composition was determined during the habitat surveys with additional observations on each site visit.

There are some slight limitations to the survey, as no instream aquatic survey was undertaken, and surveys were restricted to observations from the banks. However, given the lack of instream works within the project, and available information from desktop review, this is not considered to be a limitation to the overall conclusions of the report.

4.4 Alien Invasive Species

NBDC data records the presence of Schedule 1 species, and invasive fauna species.

Table 4-3: NBDC records of Alien Invasive Species recorded within 2km of the site

Species name	Date of last record	Designation
Japanese Knotweed *Reynoutria japonica*	20/05/2018	EU Invasive Alien Species Regulation No. 1143/2014 ||Regulation S.I. 477/2011 & S.I. 374/2024 (Ireland) || High Risk Invasive Species

Species name	Date of last record	Designation
Giant Hogweed *Heracleum mantegazzianum*	10/01/2018	EU Invasive Alien Species Regulation No. 1143/2014 || Regulation S.I. 477/2011 & S.I. 374/2024 (Ireland) || High Risk Invasive Species
Jenkins' Spire Snail *Potamopyrgus antipodarum*	26/09/2017	Medium Risk Invasive Species
Rabbit *Oryctolagus cuniculus*	20/05/2016	Medium Risk Invasive Species

However, during the site visits, no invasive species were record on the site of the Proposed Substation Development.

4.5 Local Waterbodies in the Vicinity of the Site

4.5.1 Surface Waterbodies

The Proposed Substation Development site is located within the DRUMCOMOGE_SC_010, within the Shannon Estuary South Catchment. The Camogue (DRUMCOMOGE_010) runs adjacent to the site, along the southern boundary, with field drains connecting the land to the watercourse. The Camogue discharges into the Maigue, which in turn flows into the Shannon Estuary.

The Camogue (Drumcomoge_10) river is classified as At Risk and of 'Poor' ecological status (EPA 2026).

Table 4-4: Waterbodies, types, ecological status and risk status based on EPA data.

Denomination	Waterbody	Type	Ecological status 2019-2024	Risk
Camogue	DRUMCOMOGE_010	River Type 31	Poor	At Risk

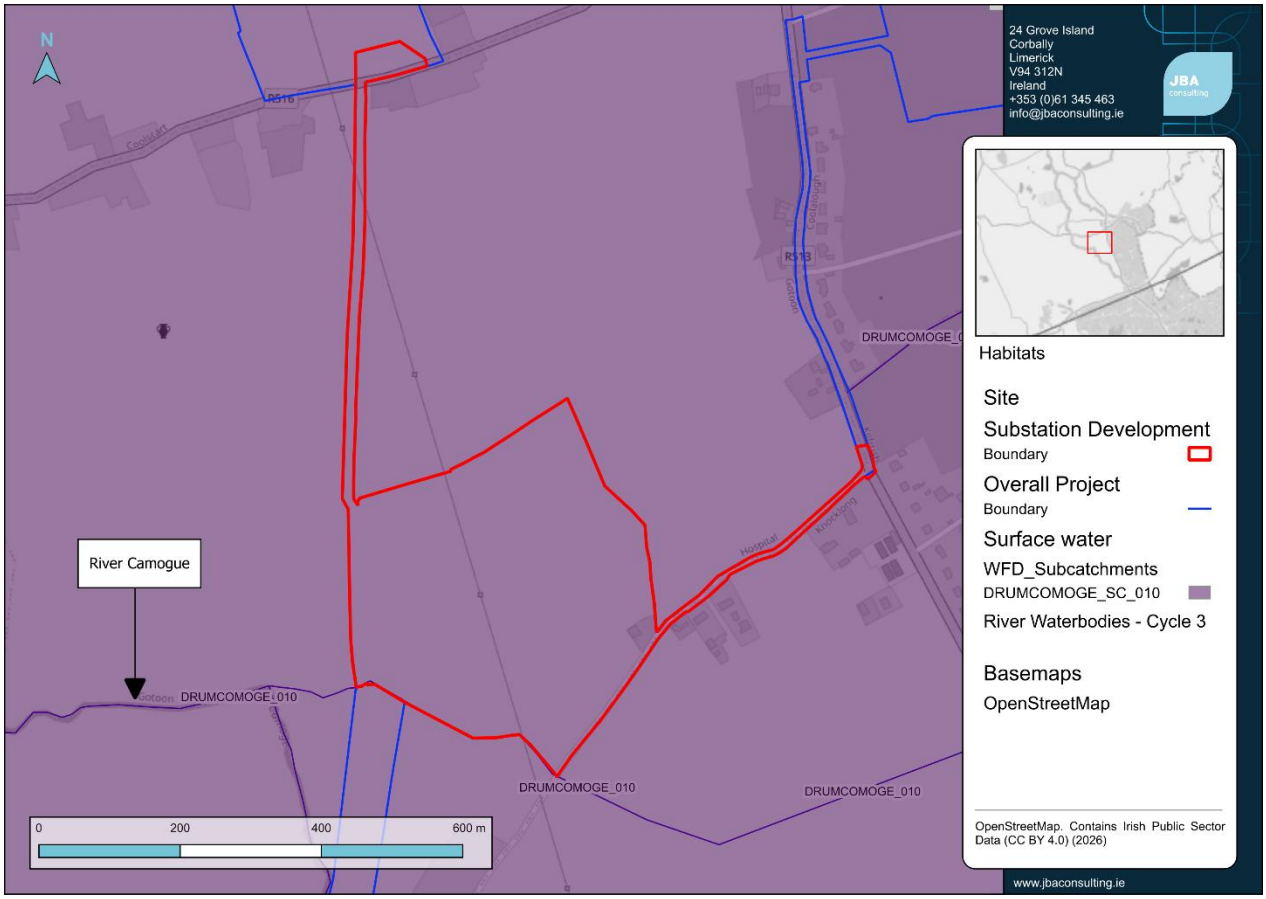

Figure 4-3: Surface water network of the site and the surrounding area.

4.5.2 Groundwater Bodies

The site is located within the Hospital groundwater body (GWB), which is classified as Not At Risk, and of Good ecological status (EPA 2024).

The area is low-lying or gently hilly and is generally poorly drained. The GWB comprises low transmissivity and low storativity rocks, although localised zones of enhanced permeability do occur. Groundwater flows along fractures, joints and major faults. The aquifers are unconfined. Most groundwater flow occurs near the surface in a narrow zone comprising a weathered zone of a few metres and a connected fractured zone below this. Flow path lengths are relatively short, and in general are between 30 and 300 m. Groundwater discharges to the numerous small streams and rivers crossing the aquifer. Local flow directions are controlled by local topography. Overall, flow directions are east- and westwards to the major rivers. Due to the shallow groundwater flow in this aquifer the groundwater and surface waters are closely linked. This interaction is rapid and seasonal; due to low storage and the local nature of the flow paths, summer baseflows to the rivers are low (GSI 2004).

The spread of the site means that it overlays different aquifers and subsoil types (Table 4-5). The majority of the site overlays a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (GSI, n.d.).

Groundwater Vulnerability is high in the northern section of the plot, and moderate in the south section (Figure 4-4).

Table 4-5: Aquifer type and underlying geology across the different parcels.

Aquifer	Description
Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones	Dark muddy limestone, shale

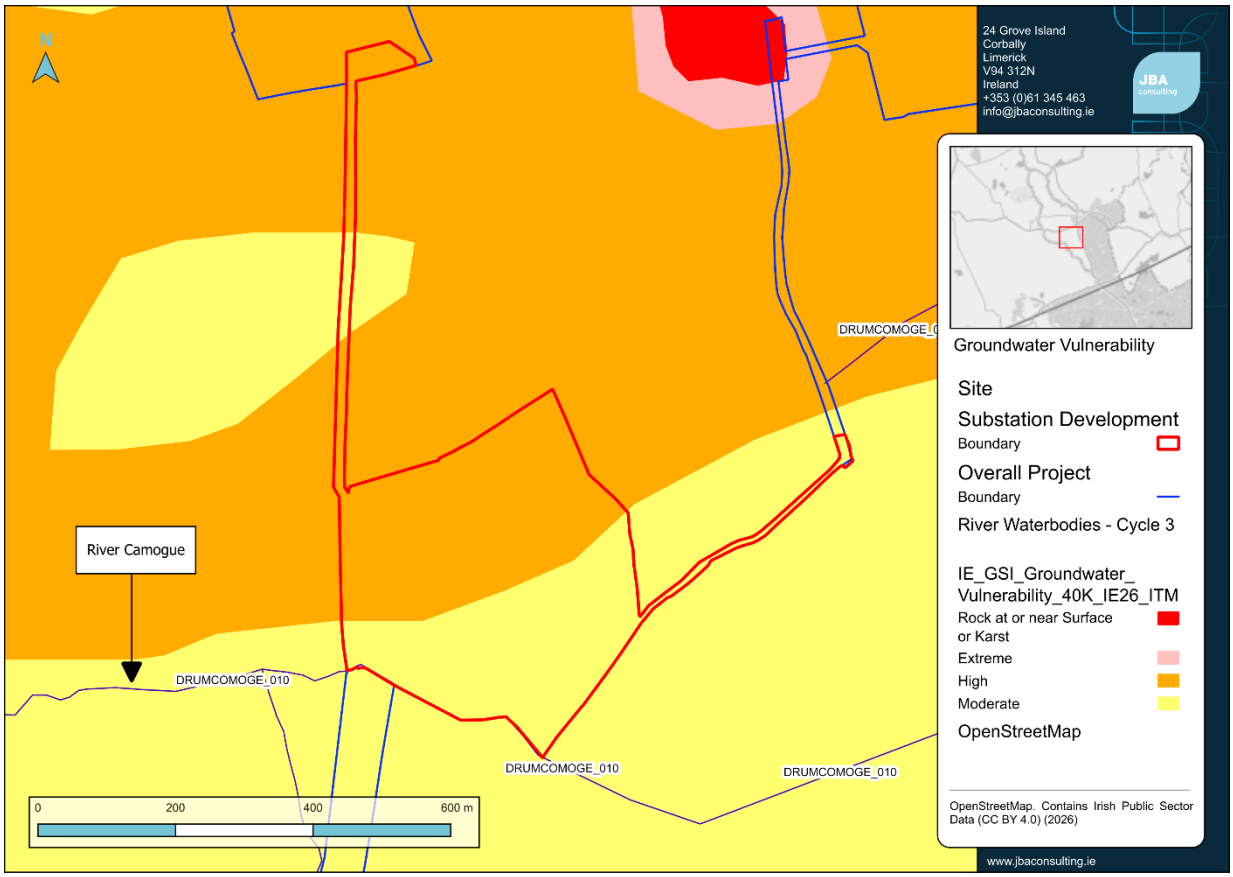

Figure 4-4: Groundwater vulnerability of the proposed site.

5 Other Relevant Plans and Projects

5.1 Cumulative Effects

Cumulative effects are the combined impacts on ecosystems, habitats, species, or ecological processes that result from the incremental effects of a proposed project or activity, when added to other past, present, or reasonably foreseeable future actions. These effects may be the sum of individual impacts; their interactions or a combination leading to outcomes that are greater, more persistent, or more widespread than anticipated

Methodology for retaining Plans and Projects for the cumulative assessment are described in the associated AA screening; briefly, due to the size and scale of the Proposed Substation Development, a 2km ZOI is applied around the Proposed Substation Development site itself. This search area yielded 17 planning applications; for these to act in-combination, they need to be connected to the watercourses that interact with the Proposed Development (Figure 5-1). SID database yielded one application that could act in combination (Figure 5-2).

Developments carried out under CAP 25 or to fulfil the targets of the Climate Action and Low Carbon Development Act may act in combination with the Proposed Development due to the similarity in nature of the projects, potential locations, size and scale, and types of works expected. The plans in themselves are unlikely to act in combination with the Proposed Development.

Any Otter at the Proposed Substation Development site are unlikely to be interacting with the Otter around the Ballinlee Wind Farm river crossing and with the population within the SAC due to the distances involved (~13km and ~42km respectively) in relation to expected territory size (<10km).

Work on the Proposed Solar Farm as part of the Overall Project may act in-combination with the Proposed Substation Development with identified risks to the watercourses and to Otter. Evidence of Otter was recorded on the Mahore, but not on the Camogue.

The Proposed Substation Development connects to the Proposed Solar Farm through directional drilling (HDD) works under the Camogue to allow for cabling to connect the southern parcels of the Proposed Solar Farm to the Proposed Substation. Construction works may lead to runoff of sediment laden waters, whilst HDD works could lead to the release of sediment or drilling mud that would negatively impact on aquatic ecosystems.

None of the retained planning applications made to the local authority are likely to act in combination with the Proposed Substation Development as they are not directly connected to a watercourse and are small scale distinct structures.

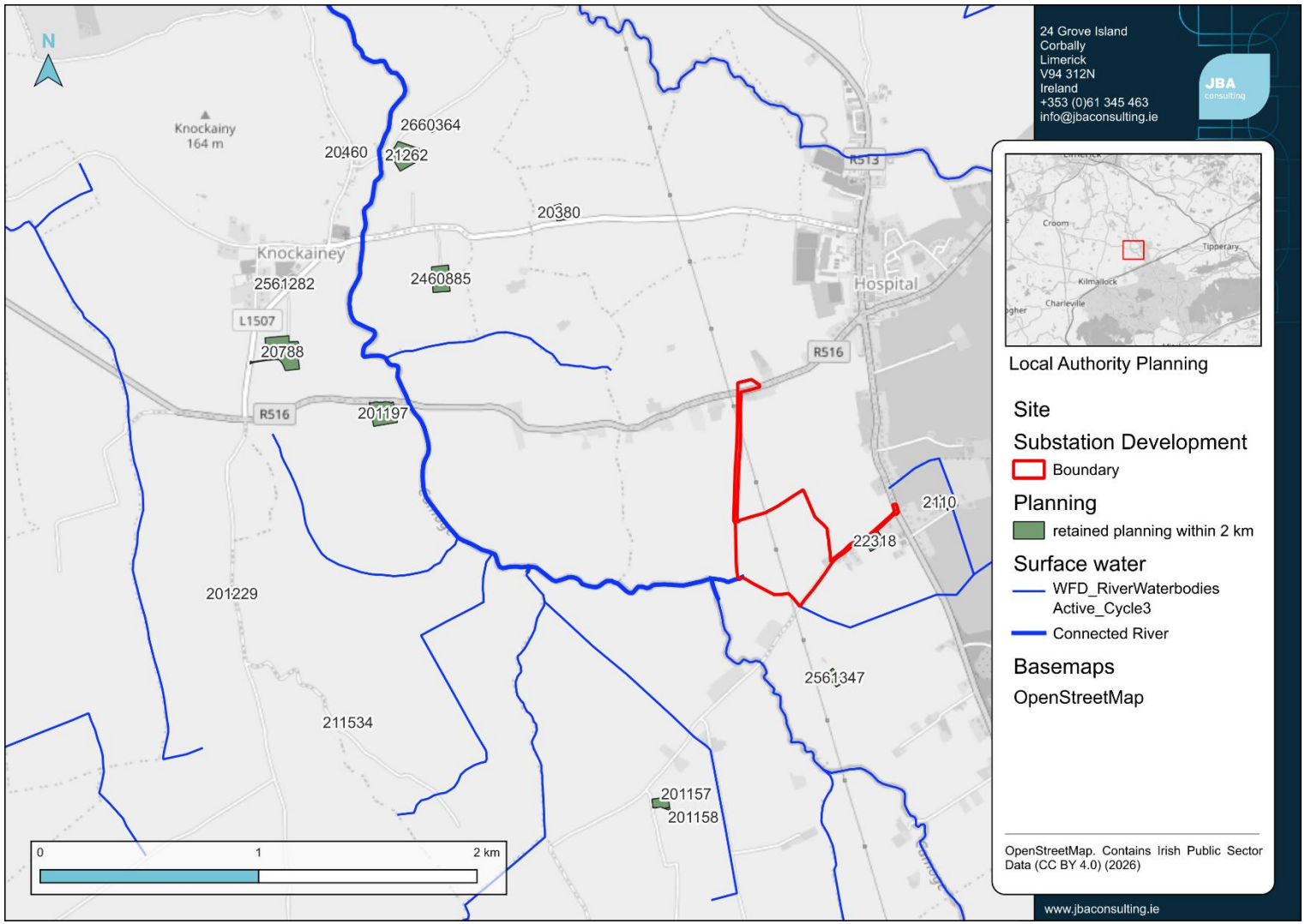

Figure 5-1: Retained planning applications

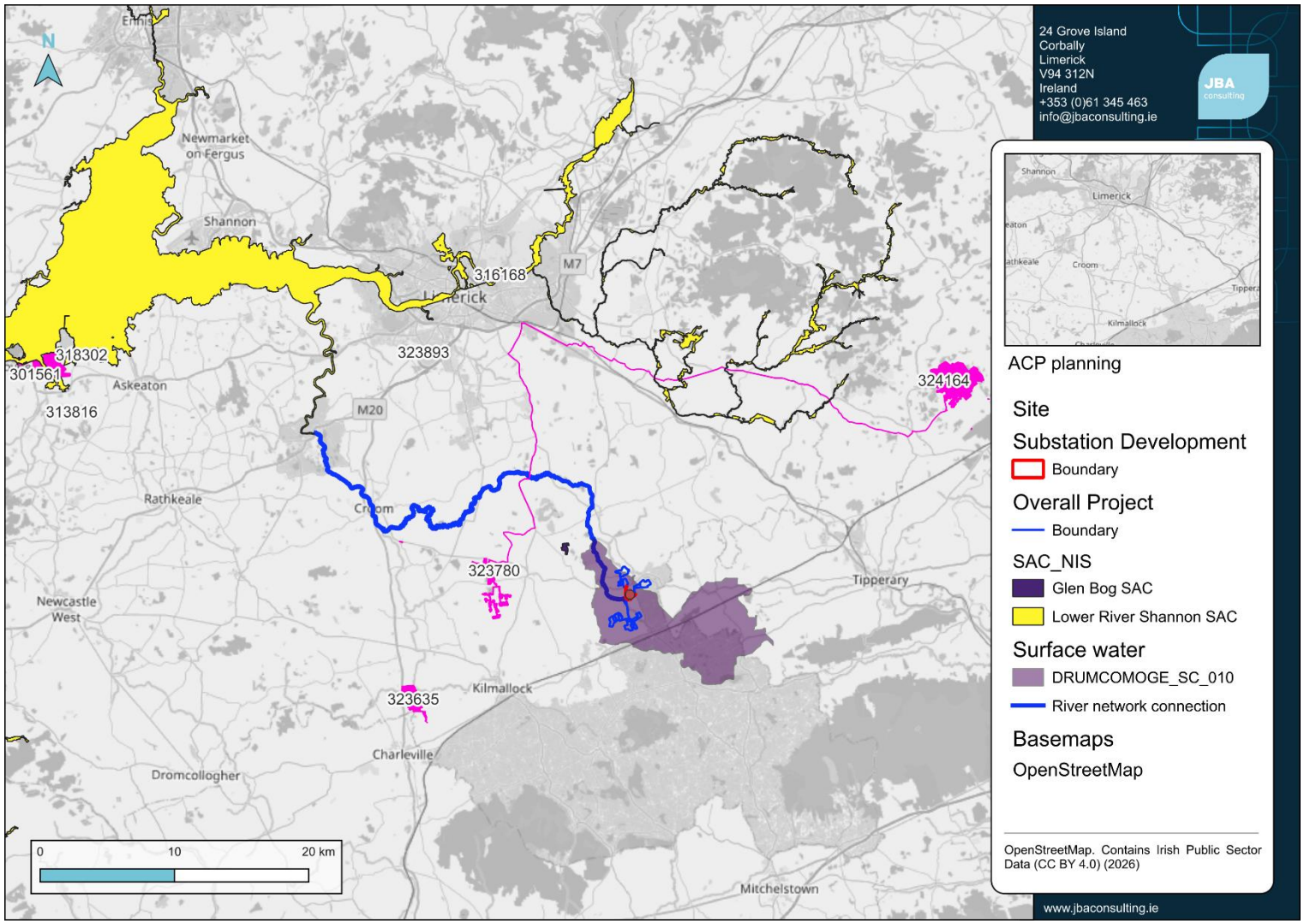

Figure 5-2: ACP planning applications

6 Appropriate Assessment

6.1 Introduction

This section of the NIS presents the detailed assessment of potential direct and indirect impacts on of the Proposed Substation Development on the Lower River Shannon SAC.

The screened in QIs are:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]
- Sea Lamprey *Petromyzon marinus* [1095]
- Brook Lamprey *Lampetra planeri* [1096]
- River Lamprey *Lampetra fluviatilis* [1099]
- Salmon *Salmo salar* [1106]
- Otter *Lutra lutra* [1355]

6.2 Potential Sources of Impact

The sources of impact on the aquatic receptors are a release of sediment, release of chemicals, hydrocarbons and other pollutants, affecting water quality and habitat structure. Otter may be directly impacted by disturbance such as construction noise or physical disturbance from works in the vicinity of the watercourse, and from indirect impacts on fish and water quality. Alluvial forest may be impacted from physical disturbance and the introduction of invasive species.

The main watercourse is the Camogue (EPA name of Drumcomoge) and is present at the south western boundary of this site. A wet field drain bisects the site (FW4), and other drier field drains (also mapped as FW4) are also present throughout on the western side of the site and connect to the Camogue at the southern boundary. The Camogue discharges into the Maigue which is part of the Lower River Shannon SAC. Despite the distance between the development site and the Maigue river, due to the direct surface water connection impact on retained QIs cannot be excluded without mitigation, using the precautionary principle.

6.2.1 Construction Phase

6.2.1.1 Release of Sediment and Pollutants

Cut and Fill: Excavations will lead to the exposure of bare soil leading to potential sediment runoff; there is also risk of opening pathways to groundwater leading to groundwater contamination.

Construction: Cementitious products, cement dust can lead to water pollution.

Access tracks: stripping of grassy vegetation exposing bare soils, tracking of vehicles, depositing of access track surface and materials, may all lead to increased sediment release especially in areas where works occur along existing drainage channels.

Refuelling: vehicles and machinery refuelling/ maintenance may lead to the release of hydrocarbons and other pollutants, due to accidental spillage.

Cabling: excavation for cabling will mobilise soils and involve excavation over long distances.

Site compounds: the site compounds are expected to be temporary in nature and not require any excavations. However, canteen and welfare facilities will be necessary. Wastewater from these is due to be collected by a licensed contractor.

Drain diversion: excavations for the drain diversion will lead to exposed soils, and the potential release of sediment into the watercourse.

6.2.1.2 Habitat Degradation

Stripping of vegetation for access tracks will lead to the loss of grassland areas; none of these will be in Annex quality or QI habitats.

Works that lead to release of suspended solids into the watercourses or works in watercourses may lead to the loss of aquatic vegetation through physical disturbance or through smothering from sediment loads.

6.2.1.3 Noise and Vibration

Excavations and any potential need for pilling, or blasting, will lead to noise and vibration impacts. This may cause disturbance to Otter in the vicinity of the work site.

6.2.1.4 Noise and Visual Disturbance

The construction phase of the proposed development has the potential to cause disturbance to fauna occurring at the substation development site and along the grid connection route through movement of machinery and people along the underground cable line; as well as the noise from the construction of the buildings and towers.

The only retained QI that could be disturbed by visual contact or noise is Otter; Otter may be found along the Camogue. Whilst to date, no holts were recorded, however, using the precautionary principle, mitigation measures to minimise disturbance to Otter will be required.

The proposed works and operations associated with the proposed project will not physically disturb, degrade or remove the QI / SCI supporting habitats within the Natura 2000 sites due to the distance from the Proposed Development to the Natura 2000 sites within the ZoI. Some disturbance to *ex-situ* habitats may occur.

6.2.1.5 Dust

Dust particles have the potential to be released through land clearance, vehicular movement and construction of access tracks. The release of dust particles can smother vegetation reducing growth, impact on air quality and therefore indirectly impact on wildlife and settle on

water leading to watercourse pollution and effect on aquatic organisms. Dust emissions are exacerbated by dry weather and high wind speeds.

6.2.1.6 Construction Lighting

Lighting has the potential to disrupt wildlife by disrupting natural cycles, creating movement barriers, and/or altering food webs. Lighting on the riparian zone, including the river and the riverbanks, has the potential to disrupt Otter and QI Fish species.

6.2.1.7 Spread of Invasive Species

Works involving the movement of machinery between multiple sites physically separated from each other may lead to cross contamination and transfer of invasive species from one area to the other. Furthermore, vehicles and materials coming into the area from different sites and different geographical areas may transport invasive species.

6.2.1.8 Flood events

None of the works areas are within flood zones A or B; however, part of the site sits in these zones. Any materials stored in areas susceptible to flooding may enter the watercourses and therefore impact on water quality.

6.2.1.9 Summary

The construction phase of the Proposed Development may lead to sediment runoff, nutrient loading of the water courses and water pollution from hydrocarbons and other chemicals that may be used on site. There may be physical disturbance to habitats, as well as noise/visual disturbance to fauna.

Water pollution may also impact on aquatic organisms.

During construction phase impacts on retained QIs of the Lower River Shannon SAC cannot be excluded and therefore mitigation measured are required.

6.2.2 Operational Phase

On completion of the project construction, the infrastructure will be largely left untouched, with periodic maintenance checks and replacement of parts if/when necessary, with storage of glycol, transformer oil, and dry spare parts. Access tracks will be retained; hard standings around the substation will be in places, with BESS bases maintained.

The access tracks will be constructed with permeable materials to allow for water infiltration, with runoff drainage ditch features adjacent to the track.

During the normal operational phase there is no likely release of dust, sediment and pollutants, no likely source of noise causing disturbance.

However, storage of materials such as oils and failure of batteries may lead to pollution events, with fire risk anywhere within the substation area potentially also leading to waterborne and airborne pollution events.

The Proposed Substation design includes for standard designs to prevent discharge to watercourses in the event of a serious accident or fire, as described by electrical infrastructure guidelines (EirGrid 2020)

6.2.2.1 BESS Failure

Lithium Iron Phosphate ($LiFePO_4$) batteries present some advantages over other battery technologies (Evro et al. 2024), there are trade-offs between all available technologies (Panesar and Mbuthu 2027). Battery failure may however be the source of pollution events in the cases of fire or leakage. Gas emissions from a fire could lead to air pollution. Water runoff from fire extinguishing, if released into the environment, could lead to contamination (Meraner et al. 2026). Although, in these scenarios pollution events would likely be localised (Fire & Risk Alliance 2025). The BESS safety management plan details that Water is not proposed to be used on site for fire suppression or boundary cooling, therefore the risk from water contamination is unlikely.

6.2.2.2 Habitat Degradation

The Proposed Substation Development will not impact on any QIs or ex-situ habitats and therefore not considered further in this NIS.

6.2.2.3 Habitat Fragmentation

The permanent installation of fencing may impact on the ability for Otter to freely move around. However, the Proposed Substation Development area is of negligible value to Otter, and the river will not be fenced off. Therefore, Otter are not likely to be affected by habitat fragmentation.

6.2.2.4 Spread of Invasive Species

Insufficient biosecurity measures may lead to the accidental spread of invasive species across the different land parcels of the Overall Project or between the Proposed Substation Development and other areas in the region. Therefore, strict biosecurity measures are required.

6.2.2.5 Summary

The operational phase of the Proposed Substation Development may lead to impacts on water quality and spread of invasive species.

During operation phase impacts on retained QIs of the Lower River Shannon SAC cannot be excluded and therefore mitigation measured are required.

6.2.3 Site Decommissioning

No fixed operational period is proposed for the Proposed Substation Development. Accordingly, the timing and extent of any future decommissioning cannot be defined at this stage. Should any element of the Proposed Substation Development be decommissioned in the future, the works would be undertaken in accordance with the relevant legislation, guidance and good practice applicable at that time. This would include the safe de-energisation and removal of

equipment no longer required, with materials reused, recycled or otherwise managed through appropriately authorised facilities, where practicable.

Decommissioning works will likely have similar impacts to the construction phase, with some localised disturbance, potential for sediment release, potential for habitat degradation and spread of invasives species.

During decommissioning phase impacts on retained QIs of the Lower River Shannon SAC cannot be excluded and therefore mitigation measured are required.

6.2.4 Cumulative Impact

The works on the Proposed Substation Development may act in-combination with works for the Overall Project, especially if HDD works are carried out at the same time as cut and fill operations and other activities requiring excavation and land clearance.

This will potentially lead to increased sediment runoff and loading of the watercourse and, should Otter have established in the area, lead to increased risk to Otter.

Cumulative on retained QIs of the Lower River Shannon SAC cannot be excluded and therefore mitigation measured are required.

6.3 Summary

This Proposed Substation Development is located in a rural setting in East Limerick. The area is primarily used for agricultural purposes and has a network of drainage ditches, streams and rivers. The distance between the site and the Lower River Shannon SAC (~40km) mean that effects on the SAC are highly likely to be highly diluted. However, the direct surface water connection provides ex-situ habitat for multiple QI species, including Otter, Salmonid, Lamprey and the rivers themselves. Therefore, in the absence of mitigation, significant effects through surface water pathways, groundwater pathways and disturbance cannot be excluded, and mitigation measures are required. Mitigation measures for this project can be by design, and/or integrated during the installation of the substation.

Table 6-1 Qualifying Interests, conservation objectives and potential impacts

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]					
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	Three high-value sub-types occur in the site; rooted macrophytes should be absent or <5% in freshwater pearl mussel habitat; mussel objective takes precedence in Cloon River.	Sediment runoff, pollutants.	Water quality impacts with increased turbidity and nutrient load may reduce habitat suitability for aquatic flora.
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution shown on map 13; see supporting document.	NA – no likely impacts on water flows	NA
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	See supporting document.	NA – no likely impacts on water flows	NA
Hydrological regime: tidal influence	Daily water level fluctuations (m)	Maintain natural tidal regime	See supporting document.	NA – no likely impacts on tidal regime	NA
Hydrological regime: freshwater seepages	Metres per second	Maintain appropriate freshwater seepage regimes	See supporting document.	NA – no likely impact on freshwater seepage	NA
Substratum	Millimetres	Substratum	Some sub-types require	Sediment runoff	Potential change in

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
composition: particle size range		dominated by particle sizes appropriate to sub-type (often sands, gravels, cobbles)	fine sediments (e.g., *Schoenoplectus triqueter*, *Groenlandia densa*).		substrate types due to increased sediment run-off
Water quality: nutrients	Milligrammes per litre	Nutrient concentrations low enough to prevent changes in species composition or habitat condition	Targets vary among sub-types.	Sediment runoff, Hydrocarbons.	Reduced water quality may impact on flora composition.
Vegetation composition: typical species	Occurrence	Typical species of the relevant sub-type present and in good condition	See supporting document.	Sediment runoff, pollutants.	Water quality impacts with increased turbidity and nutrient load may reduce habitat suitability for aquatic flora.
Floodplain connectivity	Area	Active floodplain area at and upstream of habitat maintained	See supporting document.	NA – no likely impact on floodplain connectivity	NA
Riparian habitat	Area	Riparian woodland area at and upstream of bryophyte-rich sub-type maintained	Linked to habitat 91E0 (Alluvial forests).	Physical degradation	Loss of riparian habitat
91E0 *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)					

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
Habitat area	Hectares	*Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed. See map 14*	"Minimum area, based on 5 sites surveyed by Perrin et al. (2008)… NB further areas are likely to be present within the SAC."	Disturbance	NA
Habitat distribution	Occurrence	*No decline. Surveyed locations shown on map 14*	"Distribution based on Perrin et al. (2008). NB further areas are likely to be present within the SAC."	Disturbance	NA
Woodland size	Hectares	*Area stable or increasing. Large woods ≥25ha; small woods ≥3ha*	"Sizes… need to be increased to reduce habitat fragmentation… constraints may restrict expansion."	Disturbance	NA
Woodland structure: cover and height	% and metres	*Diverse structure with closed canopy, sub-canopy, and well-developed herb layer*	"Described in Perrin et al. (2008)."	Disturbance	NA
Woodland structure: community diversity and extent	Hectares	*Maintain diversity and extent of community types*	"Described in Perrin et al. (2008)."	Disturbance	NA

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
Woodland structure: natural regeneration	Seedling : sapling : pole ratio	*Adequate proportions to ensure canopy survival*	"Alder and oak regenerate poorly; ash often regenerates but few seedlings reach pole size."	Disturbance	NA
Hydrological regime	Metres	*Appropriate hydrological regime necessary for alluvial vegetation*	"Periodic flooding is essential to maintain alluvial woodlands."	NA	NA
Dead wood	m^3/ha; number/ha	*≥30 m^3/ha fallen timber >10cm; 30 snags/ha; include stems >40cm (or >20cm for alder)*	"Dead wood is a valuable resource and integral to a healthy woodland ecosystem."	Disturbance	NA
Veteran trees	Number/ha	*No decline*	"Important habitats for bryophytes, lichens, saproxylic organisms and birds."	Disturbance	NA
Indicators of local distinctiveness	Occurrence	*No decline*	Includes ancient woodland, archaeological features, rare species.	NA	NA
Native tree cover	Percentage	*Not less than 95%*	"Species reported in Perrin et al. (2008)."	Disturbance	NA
Typical species	Occurrence	*Typical native species present (alder, willows, oak, ash)*	"Species reported in Perrin et al. (2008)."	Disturbance	NA

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
Negative indicator species	Occurrence	*Non-native invasive species absent or under control*	"Common invasives: Himalayan balsam, giant hogweed, sycamore."	Disturbance	NA
Sea Lamprey *Petromyzon marinus* [1095]					
Distribution: extent of anadromy	% of river accessible	>75% of main stem length of rivers accessible from estuary	Artificial barriers restrict upstream migration; barriers present in the Fergus, Mulkear, and Feale.	NA – no likely impact on river connectivity	NA
Population structure of juveniles	Number of age/size groups	At least 3 age/size groups present	Based on Harvey & Cowx (2003) and O'Connor (2007).	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.
Juvenile density in fine sediment	Juveniles/m²	≥1 juvenile/m²	Juveniles burrow in fine sediment in still water; target based on Harvey & Cowx (2003).	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.
Extent & distribution of spawning habitat	m² and occurrence	No decline in extent or distribution of spawning beds	Lampreys spawn in clean gravels; redds often accumulate below major weirs.	Sediment runoff	Sedimentation of gravel beds
Availability of	Number of	>50% of sample sites	Despite spawning,	NA – no likely	NA

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
juvenile habitat	positive sites in 3rd-order channels (and higher) downstream of spawning areas	positive	ammocoetes often absent or in low numbers at many stations.	impact on juvenile habitats	
Brook Lamprey *Lampetra planeri* [1096]					
Distribution	% of river accessible	Access to all water courses down to first-order streams	Artificial barriers can block or hinder migration both upstream and downstream, potentially isolating populations (Espanhol et al., 2007).	NA – no likely impact on river connectivity	NA
Population structure of juveniles	Number of age/size groups	At least 3 age/size groups of brook/river lamprey present	Juveniles of brook and river lamprey cannot be distinguished in the field (Gardiner, 2003), so they are assessed together. Based on Harvey & Cowx (2003).	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density ≥ 2/m²	Juveniles burrow in fine sediment in low-velocity water. Harvey & Cowx (2003) report 10/m² in optimal conditions and >2/m² at catchment scale.	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
Extent & distribution of spawning habitat	m² and occurrence	No decline in extent or distribution of spawning beds	Spawning site and redd attributes established by IFI (Rooney et al., in press).	Sediment runoff	Sedimentation of gravel beds
Availability of juvenile habitat	Number of positive sites in 2nd-order channels (and higher) downstream of spawning areas	>50% of sample sites positive	Many suitable sites lack larvae; occupancy >50% is considered reasonable for Irish catchments (King et al., unpublished data).	NA – no likely impact on juvenile habitats	NA
River Lamprey *Lampetra fluviatilis* [1099]					
Distribution	% of river accessible	Access to all water courses down to first-order streams	Artificial barriers can block or hinder migration both upstream and downstream, potentially isolating populations (Espanhol et al., 2007).	NA – no likely impact on river connectivity	NA
Population structure of juveniles	Number of age/size groups	At least 3 age/size groups of river/brook lamprey present	Juveniles of river and brook lamprey cannot be distinguished in the field (Gardiner, 2003), so they are assessed together. Based on Harvey & Cowx (2003).	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.
Juvenile	Juveniles/m²	Mean catchment	Juveniles burrow in fine	Sediment runoff	Sedimentation of

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
density in fine sediment		juvenile density ≥ 2/m²	sediment in low-velocity water. Harvey & Cowx (2003) report 10/m² in optimal conditions and >2/m² at catchment scale.		gravel beds, reducing potential spawning and therefore age structure.
Extent & distribution of spawning habitat	m² and occurrence	No decline in extent or distribution of spawning beds	—	Sediment runoff	Sedimentation of gravel beds
Availability of juvenile habitat	Number of positive sites in 2nd-order channels (and higher) downstream of spawning areas	>50% of sample sites positive	Many suitable sites lack larvae; occupancy >50% is considered reasonable for Irish catchments (King et al., unpublished data).	NA – no likely impact on juvenile habitats	NA
Salmon *Salmo salar* [1106]					
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Major hydro-electric barriers at Ardnacrusha and Parteen restrict upstream migration; fish passes exist but remain problematic. Additional weirs upstream also restrict access. No major obstacles on the Feale or Mulkear.	NA – no likely impact on river accessibility	NA

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	CL defined by NASCO as the spawning stock level producing long-term maximum sustainable yield. Shannon stocks above the impoundments are well below CL; Feale and Mulkear exceed CL.	NA – no likely impact on number of spawning fish	NA
Salmon fry abundance	Number of fry / 5-min electrofishing	Maintain or exceed mean catchment-wide threshold of 17 fry per 5 minutes	Threshold applies to rivers currently exceeding CL. Shannon main channel fry counts above the hydro station are significantly below target.	Sediment runoff	Sedimentation of spawning gravels would impact on fry number.
Out-migrating smolt abundance	Number	No significant decline	Smolt survival affected by estuarine pollution, predation, sea lice, and turbine mortality in the Shannon system.	Sediment runoff, pollutants	Water pollution may affect smolt health
Number and distribution of redds	Number and occurrence	No decline due to anthropogenic causes	Salmon require clean gravels; artificial barriers currently prevent access to suitable spawning habitat on the Shannon main channel.	Sediment runoff	Sedimentation or nutrient enrichment of water could affect spawning gravels and would reduce spawning habitat quality.

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
Water quality	EPA Q-value	At least Q4 at all EPA monitoring sites	Q-values come from EPA's triennial water-quality surveys.	Sediment runoff, pollutants	Water pollution and nutrient loading would directly affect Q-value
Otter *Lutra lutra* [1355]					
Distribution	Percentage of positive survey sites	No significant decline	Based on standard otter survey technique. Favourable Conservation Status (FCS) target is 88% in SACs (from 1980/81 survey). Current Shannon catchment estimate is 70.5% (Bailey & Rochford 2006).	Disturbance	Noise disturbance would cause displacement of Otter
Extent of terrestrial habitat	Hectares	No significant decline. 596.8 ha above HWM; 958.9 ha along riverbanks/ponds	No field survey; mapped using 10 m terrestrial buffer along shoreline and riverbanks, considered critical for otters (NPWS 2007).	Disturbance, loss of habitat	Development within buffer zone would lead to potential loss of habitat.
Extent of marine habitat	Hectares	No significant decline. 4,461.6 ha mapped	Based on evidence that otters forage within 80 m of shoreline (NPWS 2007; Kruuk 2006).	NA – no likely impact on marine habitats	NA
Extent of	Kilometres	No significant decline.	River length calculated	Sediment runoff,	Water pollution

Attribute	Measure	Target	Notes	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance
freshwater (river) habitat		500.1 km mapped	assuming otters use freshwater habitats from estuary to headwaters (Chapman & Chapman 1982).	pollutants, disturbance.	may affect otter distribution. Disturbance may affect otter distribution.
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. 125.6 ha mapped	Based on 80 m foraging buffer around lake/lagoon shorelines (NPWS 2007).	NA – no likely impact on lake habitats	NA
Couching sites and holts	Number	No significant decline	Otters require secure lying-up areas throughout their territory (Kruuk 2006; Kruuk & Moorhouse 1991).	Disturbance	Disturbance may cause otter to abandon couches and holts.
Fish biomass available	Kilograms	No significant decline	Diet dominated by fish: salmonids, eels, sticklebacks in freshwater; wrasse and rockling in coastal waters (Bailey & Rochford 2006; Kingston et al. 1999).	Water pollution	Reduced water quality could lead to a reduction in fish biomass and affect otter foraging opportunities.
Barriers to connectivity	Number	No significant increase	Otters regularly commute across open water up to 500 m; commuting routes must remain unobstructed (De Jongh & O'Neill 2010).	Fencing	Fencing may block commuting corridors

6.3.1 Do Nothing Impact

If the proposed project does not go ahead there will be no change to the current use of the area. The lands will continue to be used under current agricultural practices.

No impact from construction, operations or decommissioning on the screened in QIs of the Lower River Shannon SAC are therefore anticipated.

7 Mitigation

This section describes the avoidance and mitigation measures required to prevent or reduce impacts generated during the construction and operation of the Proposed Development to the screened in QIs of the Lower River Shannon SAC.

A site-specific Project Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Substation Development and is submitted as part of the current application. The Proposed Substation Development's principal contractor, as well as all other construction contractors, are required to comply with all the mitigation details outlined in this NIS, the EcIA, CEMP, and any other planning requirements.

All prescribed mitigation measures will be implemented and adhered to throughout the duration of construction and operational phases.

7.1 Environmental Clerk of Works

Oversight of the works is required by an individual Environmental Clerk of Works (ECoW) or a team of ECoWs. For clarity, ECoW is used but this can refer to one or multiple people as necessary. The ECoW will comprise of competent ecologist with experience in water quality management, mammal mitigation and construction standards. The ECoW role is for oversight and verification, with prevention-based mitigation measures upstream of ECoW intervention. The ECoW will have the power to give a stop-works order.

7.2 Inherent

Inherent measures are those that are applied at the design stage of the project regardless of mitigation effects, or natural measures that lead to the minimisation of the risks of impacts and to ensure ecological receptors are protected as much as feasibly possible.

Watercourse buffers will help prevent sediment and pollutants from entering watercourses.

- 20m buffer, as measured from the top of the bank of the river Camogue, where no works will be permissible, in line with EH018.
- 3m buffer to field drains
- Watercourse buffers will not be used for storage or site compounds.
- Watercourse buffers will be left as vegetated buffers.

Sustainable Drainage Systems: these measures will help prevent sediment and pollutants from entering watercourses

- No direct runoff from access tracks to any water feature.
- All runoff from the Proposed Substation Development and BESS area will discharge to an attenuation pond before it is released to the environment.

BESS design:

Each BESS unit will be equipped with a comprehensive fire detection and mitigation system, including in-cell temperature monitoring, unit-level off-gas detection, and smoke detection to provide early warning of abnormal battery conditions.

Active fire suppression systems, such as aerosol or clean-agent suppression, will be included alongside off-gas ventilation and explosion relief measures designed in accordance with relevant NFPA guidance.

- Fire suppression system
- Venting system

7.3 Construction Phase

The activities of the Proposed Substation Development for the construction phase shall remain within the boundary of the Proposed Substation Development site, with the exception of the need to transport materials to/from the site. Within this area, mitigation measures and best practice measures are required to minimise the potential of significant effects on designated sites or associated habitats and species. Mitigation measures are presented in the following section, with further mitigation also described in the FRA and Construction and Environment Management Plan (CEMP), ECIA and the ecological and environmental reports for the Proposed Solar Farm Development.

These measures include but are not limited to guidance outlined in the following:

- Construction and Environment Management Plan (CEMP) submitted to Limerick City and County Council for agreement prior to site works commencing;
- Construction method statements to be submitted to Limerick City and County Council for agreement prior to site works commencing;
- CIRIA C532: Control of water pollution from construction sites. Guidance for consultants and contractors. (www.ciria.org) (Masters-Williams 2001);
- CIRIA C811: *Environmental good practice on site guide*; www.ciria.org) (Kwan et al. 2023);
- CIRIA C750D: *Groundwater control: design and practice*; www.ciria.org) (Preene et al. 2016);

7.3.1 Site Compound

The site compound will be situated within the site boundary in order to minimise potential impacts on the neighbouring environment. Only plant and materials necessary for the works will be permitted to be stored at the compound location.

The compounds will be located at least 20m away from watercourse and will not be located in area subject to flooding. The compound will be equipped with standard facilities for construction staff, including self-contained port-a-loos with an integrated waste holding tank. The compound will be removed from site on completion of the construction works.

Proposed compound locations are presented in Figure 7-1.

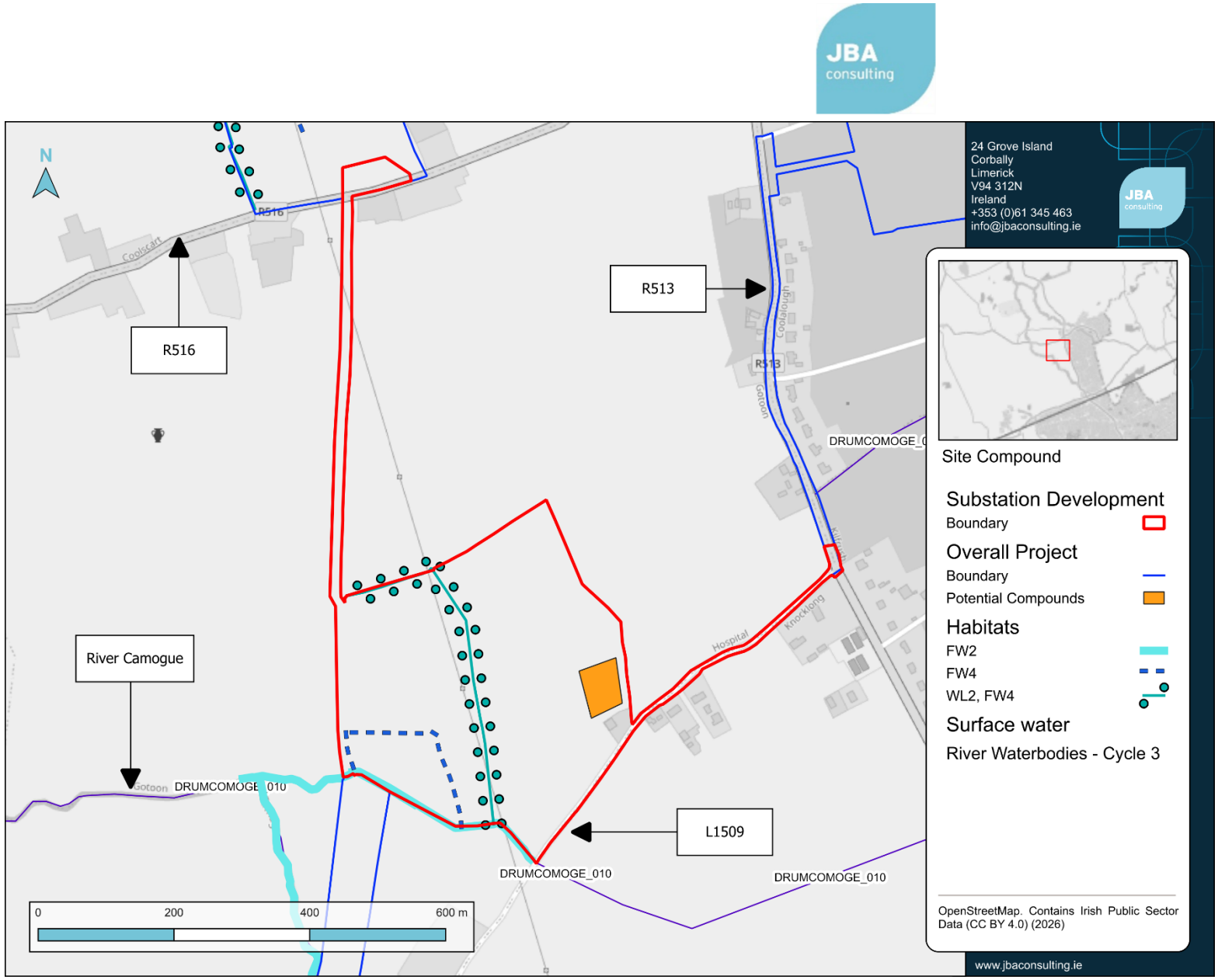

Figure 7-1: Proposed location for site compounds.

Within the compound the following will apply:

- Bunded storage of fuels and refuelling area. Bunds shall be 110% capacity of the largest vessel contained within the bunded area.
- A separate container will be in the contractor's compound to store absorbents used to contain spillages of hazardous materials. The container will be clearly labelled, and the contents of the container will be disposed of by a licenced waste contractor at a licenced site.
- Records will be maintained of material taken off site for disposal.
- A maintenance programme for the bunded areas will be managed by the site environmental manager. The removal of rainwater from the bunded areas will be their responsibility. Records will be maintained of materials taken off site for disposal.
- The site environmental manger will be responsible for maintaining all training records.
- Drainage collection system for washing area to prevent run-off into surface water system.
- All refuelling of vehicles will be carried out at the fuel stores within the main site compound and only ADR trained personnel will be permitted to operate fuel bowsers.

7.3.2 Water Quality

Relevant legislation and best practice guidance that have been considered includes but not limited to the following:

- Water Framework Directive (2000/60/EC)
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009-2025 (S.I. No. 272 of 2009), as updated.
- Local Government (Water Pollution) Acts 1977-2024
- CIRIA C532: *Control of water pollution from construction sites*. Guidance for consultants and contractors. (www.ciria.org) (Masters-Williams 2001)
- CIRIA C811: *Environmental good practice on site guide*; www.ciria.org) (Kwan et al. 2023);
- CIRIA C750D: *Groundwater control: design and practice* (Preene *et al.*, 2016) (www.ciria.org)
- Inland Fisheries Ireland 2016 *Guidance on Protection of Fisheries During Construction Works in and Adjacent to Waters*
- EirGrid Evidence Based Environmental Studies Study 6: Water Quality & Aquatic Ecology (EirGrid 2016)

Buffer zones must be of adequate dimensions and impede all free flow to waterways. Heavy machinery and site traffic must be excluded from these areas.

To minimise surface water pollution the Proposed Substation Development will:

- 20m buffer from the edge of all mapped EPA watercourses
- A 3m buffer to all retained drainage ditches.

- Adoption of a surface water plan including appropriate barrier controls to minimise any polluted surface water leaving the site untreated. This will include the use of silt busters, settlement ponds or other appropriate method.
- Minimise area of exposed ground by maintaining existing vegetation.
- Do not leave stockpiles of materials exposed.
- Do not store material in lands subject to flooding.
- Cover vehicles transporting materials or soils to and from site.
- Oil booms and oil soakage pads shall be maintained on-site to enable a rapid and effective response to any accidental spillage or discharge. These shall be disposed of correctly.
- Fail-safe site drainage and bunding through drip trays on plant and machinery will be provided to prevent discharge of chemical spillage from the site to surface water.
- Appropriate geotextile/geosynthetic barriers, similar in grade to those used in road construction in groundwater sensitive areas, will be installed within the areas of concrete pouring on site, in order to prevent potential pollutant seepage into the groundwater or to cause runoff.
- Sediment barrier to be placed along drainage ditches to prevent mobilisation and flow of sediment, and to be monitored daily in times of inclement weather.
- Wastewater will not be permitted to runoff site.
- No batching of wet-cement products to occur on site.
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements.
- Where concrete is delivered on site, use the smallest volume of water possible to clean equipment and chute. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Cleaning water is to be tanked and removed from the site to a suitable, non-polluting, discharge location.
- No washing out of any plant used in concrete transport or concreting operations to occur on site.
- Concrete pouring will be carried out in good weather conditions when no rain is forecast.
- Ensure pour site is free of standing water at the time of pouring.
- No using any water from the River Camogue for construction or cleaning purposes.

During construction and site establishment operations, silt fencing will be used to prevent disturbed soils reaching the aquatic zone. These measures will be applied close to the pressure source in dry terrestrial conditions. The silt fencing will be removed only when bare soil is revegetated and sediment movement is no longer a risk. Monitoring of silt fences is essential to ensure their upkeep, and the very regular maintenance required means that appropriate manpower must be on site until such time as vegetation regrowth has occurred and the risk of sediment movement is past.

- Harris fencing shall be placed along the edge of the river buffer, keeping at minimum 20m undisturbed on the river side of the fence, with a silt barrier on the land side of the fence.

- Silt fencing will be installed around excavation areas where there is a risk of sediment runoff i.e. where there is not a minimum of 5m grass buffer between the works area and a drainage ditch/ non-EPA marked watercourse.
  Drainage ditches will be bunded with silt barrier/ straw bale.

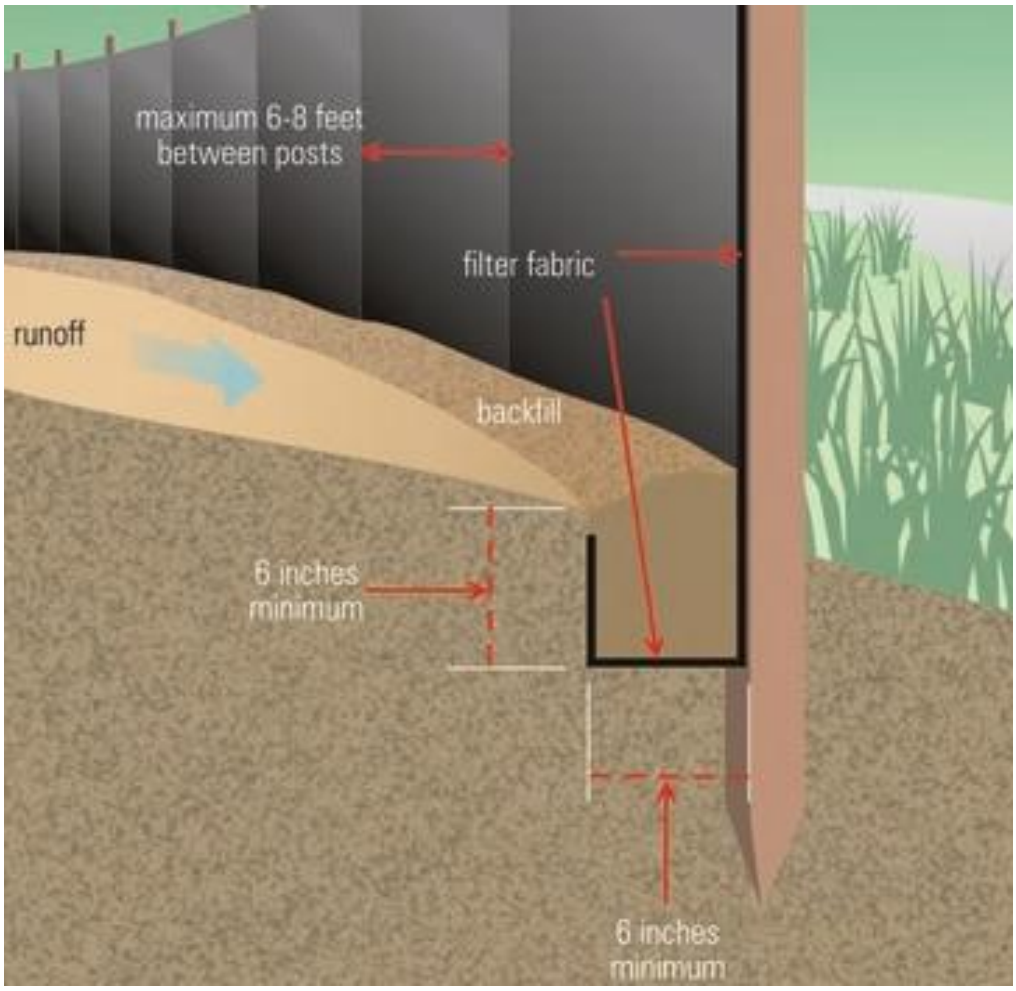

Figure 7-2: Silt fence diagram (EPA 2007).

7.3.3 Pollution Control and Spill Prevention

The Contractor will ensure that the following procedures are in place in advance of works to contain any spills:

- Emergency response awareness training for all staff.
- Appropriate and sufficient spill control materials will be installed at strategic locations within the site.
- Spills kits for immediate use will be kept in the cab of mobile equipment.
- Spill kits will be stored in the site compounds with easy access for delivery to required location in the case of an emergency.

A minimum stock of spill kits will be maintained at all times and site vehicles will carry spill kits at all times. Spill kits must include suitable spill control materials to deal with the type of spillage that may occur and where it may occur. Typical contents of an on-site spill kit will include the following as a minimum:

- Absorbent granules.
- Absorbent mats/cushions.
- Absorbent booms.
- Track-mats, geotextile material and drain covers.
- All potentially polluting substances such as oils and chemicals used during construction will be stored in containers clearly labelled and stored with suitable precautionary measures such as bunding within the site compound.

All tank and drum storage areas on the site will, as a minimum, be bunded to a volume not less than the following:

- 110% of the capacity of the largest tank or drum within the bunded area, or
- 25% of the total volume of substances which could be stored within the bunded area.
- The site compound fuel storage areas and cleaning areas will be rendered impervious and will be constructed to ensure no discharges will cause pollution to surface or ground waters.
- Designated locations for refuelling are within the site compound.
- Potentially contaminated run off from plant and machinery maintenance areas will be managed within the site compound surface water collection system.
- Damaged or leaking containers will be removed from use and replaced immediately.

Disposal:

- Used material will be disposed of in accordance with the Waste Management Plan. All used spill materials will be placed in a bunded container in the contractor's compound. The material will be disposed of by a licenced waste contractor at a licenced facility. Records will be maintained by the environmental site manager.

Plant:

- Pumps and generators will be used with spill containment berms, mats, or pallets.
- Regular inspection maintenance of plant and machinery.

7.3.4 Noise and Light Disturbance

Otter are sensitive to noise and may be disturbed from couches or holts. A pre-construction survey will be carried out to update distribution of Otter along the Camogue.

The following measures shall apply:

- Minimum 20m buffer along the Camogue to maintain riparian habitat for Otter.
- No lights shall be directed towards the watercourse, including temporary work lights.
- No excavation shall be left uncovered when not being worked on.
- No heavy machinery within 20m of Camogue unless on already existing access track (Parcel 8).
- No nighttime working along the Camogue.

7.3.5 Vegetation Management

Vegetation management is required to protect riparian habitats.

- Minimum 20m buffer along the Camogue to not damage riparian habitats.
- No clearance / cutting / felling / removing of vegetation along the Camogue running adjacent to the land parcel.

7.3.6 Drainage Ditch Diversion

The diverted drainage ditch will run in a general north south direction approximately 70m to the west of the existing ditch.

- The divert ditch shall be dug during a period of dry weather to minimise the risk of sediment runoff.
- Excavation materials can be used to infill the existing drain, or spread across the fields as necessary.
- The diverted ditch shall connect to the existing drainage ditch (Figure 7-3)
- Prior to the new ditch being connected to the existing ditch, a bund barrier shall be installed to prevent runoff from the fresh excavations, with a secondary bund located further downstream.
- The bunds shall be monitored with excess silt removed to ensure that no overtopping of sediment occurs.
- The banks of the ditch shall be reseeded to minimise the amount of exposed soil and to prevent sediment runoff.
- No excavation materials shall be deposited in flood zone C (i.e. not in the floodplain and more than 20m away from the top of the riverbank)

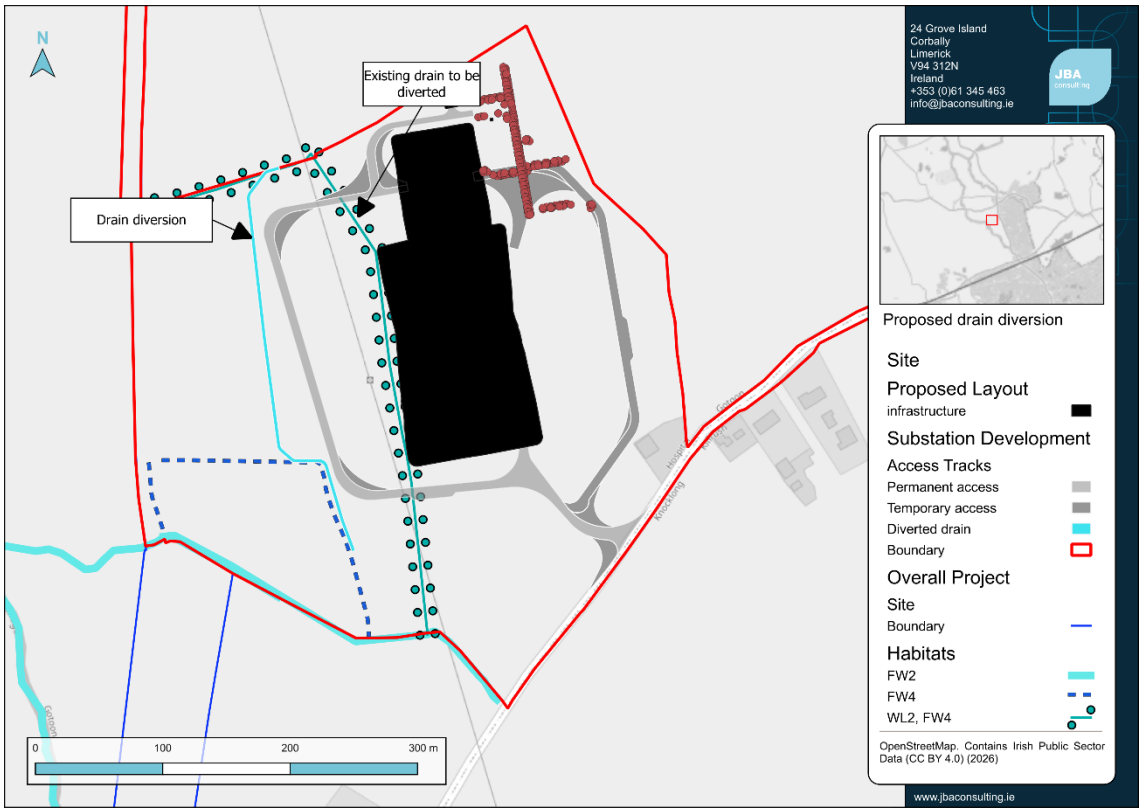

Figure 7-3: Existing and proposed diverted ditch.

7.3.7 Invasive Species

An invasive species management plan has been prepared for the Overall Project, setting out best practice and biosecurity measures to prevent the introduction and/or spread of invasive species. Strict adherence to biosecurity measures as set out in the Invasive Species Management Plan will be implemented.

7.4 Otter Mitigation

At the time of the surveys, no evidence of Otter was recorded in this stretch of the Camogue river, and desktop data did not record the presence of Otter in the area. Therefore, out of precaution, the following measures are to be carried out.

Prior to the works commencing, Otter surveys shall be carried out to determine whether there has been any change in the Otter distribution in the area. Proposed mitigation measures are presented, and shall be applied, if Otter are recorded during pre-construction surveys.

Guidelines for treatment of Otter and monitoring are provided in:

- NRA 2006: Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes
- Findlay and White 2026: The Otter Field Survey and Monitoring Handbook

Prior to work commencing a full Otter survey shall be carried out along the Camogue running adjacent to the Proposed Substation Development site.

The Otter survey will be carried out at least 3 months prior to the works commencing and will involve walking the area covering a 200m buffer around the watercourses looking for signs of use in the form of spraints, food remains, prints, slides, holts or any other evidence.

Camera traps will be deployed at potential resting places, with guidelines to determine if the area is a resting place or not as described in Findlay and White 2026.

If Otter resting places are recorded, status will be determined using filed signs and camera trapping;

- If a couch or resting holt is identified, a 20m buffer will be maintained around it where no works, or machinery will be permitted.
- If a maternity holt is identified, a 150m buffer will be maintained around it, until all the cubs have been weaned and are independent. Otter may breed year-round and therefore there are no time constraints associated with these surveys.

Whilst no work can be carried out within 150m of the holt, works in other areas of the Proposed Substation Development may go ahead.

Should a resting place be located, applications for Regulation 54 Derogations for Annex IV species from the NPWS shall be carried out.

- Fencing shall not obstruct Otter passage
- Fencing shall not cut across watercourses
- Fencing mesh size shall be such that Otter can freely walk through, i.e. at minimum 100mmx100mm gaps; wildlife gaps will be placed to allow free movement of Otter along the riverbanks.
- No temporary or permanent lighting to shine on watercourses or to be present within 50m of watercourses.
- Where couches occur, daily checks prior to works commencing will be carried out. If Otter are present, works must be postponed until the Otter has moved on.
- Where holts are present, no works will occur within 150m of the holt until breeding status is ascertained. Note that Otter may breed year-round. Should a breeding holt be discovered, consultation with the NPWS must be carried out and no works in the area can take places until the pups have left the holt and are independent.

7.5 Location Specific Measures

Water quality measures and monitoring described in section 7.3.2 also apply to the following specific locations.

The river Camogue flows along the western aspect of the site. This river has *ex-situ* habitat for QI fish and Otter.

- No work within 20m of the river
- No heavy machinery within 20m of the river

- Preconstruction survey for Otter
- Maintain a minimum of 20m grassed buffer along watercourse
- No tree felling or scrub clearing during statutory breeding bird season (March to August inclusive)
- Minimise areas of exposed soils
- Revegetate exposed soils as soon as works are completed

Enhancement:

Riparian planting to be carried out along the Camogue, with the indicative planting area is presented in Figure 7-4 for reference. A mix of species shall be used following a 30:20:10 measure, where no more than 30% from a single family, no more than 20% from a single genus, no more than 10% from a single species.

- Riparian corridor restoration through selective planting of native species of native origin.
- Planting to be carried out by hand.
- Planting shall occur between October and March
- Planting shall not occur in periods of flooding or frozen ground

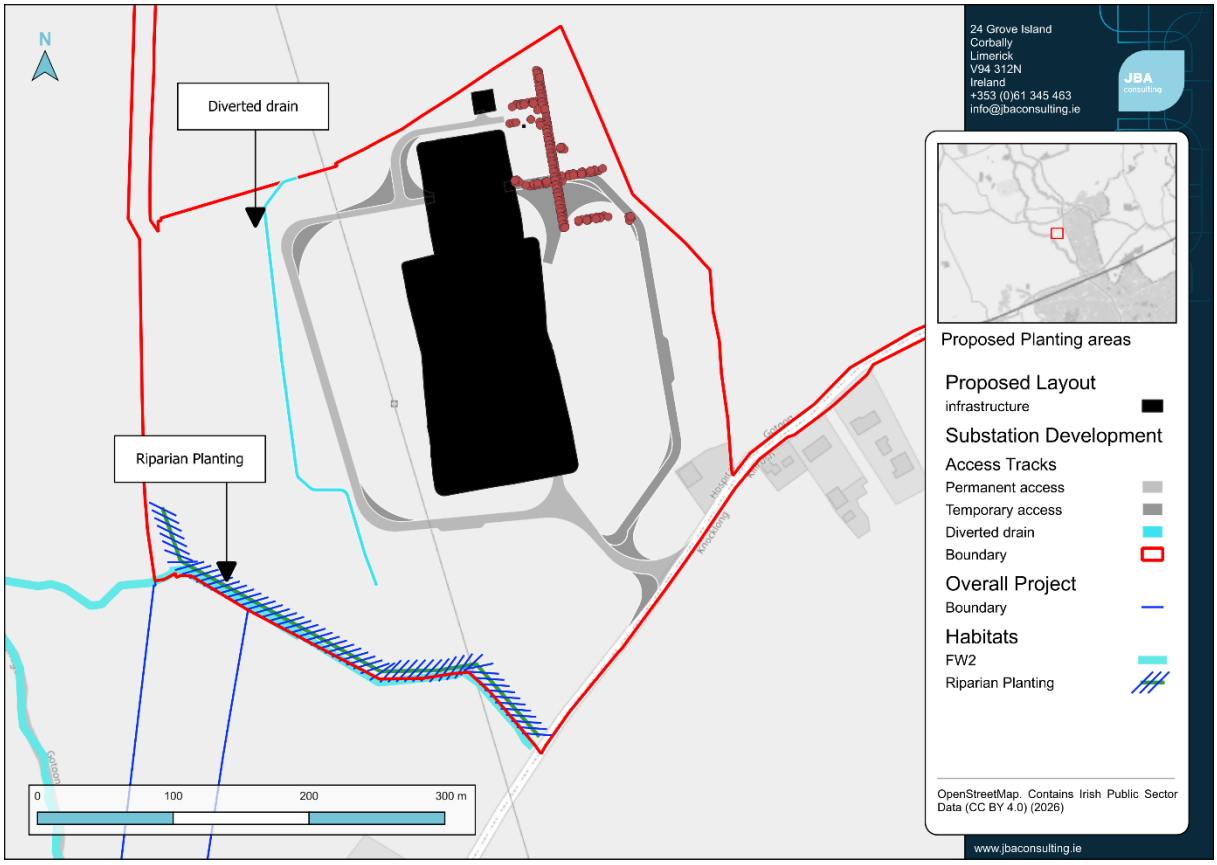

Figure 7-4: Specific locations in Parcel 4

7.6 Operational Impacts

Once the development is complete, very little impacts are anticipated as the system will be largely self-sustaining. Maintenance visits are anticipated to check the different components of the Proposed Substation Development, with some works anticipated on an in-frequent basis. This will result in small scale works in an ad-hoc manner.

- No emissions are anticipated during the operation of the Proposed Substation Development. Therefore no change in baseline conditions are anticipated.
- Hard standing areas will be connected to a surface water drainage system, discharging to an attenuation pond. Overall runoff rates are not anticipated to be any different to greenfield runoff. Therefore, no changes in baseline conditions are anticipated.
- Herbicide use is not anticipated for the maintenance of the Proposed Substation Development.
- Nighttime lighting will be limited to emergency situation or when people are on site. No permanent lighting will be operational, other than the required safety beacons on masts.
- No lighting along the watercourses and therefore no light disturbance to Otter will occur.
- No obstruction of watercourses.

Therefore, no operational impacts on QI species or ex-situ habitats are anticipated.

7.7 Decommissioning Phase

Should any element of the Proposed Substation Development be decommissioned in the future, the works would be undertaken in accordance with the relevant legislation, guidance and good practice applicable at that time.

Therefore decommissioning works will likely have similar impacts to the construction phase, with some localised disturbance, potential for sediment release, potential for habitat degradation and spread of invasives species.

Mitigation measures described in sections 7.1, 7.3, 7.4 apply.

7.8 Residual Impacts

Mitigation has been drawn up for the project, as well as inherent mitigation by design. These are such that no significant residual adverse effects on the integrity of the Lower River Shannon SAC can reasonably be anticipated following strict adherence to the mitigation prescribed.

Therefore, no significant effects on the designated Natura 2000 sites and retained qualifying interests are likely.

A Summary table of residual impacts is outlined in Table 7-1.

7.8.1 Summary of Cumulative Impacts

Work on the Proposed Solar Farm as part of the Overall Project may act in-combination with the Proposed Substation Development with identified risks to the watercourses and to Otter. No evidence of Otter was recorded on the Camogue.

The Proposed Substation Development connects to the Proposed Solar Farm through directional drilling (HDD) works under the Camogue to allow for cabling to connect the southern parcels of the Proposed Solar Farm to the Proposed Substation. Construction works may lead to runoff of sediment laden waters, whilst HDD works could lead to the release of sediment or drilling mud that would negatively impact on aquatic ecosystems.

None of the retained planning applications made to the local authority are likely to act in combination with the Proposed Substation Development as they are not directly connected to a watercourse and are small scale distinct structures.

Preventing sediment and pollutant runoff will protect water quality of the aquatic ecosystems and species that depend on them .

With the implementation of the mitigation measures set out in section 7.3, 7.4 and 7.5, and the phasing of works to avoid overlap along the Mahore, **no significant effects on the designated Natura 2000 site and its qualifying interests are likely**.

7.9 Qualifying Interests, Potential Impacts and Mitigation Measures

The QI's, the potential impacts from the Proposed Substation Development as well as a summary of mitigation measures are presented in Table 7-1.

Table 7-1 Qualifying Interests, mitigation measures and potential impacts

Attribute	Measure Target	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]					
Habitat area	Kilometres Area stable or increasing, subject to natural processes	Sediment runoff, pollutants.	Water quality impacts with increased turbidity and nutrient load may reduce habitat suitability for aquatic flora.	Maintain 20m buffer to river Camogue. Silt fence around areas where soils will be exposed; bund ditches where necessary.	No residual adverse impact
Substratum composition: particle size range	Millimetres Substratum dominated by particle sizes appropriate to sub-type (often sands, gravels, cobbles)	Sediment runoff	Potential change in substrate types due to increased sediment run-off	Maintain 20m buffer to river Camogue. Silt fence around areas where soils will be exposed; bund ditches where necessary.	No residual adverse impact
Water quality: nutrients	Milligrams per litre Nutrient concentrations low enough to prevent changes in species composition or habitat condition	Sediment runoff, Hydrocarbons.	Reduced water quality may impact on flora composition.	Maintain 20m buffer to river Camogue. Silt fence around areas where soils will be exposed; bund ditches where necessary. Water quality protection measures to minimise risk of pollutants entering watercourses	No residual adverse impact

Attribute	Measure Target	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact
Vegetation composition: typical species	Occurrence Typical species of the relevant sub-type present and in good condition	Sediment runoff, pollutants.	Water quality impacts with increased turbidity and nutrient load may reduce habitat suitability for aquatic flora.	Maintain 20m buffer to river Camogue. Silt fence around areas where soils will be exposed; bund ditches if necessary. Water quality protection measures to minimise risk of pollutants entering watercourses. No instream works.	No residual adverse impact
Riparian habitat	Area Riparian woodland area at and upstream of bryophyte-rich sub-type maintained	Physical degradation	Loss of riparian habitat	Maintain 20m buffer zones;	No residual adverse impact
Sea Lamprey *Petromyzon marinus* [1095]					
Population structure of juveniles	Number of age/size groups At least 3 age/size groups present	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works. Regular water quality monitoring with ECoW to give stop works instructions when necessary.	No residual adverse impact
Juvenile density	Juveniles/m²	Sediment runoff	Sedimentation of	Water quality protection	No residual

Attribute	Measure Target	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact
in fine sediment	≥1 juvenile/m²		gravel beds, reducing potential spawning and therefore age structure.	measures to minimise risk of pollutants entering watercourses; No instream works. Regular water quality monitoring with ECOW to give stop works instructions when necessary.	adverse impact
Extent & distribution of spawning habitat	m² and occurrence No decline in extent or distribution of spawning beds	Sediment runoff	Sedimentation of gravel beds	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works. Regular water quality monitoring with ECOW to give stop works instructions when necessary.	No residual adverse impact
Brook Lamprey *Lampetra planeri* [1096]					
Population structure of juveniles	Number of age/size groups At least 3 age/size groups of brook/river lamprey present	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works. Regular water quality monitoring with ECoW to give stop works instructions when	No residual adverse impact

Attribute	Measure Target	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact
				necessary.	
Juvenile density in fine sediment	Juveniles/m² Mean catchment juvenile density ≥ 2/m²	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works. Regular water quality monitoring with ECoW to give stop works instructions when necessary.	No residual adverse impact
Extent & distribution of spawning habitat	m² and occurrence No decline in extent or distribution of spawning beds	Sediment runoff	Sedimentation of gravel beds	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works. Regular water quality monitoring with ECoW to give stop works instructions when necessary.	No residual adverse impact
River Lamprey *Lampetra fluviatilis* [1099]					
Population structure of juveniles	Number of age/size groups At least 3 age/size groups of river/brook lamprey present	Sediment runoff	Sedimentation of gravel beds, reducing potential spawning and therefore age structure.	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works.	No residual adverse impact
Juvenile density	Juveniles/m²	Sediment runoff	Sedimentation of	Regular water quality	No residual

Attribute	Measure Target	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact
in fine sediment	Mean catchment juvenile density ≥ 2/m²		gravel beds, reducing potential spawning and therefore age structure.	monitoring with ECoW to give stop works instructions when necessary.	adverse impact
Extent & distribution of spawning habitat	m² and occurrence No decline in extent or distribution of spawning beds	Sediment runoff	Sedimentation of gravel beds	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works.	No residual adverse impact
Salmon *Salmo salar* [1106]					
Salmon fry abundance	Number of fry / 5-min electrofishing Maintain or exceed mean catchment-wide threshold of 17 fry per 5 minutes	Sediment runoff	Sedimentation of spawning gravels would impact on fry number.	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works	No residual adverse impact
Out-migrating smolt abundance	Number No significant decline	Sediment runoff, pollutants	Water pollution may affect smolt health	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works	No residual adverse impact
Number and distribution of redds	Number and occurrence No decline due to anthropogenic causes	Sediment runoff	Sedimentation of spawning gravels would reduce spawning habitat.	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works	No residual adverse impact

Attribute	Measure Target	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact
Water quality	EPA Q-value At least Q4 at all EPA monitoring sites	Sediment runoff, pollutants	Water pollution and nutrient loading would directly affect Q-value	Water quality protection measures to minimise risk of pollutants entering watercourses; No instream works. Regular water quality monitoring with ECoW to give stop works instructions when necessary.	No residual adverse impact
Otter *Lutra lutra* [1355]					
Distribution	Percentage of positive survey sites No significant decline	Disturbance	Noise disturbance would cause displacement of Otter	No works within 20m of the river Camogue; pre works survey to update Otter distribution; daily Otter checks at the start of the workday to avoid disturbance.	No residual adverse impact
Extent of terrestrial habitat	Hectares No significant decline. 596.8 ha above HWM; 958.9 ha along riverbanks/ponds	Disturbance, loss of habitat	Development within buffer zone would lead to potential loss of habitat.	20m riparian buffer to be maintained; no planting of trees if actively used holt is present; tree planting may only occur when the Otters are not actively using the area. No use of heavy machinery for works in	No residual adverse impact

Attribute	Measure Target	Potential Source of Impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact
				riparian zone.	
Extent of freshwater (river) habitat	Kilometres No significant decline. 500.1 km mapped	Sediment runoff, pollutants, disturbance.	Water pollution may affect otter distribution. Disturbance may affect otter distribution.	Water protection measures to minimise sediment mobilisation, and hydrocarbon pollution	No residual adverse impact
Couching sites and holts	Number No significant decline	Disturbance	Disturbance may cause otter to abandon couches and holts.	20m riparian buffer to be maintained; no planting of trees if actively used couch/ holt is present. No use of heavy machinery for works in riparian zone.	No residual adverse impact
Fish biomass available	Kilograms No significant decline	Water pollution	Reduced water quality could lead to a reduction in fish biomass and affect otter foraging opportunities.	Water quality protection measures to minimise risk of water pollution.	No residual adverse impact
Barriers to connectivity	Number No significant increase	Fencing	Fencing may block commuting corridors	No works in watercourses; no fencing across watercourses.	No residual adverse impact

8 Impact on Site Integrity

The initial screening of the Proposed Substation Development indicated that Likely Significant Effects could not be excluded due to a surface water pathway to the following Natura 2000 sites:

- Lower River Shannon SAC
- Glen Bog SAC

with a conclusion that adverse effects could occur during the construction, operational and decommissioning phase through surface water pathways, loss of habitat and habitat fragmentation, disturbance, spread of invasive species.

Upon further examination of the pathway and the nature of the project, it was concluded that no viable pathway for impact to Glen Bog SAC was possible.

As such, mitigation was drawn up around protection of watercourses and aquatic Qis of the Lower River Shannon SAC.

Provided that standard construction practices and the mitigation measures outlined in this document are adhered to it can be ascertained, beyond reasonable scientific doubt, that no adverse effects on the integrity of the Lower River Shannon SAC will arise either alone or in-combination with other plans or projects.

This includes mitigation for the protection of water quality; to protect habitat quality of floating river vegetation; and to protect the quality of fisheries habitat. The mitigation measures will be implemented during the construction, operation and decommissioning of the Proposed Substation Development. Provision is also made for the protection of Otter during construction, operation and decommissioning of the Proposed Substation Development.

To confirm this conclusion, a checklist on methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC from (European Commission 2021) has been completed with regards to conservation objectives in Table 7-1.

Table 8-1 Assessing the effects on the integrity of the Natura 2000 site.

Does the plan or project have the potential to:	Yes/No
Hamper or cause delays in progress towards achieving the site's conservation objectives?	No - Following mitigation detailed in sections 7.3, 7.4, and 7.5, no significant adverse residual impacts have been identified that will hamper or delay achievement of the conservation objectives of the Lower River Shannon SAC
Reduce the area, or quality, of protected habitat types or habitats of protected species present on the site?	No - Potential adverse impacts on the habitats or protected species of the Lower River Shannon SAC are not expected given the mitigation measures that have been detailed, and the location of the Proposed Substation Development in relation to the SAC (sections 7.3, 7.4, 7.5, 7.6, 7.7)..
Reduce the population of the protected species significantly present on the site?	No - Potential impacts to key species of the Lower River Shannon SAC are not expected, as impacts

Does the plan or project have the potential to:	Yes/No
	can be avoided by implementing mitigation measures for water quality in section 7.3.2, and Otter 7.4.
Result in disturbance that could affect the population size or density or the balance between species?	No - Potential impacts to key species for which the Lower River Shannon SAC are designated are not expected, as impacts can be avoided by implementing the detailed mitigation measures for water quality during the construction phase (section 7.3). Population sizes and ecosystem function will be maintained due to mitigation measures, type and location of development detailed in sections 7.3, 7.6 and 7.7.
Cause the displacement of protected species significantly present on the site and thus reduce the distribution area of those species in the site?	No - Protected species will not be significantly displaced. The distribution areas of species in the Lower River Shannon SAC will be maintained. Measures to protect Otter from disturbance detailed in section 7.3 and 7.4 will allow for the River Camogue to be available to Otter.
Result in a fragmentation of Annex I habitats or habitats of species?	No – Potential impacts resulting in fragmentation of species or habitats of the Lower River Shannon SAC are not expected as the river and riparian margins will be preserved (section 7.3.2, 7.3.3, 7.3.4).
Result in a loss or reduction of key features, natural processes or resources that are essential for the maintenance or restoration of relevant habitats and species in the site (e.g. tree cover, tidal exposure, annual flooding, prey, food resources)?	No - Potential adverse impacts on key features of the Lower River Shannon SAC are not expected, as impacts will be avoided by implementing mitigation measures (sections 7.3, 7.4, 7.5, 7.6, 7.7). Breeding habitat, water quality, and prey and food resources will not be affected.
Disrupt the factors that help maintain the favourable conditions of the site or that are needed to restore these to a favourable condition within the site?	No - Potential adverse impacts via surface water; land and air; and groundwater pathways identified during the screening process can be mitigated against (sections 7.3, 7.4, 7.5, 7.6, 7.7). The conservation objectives of the Lower River Shannon SAC that allow favourable condition of the site have been assessed individually, and no adverse effects on the measures of favourable condition will occur.
Interfere with the balance, distribution and density of species that are the indicators of the favourable conditions of the site?	No - Potential impacts to the population size, density or balance of key species of the Lower River Shannon SAC are not expected, as impacts will be avoided by implementing mitigation (sections 7.3, 7.4, 7.5, 7.6, 7.7).

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