

Ballinlee Green Energy Ltd.

Ballinlee Wind Farm

Natura Impact Statement (NIS)

James O'Connor



Woodrow Ref: P00012353

Date: September 2025

COMMERCIAL IN CONFIDENCE



Client: Ballinlee Green Energy Ltd.

Project reference: P00012353

Date of issue: September 2025

Project Director: Rory Canavan

Project Manager: Maeve Maher-McWilliams

Authors: James O'Connor

APEM Group Woodrow
Upper Offices
Ballisodare Centre
Station Road
Ballisodare
Co. Sligo
F91 PE04
Ireland

Tel: +353 71 9140542

Web: www.woodrow.ie

Registered in Ireland No. 493496

Report should be cited as:

“APEM Group Woodrow (2025). Ballinlee Wind Farm. Natura Impact Statement (NIS). Ballinlee Green Energy Ltd., September 2025”

Document	Natura Impact Statement (NIS) – Ballinlee Wind Farm, Co. Limerick
Client	Ballinlee Green Energy Ltd.
Prepared by	APEM Group Woodrow, Upper Offices, Ballisodare Centre, Station Road, Ballisodare, Co Sligo, F91 PE04, Ireland.
Author	James O'Connor
Checked internally	Maeve Maher-McWilliams
Checked by client	Yes
Status / Version / Date	Version 04 / V04 / 25 September 2025

STATEMENT OF AUTHORITY

APEM Group Woodrow, trading as Woodrow Sustainable Solution Limited, is an established and accomplished environmental consultancy committed to delivering robust ecological assessment services for clients in the private and public sectors. APEM Group Woodrow provides an in-house team of ecologists and environmental professionals whose primary specialisms include botany, habitats, birds, bats, mammals, invertebrates and aquatic ecology. APEM Group Woodrow's investment in high-technology field equipment and software, and the development of our own field-data collection app (Eco-Log), ensures reliability and confidence in our work. APEM Group Woodrow staff are fully conversant with wildlife legislation in both Ireland and the UK, and work to exacting standards, according to established guidelines issued by the Chartered Institute of Ecology and Environmental Management (CIEEM).

This report has been prepared by James O'Connor, a Senior Ecologist with APEM Group Woodrow, who holds a PhD in aquatic sciences with a primary technical specialism in freshwater ecology. He has prior experience monitoring wild bird populations with BirdWatch Ireland and is heavily involved in ornithological work as part of his role with APEM Group Woodrow. James also regularly conducts mammal surveys, particularly for otter and badger. He is the first author of several peer-reviewed academic research papers and has contributed to reports disseminating key research findings to state agencies such as the Irish Environmental Protection Agency (EPA) and Irish county councils. His reporting experience includes contributions to EIARs for wind farm developments, the production of AA Screening and NIS reports, and various technical reports.

This report was reviewed and approved by Maeve Maher-McWilliams, Associate Director with APEM Group Woodrow. Maeve has over 13 years' experience on complex EIARs, AAs and mitigation design for infrastructure and development projects across Ireland, Northern Ireland, and Scotland. Maeve has been involved in projects across several sectors such as renewable energy; linear infrastructure; flood relief schemes and port developments; tourism and recreation; residential, pharmaceutical, and data centre developments. Included in this list are over twenty onshore wind energy projects in Ireland and Northern Ireland, and associated substations and onshore grid connections. Maeve has provided advice and recommendations throughout project lifetimes from inception and due diligence, right through to the planning process and into post-planning compliance and secondary consents. As a field ecologist Maeve is skilled in multidisciplinary surveys, habitat surveys, bat surveys, mammal surveys, and specialises in ornithology surveys. As a project manager and ecologist, Maeve directs, manages and authors large scale EIA Reports (EIARs), including biodiversity chapters and ornithology chapters for wind energy projects, as well as AA Screening and NIS reports.

James O'Connor – Qualifications:

BSc Agriculture and Environmental Management, ATU Galway, 2013.

MSc Applied Environmental Science, University College Dublin, 2015.

PhD Aquatic Sciences, ATU Galway, 2021.

Maeve Maher-McWilliams – Qualifications:

BSc (Hons) Biological Sciences, Queen's University Belfast, 2008.

MSc Evolutionary and Behavioural Ecology, University of Exeter, 2010.

Table of Contents

1. Introduction	1
1.1. Background	1
1.2. Site Description	1
1.3. Purpose of this Document	1
1.4. Objectives of the Appropriate Assessment Approach	2
1.5. Legislative Context	2
1.5.1. Requirement for Appropriate Assessment	3
1.5.2. Natura Impact Statement (NIS)	4
2. Description of the Proposed Development	6
3. Main Sources of Information.....	11
4. Screening for Appropriate Assessment.....	12
4.1. Approach to Screening for Appropriate Assessment.....	12
4.2. Outcome of Screening for Appropriate Assessment	12
5. Identification of Potential Impacts	15
6. Appropriate Assessment (Alone).....	19
6.1. Lower River Shannon SAC	20
6.1.1. Qualifying Interests of Lower River Shannon SAC	20
6.1.2. Conservation Objectives of Qualifying Interests (QIs).....	21
6.1.3. Assessment of Effects	26
6.2. River Shannon and River Fergus Estuaries SPA.....	29
6.2.1. Special Conservation Interests of River Shannon and River Fergus Estuaries SPA.....	29
6.2.2. Conservation Objectives of Special Conservation Interests	30
6.2.3. Assessment of Effects	30
6.3. Mitigation Measures.....	31
6.3.1. Construction Phase Mitigation	31
6.3.2. Operational Phase Mitigation.....	37
6.3.3. Decommissioning Phase Mitigation.....	37
6.3.4. Efficacy of Mitigation	38
6.4. Monitoring	40
6.4.1. Construction Phase Water Quality Monitoring	40
6.4.2. Operational Phase Water Quality Monitoring.....	40
6.5. Conclusion of Appropriate Assessment (Alone)	41
7. Appropriate Assessment (In-Combination)	42
7.1. Associated / Connected Developments.....	42
7.2. Additive / Incremental Effects	42

7.3.	Conclusion of Appropriate Assessment (In-Combination).....	44
8.	Conclusions	47
9.	References	48

1. INTRODUCTION

1.1. Background

APEM Group Woodrow was engaged by Ballinlee Green Energy Ltd., to undertake Stage 2 Appropriate Assessment and prepare a Natura Impact Statement, for the proposed Wind Farm at Ballinlee, Co. Limerick, and associated infrastructure (hereinafter referred to as the Proposed Development).

Stage 1 screening for Appropriate Assessment (hereinafter referred to as AA) was prepared and identified, without consideration of on-site conditions and in the absence of mitigation, potential for Likely Significant Effects (LSE) on the Natura 2000 network (hereinafter referred to as European Sites¹) within the Zone of Influence (Zoi) of the Proposed Development (APEM Group Woodrow, 2025). Therefore, on the basis of objective scientific information, it was determined that the Proposed Development be subject to Stage 2 AA and an NIS be prepared.

This NIS provides information, in view of best scientific knowledge, applying the precautionary principle, and considering the conservation objectives of the relevant European Sites, whether the Proposed Development, either alone or in combination with other plans or projects, may adversely affect the integrity of any European Site. European Sites are Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), as well as candidate SACs and SPAs.

The legislative context of the requirement to undertake AA is outlined in the following sections.

1.2. Site Description

The Proposed Development site under consideration is located on privately-owned, predominantly agricultural lands within the townlands of Ballincurra, Ballinlee South, Ballingayrour, Ballinrea, Knockuregare, Ballinlee North, Carrigeen and Camas South, c. 18 km south of Limerick City and c. 3 km southwest of Bruff, Co. Limerick. The site itself is intersected by the L1414 minor road (Convent Road), with sections of the Planning Application Boundary extending both north and south of this (**Figure 1**).

The area is rural in nature, characterized by agricultural lands and rural settlements, with some small pockets of forestry. Land is managed for agriculture at varying levels of intensity, with hedgerows and drainage ditches scattered throughout. The surrounding landscape is predominantly agricultural, interspersed with small conifer plantations and single residential dwellings.

1.3. Purpose of this Document

The aim of this report is to provide supporting information to assist the Competent Authority, in this case An Coimisiún Pleanála, in applying Article 6(3) of the EU Habitats Directive² (92/43/EEC) as necessary, under their roles, functions and responsibilities in relation to the AA of plans or projects. The purpose of this NIS is to assess whether the potential LSE identified in the AA Screening could

¹ Natura 2000 sites are referred to as European Sites in certain guidance documents and legislation such as the European Communities (Birds and Natural Habitats) Regulations 2011, as well as the Planning and Development Acts 2000 (as amended).

² Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, as amended by Council Directive 97/62/EC. Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm [Accessed August 2024].

adversely affect the integrity of any European Site alone or in-combination with other plans and projects. The NIS takes account of the Qualifying Interests (QIs) and Special Conservation Interests (SCIs) and the conservation objectives as defined for the various relevant European Sites in the zone of influence of the project. This report focuses on the works associated with the Proposed Development, as outlined in **Section 2**.

The report sections, paragraphs and tables relate in sequence to the process of assessing the potential impact of the Proposed Development in the context of sequential requirements of Article 6 of the EU Habitats Directive.

1.4. Objectives of the Appropriate Assessment Approach

The AA approach in Ireland is driven by the Habitats Directive (92/43/EEC) which is transposed into Irish Law by Part XAB of the Planning and Development Act, 2000 (the "PDA 2000") in respect of land use plans and proposed development requiring development consent and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended for all other activities, plans and projects. The objective of AA is to safeguard the long-term survival of habitats and species designated under European Sites, as defined in the PDA 2000, including Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Birds Directive (2009/147/EC).

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures to be addressed in the Appropriate Assessment process (OPR, 2021) as follows:

- Firstly, a plan / project should aim to avoid any potential for negative impacts on European Sites;
- Secondly, if avoidance isn't possible, the project must undergo Stage 2 AA, where mitigation measures should be applied to the point where no adverse impacts on the site(s) remain;
- Thirdly a plan / project may have to undergo an assessment of alternative solutions. Under this stage of the assessment, compensatory measures are required for any remaining adverse effects, but they are permitted only if (a) there are no alternative solutions and (b) the plan / project is required for Imperative Reasons of Overriding Public Interest (the 'IROPI test'). European case law highlights that consideration must be given to alternatives outside the plan / project boundary area in carrying out the IROPI test.

1.5. Legislative Context

The legislation relevant to this report is as follows:

- The Habitats Directive 92/43/EEC;
- The Birds Directive 2009/147/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011; and
- Planning and Development Acts 2000 (as amended) – PART XAB.
- Planning and Development Act 2024
- Planning and Development (Amendment) Act 2025
- Planning and Development Regulations 2001 to 2025
- Limerick Development Plan, 2022-2028
- Limerick Biodiversity Action Plan 2025–2030

1.5.1. Requirement for Appropriate Assessment

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as 'The Habitats Directive', provides legal protection for habitats and species of European importance.

Articles 3 to 9 of the Habitats Directive provide the legislative means to protect habitats and species of community interest through the establishment and conservation of a European Union (EU)-wide network of European Sites (forming the Natura 2000 network). Article 12 establishes strict protection measures for species of Community interest listed in Annex IV of the directive. These species require strict legal protection across their natural range, regardless of whether they are within designated protected areas. Relevant to AA are Article 6(3) and Article 6(4).

Article 6(3) states:

Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In 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) states:

If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Under the EU Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC) areas which support habitats and species of conservation importance which are designated for the conservation of flora, fauna and habitats of European importance are referred to as SACs. Areas which are designated for the protection and conservation of bird species and habitats of European importance are referred to as SPAs.

SACs are selected based on Annex I habitats and Annex II animal and plant species. Annex I of the Habitats Directive lists certain habitats that must be given protection, referred to as Annex I habitats. Certain Annex I habitats are deemed 'priority' and have greater protection. Examples of designated Irish habitats include raised bogs, active blanket bogs, turloughs, heaths, lakes and rivers. Annex II of the Habitats Directive lists species whose habitats must be protected, species examples include: lesser horseshoe bat (*Rhinolophus hipposideros*), Eurasian otter (*Lutra lutra*), Atlantic salmon (*Salmo salar*) and white-clawed crayfish (*Austropotamobius pallipes*).

The Birds Directive aims to protect wild bird species naturally occurring in the EU, including those listed in Annex I of the directive. SPAs are designated based on the presence of internationally

significant populations of these bird species which include birds of prey, waders, seabirds, waterfowl and wetlands which attract large numbers of migratory birds each year.

Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate SPAs for the protection of endangered species of wild birds. This includes certain listed rare and vulnerable species, regularly occurring migratory species, such as ducks, geese and waders, and wetlands, especially those of international importance, which attract large numbers of migratory birds each year.

The Habitats Directive was transposed into Irish law in a planning context, through Part XAB of the Planning and Development Acts 2000 (as amended). This sets out the circumstances under which an AA is required, the stages of that assessment which must be undertaken, and the responsibilities of the Competent Authority in considering whether or not to approve consent for proposed plans or projects.

Section 177U(1) of this Act states that:

A screening for appropriate assessment of a draft Land use plan or application for consent for proposed development shall be carried out by the Competent Authority to assess, in view of best scientific knowledge, if that Land use plan or proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site.

Section 177U(4) of this Act states that:

The Competent Authority shall determine that an appropriate assessment of a draft Land use plan or a proposed development, as the case may be, is required if it cannot be excluded, on the basis of objective information, that the draft Land use plan or proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

1.5.2. Natura Impact Statement (NIS)

If, following the screening process, an LSE is predicted or cannot be ruled out; an AA is required under s. 177U(4) of the Planning and Development Acts (as amended) to assess the potential for adverse effects on the integrity of a European Site.

Under the Planning and Development Acts 2000 (as amended), Section 177T(4) states:

The applicant for consent for proposed development may, or if directed in accordance with subsection (5) by a competent authority, shall furnish a Natura impact statement to the competent authority in relation to the proposed development.

Furthermore, Section 177T(1)(b) states:

A Natura impact statement means a statement, for the purposes of Article 6 of the Habitats Directive of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites.

While, Section 177T(2) states:

...a Natura impact statement... shall include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one European site in view of the conservation objectives of the site or sites.

With the AA Screening having determined that the potential for LSE on European Sites could not be ruled out, a NIS is required. This NIS provides an assessment of the Proposed Development considering potential impacts on QIs and SCIs and provides mitigation proposals to avoid adverse effects on the integrity of European Sites. This allows for an audit trail through Article 6 of the EU Habitats Directive to facilitate an AA by a Competent Authority, in this case, An Coimisiún Pleanála.

The approach to preparing the NIS is summarised as follows:

- Describe the elements of the project that are likely to give rise to LSE on the European Sites;
- Set out the conservation objectives of the European Sites;
- Identify and assess potential impact pathways, including hydrological, hydrogeological, air/dust, land-based disturbance, visual disturbance, collision risk, flightlines, and *ex-situ* SPA bird connectivity;
- Apply the Source-Pathway-Receptor (SPR) model with reference to the nature, size, and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects;
- Describe how the project will affect the key species and key habitats of the European Sites;
- Describe how the integrity of European Sites is likely to be affected by the project;
- Describe what measures are to be introduced to avoid, reduce or remedy the adverse effects on the integrity of the European Site; and,
- Consider findings and determine if potential for adverse effects on European Sites remains after such measures have been implemented.

In the event of a negative assessment in terms of an adverse effect on site integrity, a proposal can only be consented in the absence of feasible alternatives and for Imperative Reasons of Overriding Public Interest (IROPI). In such cases, compensatory measures to ensure the integrity of the European Site is maintained, are required. The Guidance document on Article 6(4) of the Habitats Directive states that:

Any uncertainty over the precise nature and/or magnitude of the adverse effects should be thoroughly tested. Where appropriate, a precautionary approach should be adopted and the assessment of adverse effect based on a worst-case scenario.

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development is located in a rural area of east Limerick approximately 18km south of Limerick City and 3km southwest of Bruff. **Figure 1** outlines the location of the proposed development and indicates the planning application boundary included in the planning application. The area within this boundary is approximately 255.12 ha.

The current proposal comprises of the following components:

- Seventeen (17) No. wind turbines (turbine tip height of 160m, and 150m (T6 only)) with associated foundations and crane hardstand areas.
- One (1) No. Permanent Meteorological Mast (92m height) and associated foundation, hardstand area and ancillary main crane hardstand area.
- One (1) No. Electrical Substation (110kV) including Eirgrid compound, IPP, maintenance compounds, ancillary building, security fencing and all associated works.
- Nine (9) No. site entrances.
- New and upgraded internal site service tracks (approximately 10.8km of new internal access tracks to be constructed).
- New clear span bridge over the Morningstar River.
- Underground electric collector cable systems between turbines within the wind farm site.
- New temporary access track via R516 to facilitate turbine delivery route located in the townland of Tullovin.
- Three (3) No. temporary construction site compounds (one approximately 95m x 50m and two approximately 55m x 25m).
- Two (2) No. borrow pits to be used as a source of stone material during construction and for storage of excess excavated materials.
- Nine (9) No. permanent and two (2) temporary deposition areas.
- Associated surface water management systems.
- Tree felling required for wind farm infrastructure.
- Whooper Swan Management Works
- Habitat Enhancement Works
- Landscaping, fencing and all associated works.

The proposed TDR departs Foynes port before travelling along the N69 as far as the N18 bypass. The route then follows the M20 before turning left at the N20 junction in Ballbronnouge and continuing toward Croom. Here, it follows the R516 road for c. 15 km until it terminates at the northern Planning Application Boundary. The route only passes through one town (Croom), with the rest of the route being predominantly rural (**Figure 3**).

General construction works will involve tree removal, vegetation stripping, excavation, grading, aggregate placement, geogrid/geotextile installation, drainage, backfilling, concrete pouring, fencing, and landscaping. No in-stream works are required in any EPA mapped watercourses. Minor works will be required to existing land drains as part of the construction phase. Existing watercourse crossing construction activities include widening using pre-cast piping, debris removal, cleaning and silt fence installation.

Included within the Planning Application Boundary are lands designated for a whooper swan (*Cygnus cygnus*) management plan and a Habitat and Species Management Plan (HSMP). These areas are located within the main Wind Farm site. While they are not considered Key Components of the Proposed Development, they are integral associated project elements aimed at supporting the management and enhancement of biodiversity on site.

The Wind Farm is designed for a 35-year lifespan and will operate within wind speeds of 4-25 m/s. Regular maintenance will be carried out by the turbine manufacturer or service company. At the end of its lifespan, the developer will decommission the site, the turbines will be removed, and foundations covered with soil. Access tracks will remain for agricultural use, while the grid connection will become a permanent part of the national electricity grid.

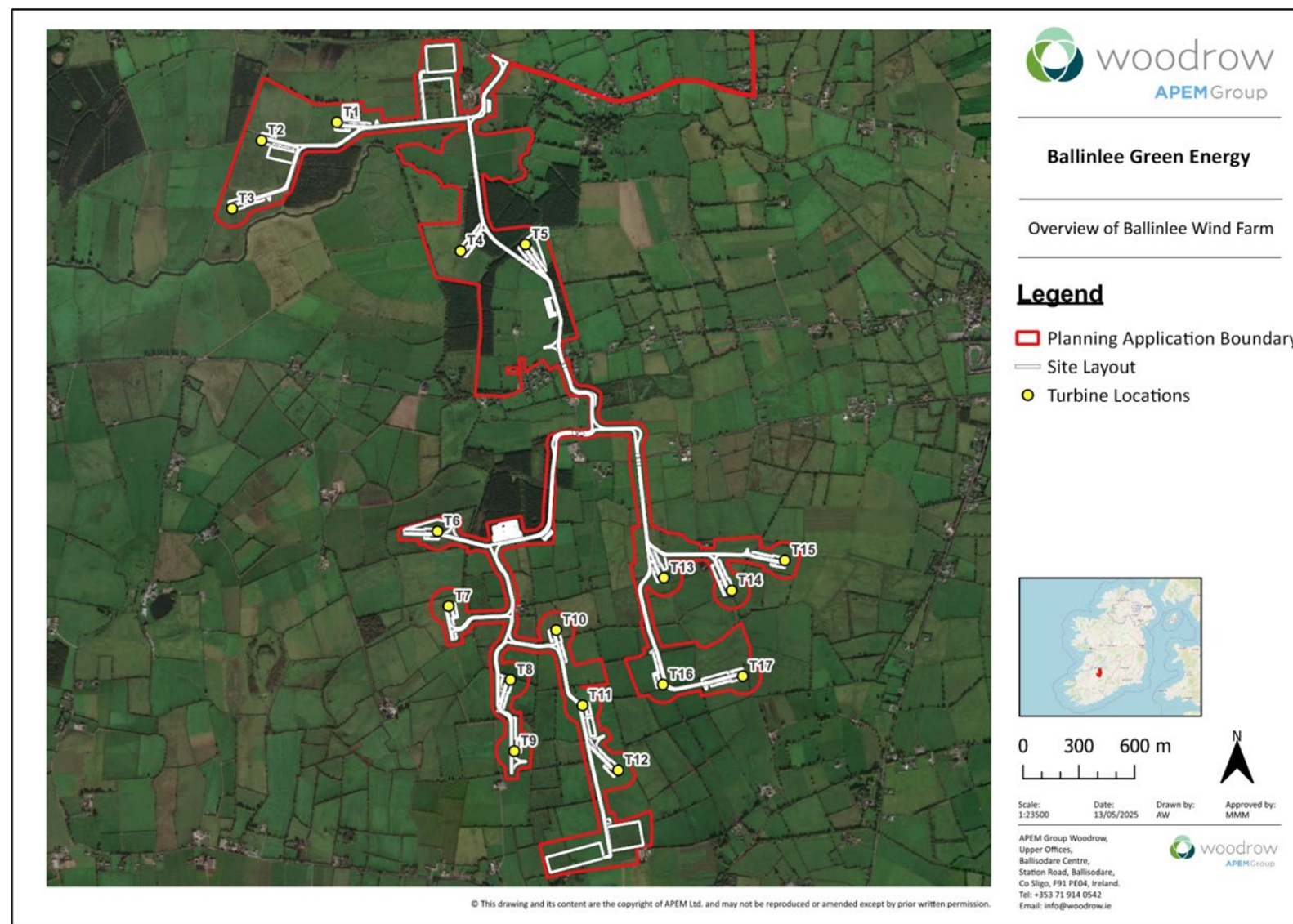


Figure 1: Overview of the Proposed Development showing Planning Application Boundary and site layout

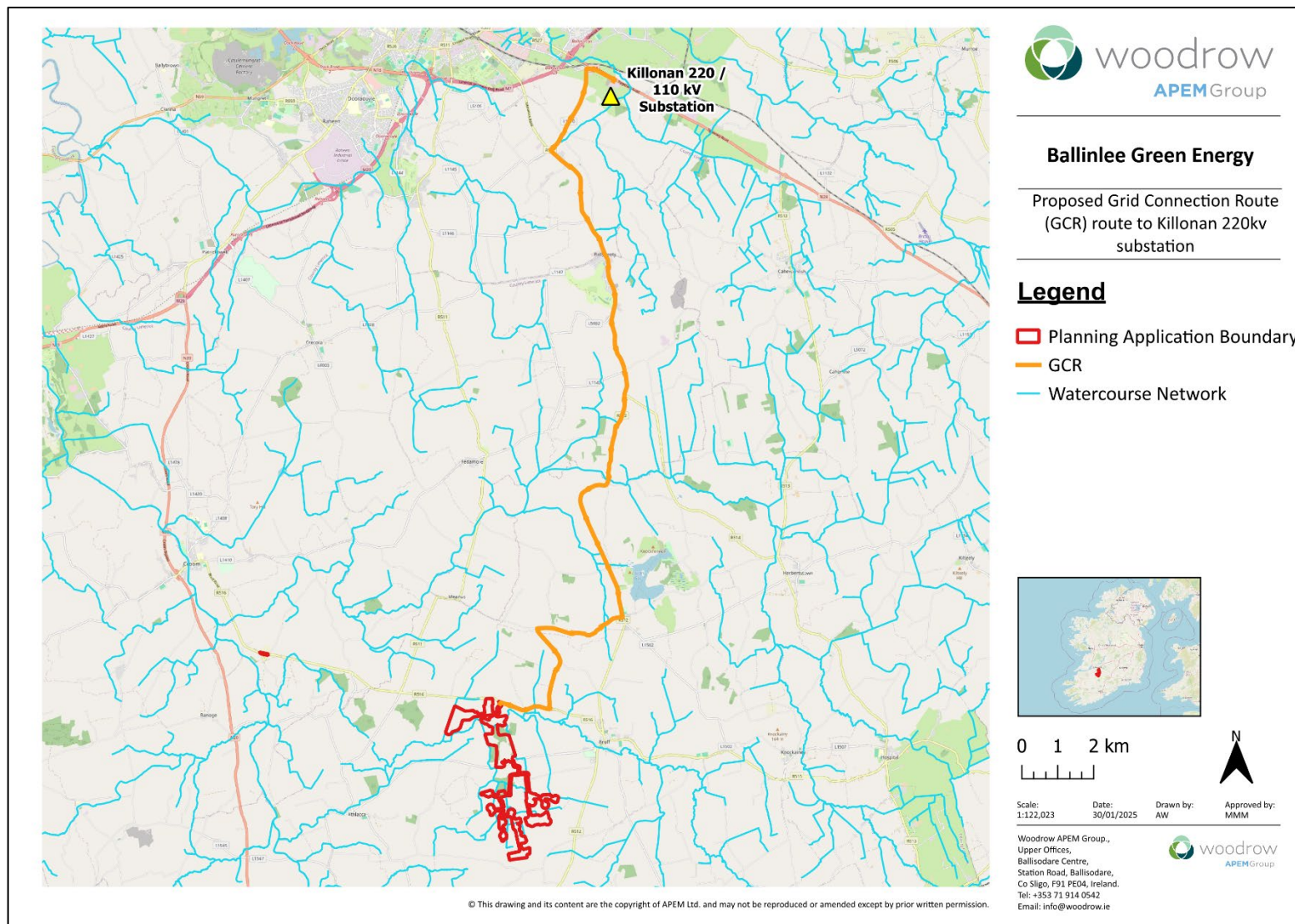


Figure 2: Grid Connection Route (GCR) of the Proposed Development

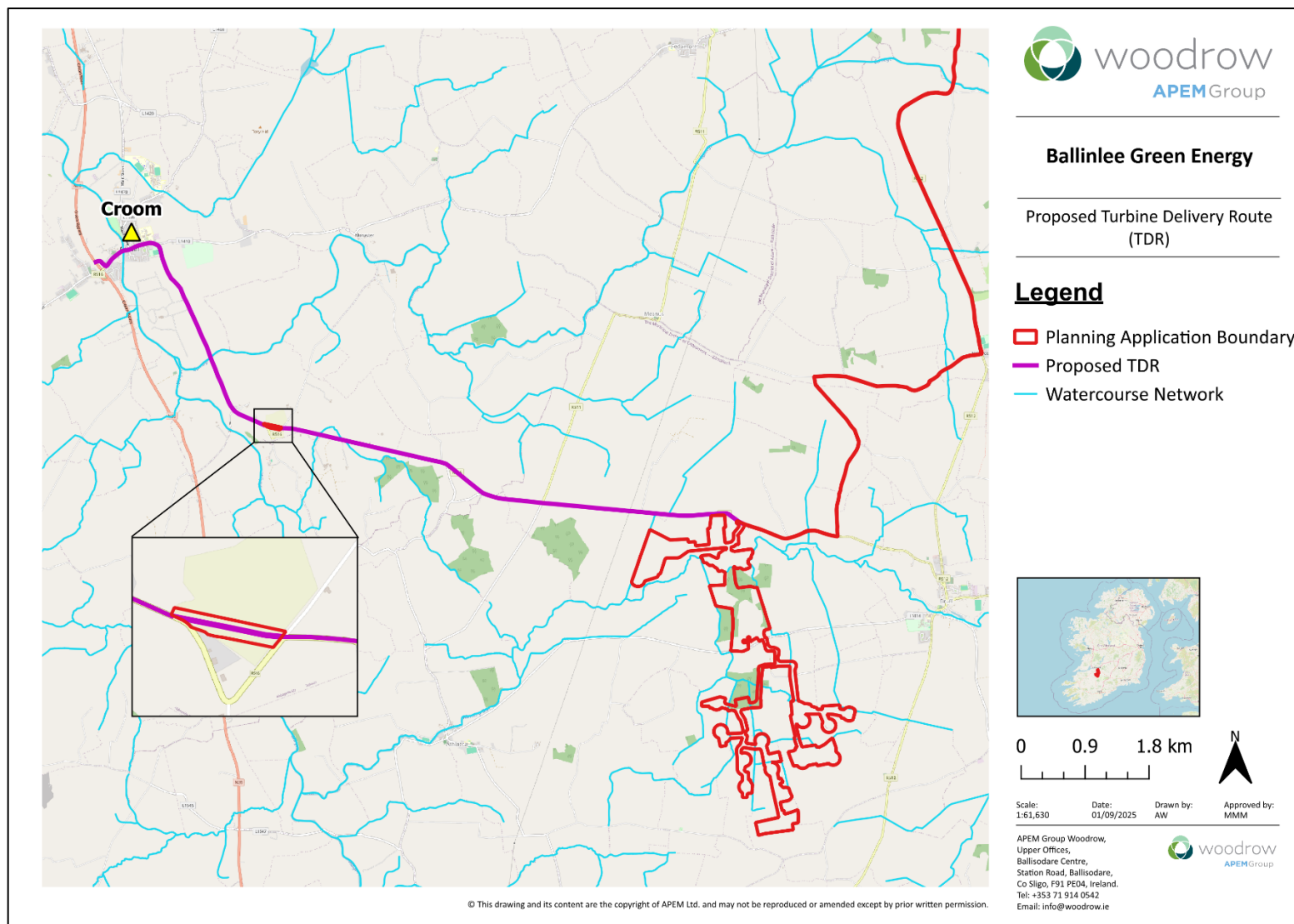


Figure 3: Turbine Delivery Route (TDR) (from Croom) of the Proposed Development

3. MAIN SOURCES OF INFORMATION

The following legislation, regulatory documents, and relevant sources of information were consulted:

- Department of Environment, Heritage and Local Government (2009 as amended in 2010). Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities.
- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPWS 1/10 & PSSP 2/10.
- European Community Habitats Directive (92/43/EEC) – The Habitats Directive (European Commission 1992).
- European Commission (2021) Commission Notice - Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
- European Commission (2021) ANNEX to the Commission Notice - Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
- European Communities (Natural Habitats) Regulations 1997 (European Commission 1997).
- Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC (EC, 2019).
- Office of the Planning Regulator (OPR) (2021) OPR Practice Note PN01 Appropriate Assessment Screening for Development Management.
- Environmental Protection Agency (EPA) Maps³.
- National Parks and Wildlife Services online Map Viewer⁴.
- Ireland's National Geospatial Data Hub online Map Viewer⁵.
- Inland Fisheries Ireland (IFI) Open Data Hub⁶.
- I-WeBS Core Count Data – Shannon and Fergus Estuary⁷
- Geological Survey of Ireland (GSI) Data and Maps⁸.
- Limerick City & County Council Planning Portal⁹.
- Limerick Development Plan 2022-2028¹⁰.
- Ballinlee Green Energy Ltd. Environmental Impact Assessment Report (EIAR). Chapters 6 & 7. Biodiversity & Ornithology; Chapter 8. Lands, Soil & Geology; Chapter 9. Water – Hydrology & Hydrogeology.

3 EPA Maps. Available at: <https://gis.epa.ie/EPAMaps/> [Accessed February 2025].

4 NPWS Designations Viewer. Available at: <https://dahg.maps.arcgis.com/apps/webappviewer/> [Accessed February 2025].

5 Geohive Map Viewer. Available at: <https://www.arcgis.com/apps/webappviewer/> [Accessed February 2025].

6 IFI Open Data Hub: Available at: <https://opendata-ifeo.hub.arcgis.com/> [Accessed February 2025].

7 I-WeBS Core Count Data. Available at: <https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/> [Accessed March 2025].

8 GSI Data and Maps: Available at: <https://www.gsi.ie/en-ie/data-and-maps/> [Accessed February 2025].

9 Limerick County Council Planning Portal. Available at: <https://www.limerick.ie/council/services/planning-and-placemaking/> [Accessed February 2025].

10 Limerick Development Plan 2022-2028. Available at: <https://www.limerick.ie/council/services/planning-and-placemaking/development-plan> [Accessed February 2025].

4. SCREENING FOR APPROPRIATE ASSESSMENT

4.1. Approach to Screening for Appropriate Assessment

Section 3.2.3 of the Guidance for Planning Authorities (DoEHLG, 2010) states a screening assessment should include any European Site within or adjacent to the plan or project area and any European Site within the likely 'Zone of Influence' (Zoi) of the plan or project.

The approach taken in preparing the AA Screening is summarised as follows:

- Identify European Sites within the potential Zoi of the project *via* the SPR model, as defined in Section 2.2.1 of the AA Screening (see APEM Group Woodrow, 2025), i.e. the Zoi is the area over which ecological features may be affected by biophysical changes resulting from the Proposed Development;
- Identify the Qualifying Interests (QIs) of the European Sites and review their conservation objectives;
- Review whether there is potential for the QI to be affected by the project based on their conservation objectives, as defined by their specific attributes and targets, proximity to the site and the nature and scale of the works associated with the project;
- Consider the likelihood of the identified potential impacts, in the absence of mitigation, occurring based on the information collated and professional judgement;
- Consider the likelihood of cumulative effects arising from the project in-combination with other plans and projects; and
- Identify the likelihood of significant effects on European Sites occurring because of the project in light of mitigation.

Following the above process, and based on the completed AA Screening (see APEM Group Woodrow, 2025), for each European Site and its QIs, it will be concluded that either:

- There are no LSE on the European Site(s) and their QIs, and therefore no further assessment is required; or,
- The potential for LSE on the European Site(s) and their QIs cannot be discounted and therefore Stage 2 AA (Natura Impact Assessment (NIS)) is necessary.

A precautionary approach is applied and so if the potential for LSE cannot be excluded beyond reasonable scientific doubt, then the relevant site and QI will be screened into the subsequent stages of the NIS process.

4.2. Outcome of Screening for Appropriate Assessment

The AA Screening (APEM Group Woodrow, 2025) identified that the Proposed Development does not overlap with, nor is it necessary for the management of any European Site. There is a weak hydrological connection between the proposed Wind Farm and the Lower River Shannon SAC, as well as the River Shannon and River Fergus Estuaries SPA, which are located respective distances of c. 24.2 and c. 36.9 river kilometres (rkm)¹¹ downstream (**Figure 4**). At its nearest point, the GCR extends to within 190 m of the River Groody, a distance of c. 5.3 rkm upstream of the SAC boundary in Limerick City.

¹¹ River kilometres (rkm) is a measure of distance, in kilometres, along the path of a watercourse.

Based on these pathways, the AA Screening concluded:

“In accordance with Article 6(3) of the Habitats Directive, this AA Screening has been undertaken with a precautionary approach, considering the best available scientific evidence and the conservation objectives of relevant European Sites. Despite the absence of direct impacts, the potential for a Likely Significant Effect on the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, either alone or in combination with other plans or projects, cannot be definitively excluded.

Given this uncertainty and in line with the precautionary principle, it is concluded that a Stage 2 Appropriate Assessment is required to robustly assess whether the integrity of these sites may be adversely affected, with full consideration of their conservation objectives.”

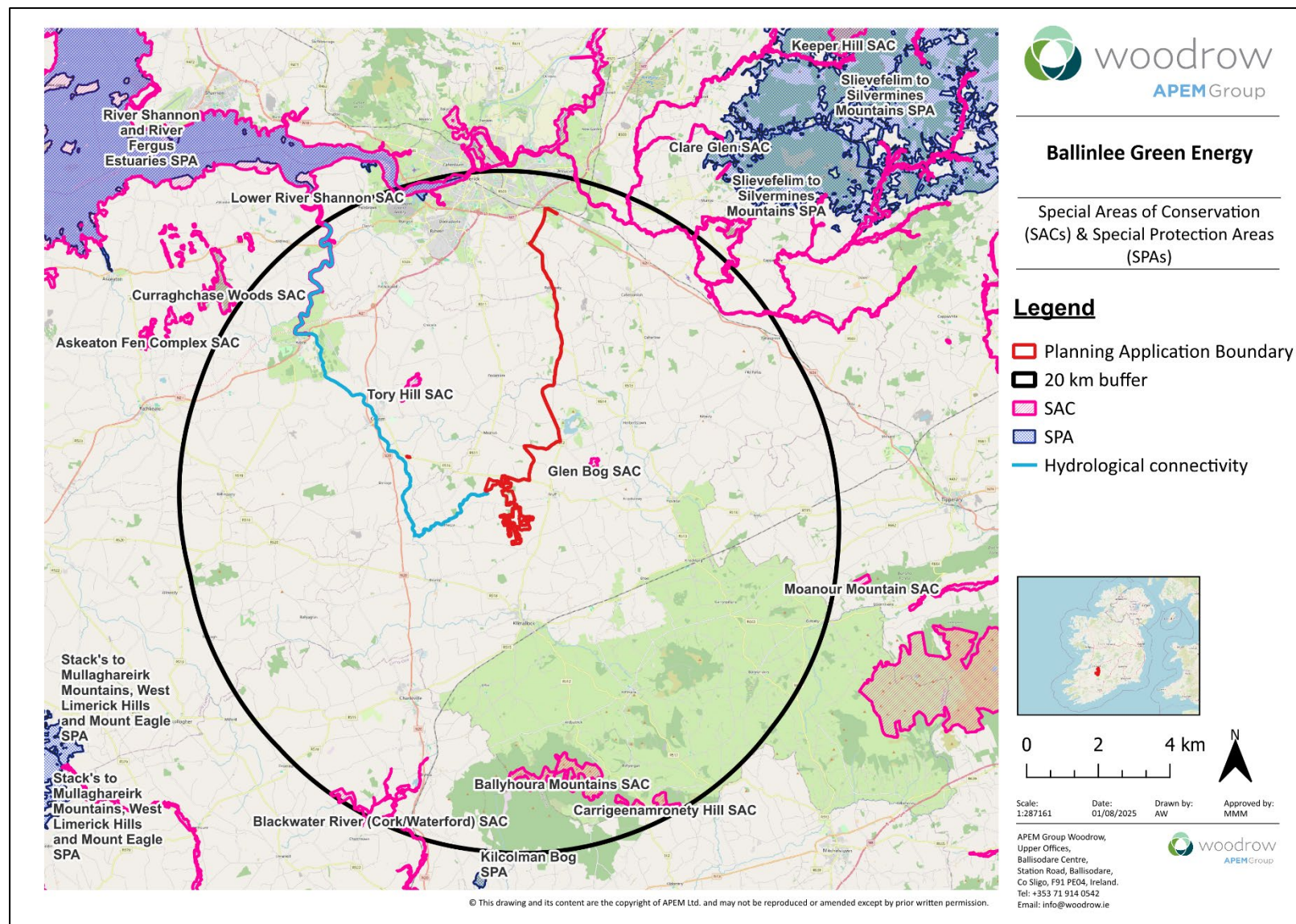


Figure 4: Location of the proposed Development in relation to European Sites, with hydrological connectivity also depicted

5. IDENTIFICATION OF POTENTIAL IMPACTS

As identified in the AA screening, potential water quality impacts from the Proposed Development may arise from airborne dust, sediment, hydrocarbons, and contaminated runoff (including HDD drilling fluid) entering watercourses connected to the Shannon Estuary (i.e. Morningstar River, River Maigue), as well as the groundwater environment. Although estuarine habitats are located c. 24.2 rkm downstream, in the absence of mitigation, deposition and subsequent resuspension of sediments arising from the Proposed Development could contribute to the overall sediment and nutrient load. While such effects are considered unlikely, they could nevertheless have potential implications for water quality and habitat conditions within the estuary.

Similarly, otter were screened in for further assessment due to potential ecological connectivity, owing to their purported large home range¹², and the potential for temporary reduction in habitat availability within the Planning Application Boundary. However, given the extent of intervening river corridor, as well as the availability of suitable habitat elsewhere, it is considered unlikely that the otter population associated with the Proposed Development site is functionally connected to that of the SAC.

Given the weak hydrological connection between the proposed Wind Farm and the identified European Sites, and as all works along the GCR will occur within the existing road network, significant impacts are only expected in the event of an extreme pollution event or substantial sediment release.

¹² Ó Néill, L., Veldhuizen, T., de Jongh, A. & Rochford, J. (2009). Ranging behaviour and socio-biology of Eurasian otters (*Lutra lutra*) on lowland mesotrophic river systems. *European Journal of Wildlife Research*, 55: 363-370.

Table 1 below summarises the Proposed Development's potential impacts, the QIs and SCIs of affected European Sites, and the phase(s) during which they may occur.

Other potential impacts included, elevated levels of noise, airborne particles, and ground disturbance associated with excavation, rock blasting, drilling, or similar groundworks; artificial lighting; and heightened levels of human activity and site traffic during the construction phase. Given the distance between the Proposed Development and the identified European sites, these impacts, even using the precautionary principal, are beyond the ZoI as shown below.

- Airborne particles - sensitive ecological receptors (European sites), sensitivity to dust is 'High' up to 20 m from the source and reduces to 'Medium' over 50 m from the source and to 'Low' over 100 m from the source (Holman et al. 2014 and CIEEM 2021);
- Noise, human presence and ground works - Generally, birds can experience disturbance impacts if disturbance incident occurs within 500m of foraging, nesting, or roosting areas (Holloway 1997; Maarten & Henkensj 1997; Scarton 2018).
- Artificial light - As light will be restricted to the Proposed Development site and no QI/SCI species have been identified using the Site, there will be no direct or indirect impacts from light used as part of the Proposed Development.

Giant rhubarb *Gunnera manicata* and Japanese knotweed *Reynoutria japonica*, both listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011, as amended), were recorded during ecological surveys within the Study Area (refer to accompanying AA screening report).

Four stands of giant rhubarb were recorded in the northern section of the Study Area, all occurring along the banks of the Morningstar River.

Japanese knotweed was recorded in the southern section of the Study Area, with two large stands present adjacent to agricultural sheds approximately 50 m from a proposed access track. These stands were cut between when they were first recorded, in August 2023, and when field surveyors were present again in December 2023. During the update survey in July 2025, new growth had been detected within the existing farm access track adjacent to the stand of Japanese knotweed.

Two riparian invasive alien plant species (IAS) were recorded along the GCR route during field surveys. Japanese knotweed and winter heliotrope were recorded primarily alongside roadside verges. Both of these species can be found and spread along the riparian zone of watercourses. There is risk of spreading invasive plant species during the construction of the underground cabling if works involving heavy machinery take place directly adjacent to areas where these were recorded along the route.

Table 1: Potential impacts arising from the Proposed Development in the context of European Sites

European Site (Site Code)	QIs/SCIs for which LSE Identified	Potential Impact(s)	Development Phase
Lower River Shannon SAC (0026165)	- Estuaries [1130] - Mudflats and sandflats not covered by seawater at low tide [1140] - Coastal lagoons [1150] - Reefs [1170] - Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] - Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] <i>Salicornia</i> and other annuals colonising mud and sand [1310] - Water courses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i> vegetation [3260] <i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra planeri</i> (Brook Lamprey) [1096] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Salmo salar</i> (Atlantic Salmon) [1106] <i>Tursiops truncatus</i> (Common Bottlenose Dolphin) [1349] <i>Lutra lutra</i> (Otter) [1355]	- Pollution events (incl. hydrocarbon spills) - Reduction in water quality (incl. nutrient enrichment) - Sedimentation and elevated levels of suspended solids. - Spread of invasive alien species	Construction & Decommissioning. Pollution events may also occur during Operation.
River Shannon and River Fergus Estuaries SPA (004077)	- Cormorant (<i>Phalacrocorax carbo</i>) [A017] - Whooper Swan (<i>Cygnus cygnus</i>) [A038] - Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] - Shelduck (<i>Tadorna tadorna</i>) [A048] - Wigeon (<i>Anas penelope</i>) [A050] - Teal (<i>Anas crecca</i>) [A052] - Pintail (<i>Anas acuta</i>) [A054] - Shoveler (<i>Anas clypeata</i>) [A056] - Scaup (<i>Aythya marila</i>) [A062] - Ringed Plover (<i>Charadrius hiaticula</i>) [A137] - Golden Plover (<i>Pluvialis apricaria</i>) [A140] - Grey Plover (<i>Pluvialis squatarola</i>) [A141] - Lapwing (<i>Vanellus vanellus</i>) [A142] - Knot (<i>Calidris canutus</i>) [A143]	- Pollution events (incl. hydrocarbon spills) - Sedimentation - Indirect loss of foraging and/or roosting habitat - Spread of invasive alien species	Construction & Decommissioning. Pollution events may also occur during Operation.

European Site (Site Code)	QIs/SCIs for which LSE Identified	Potential Impact(s)	Development Phase
	- Dunlin (<i>Calidris alpina</i>) [A149] - Black-tailed Godwit (<i>Limosa limosa</i>) [A156] - Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] - Curlew (<i>Numenius arquata</i>) [A160] - Redshank (<i>Tringa totanus</i>) [A162] - Greenshank (<i>Tringa nebularia</i>) [A164] - Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] - Wetland and Waterbirds [A999]		

6. APPROPRIATE ASSESSMENT (ALONE)

Where potential for LSE on a European Site has been identified, there is a requirement to consider whether those effects will undermine the integrity of the European Site in view of its conservation objectives. The information for the European Sites screened in, namely the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, is presented below, followed by a detailed assessment of the potential effects on relevant QIs/SCIs, (see

Table 1) and their conservation objectives.

6.1. Lower River Shannon SAC

6.1.1. Qualifying Interests of Lower River Shannon SAC

The proximity between the Lower River Shannon SAC and the Proposed Development, given the GCR to the north, is c. 5.3 rkm at its nearest point. Based on the hydrological connectivity and the functional requirements of the QIs for which it has been designated, this site was screened in due to the potential for the Proposed Development to compromise the conservation objectives of the site's QIs, primarily as a result of water quality impacts.

However, given that the connection between the proposed Wind Farm and this site is weak (located c. 24.2 rkm downstream), and as all works along the GCR will occur within the existing road network, significant water quality impacts are only expected in the event of an extreme pollution event.

Nonetheless, the following QIs have been screened in for further assessment:

- Estuaries [1130]
- Mudflats and sandflats not covered by seawater at low tide [1140]
- Coastal lagoons* [1150]
- Reefs [1170]
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) [1330]
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
- *Salicornia* and other annuals colonising mud and sand [1310]
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260]
- *Petromyzon marinus* (Sea Lamprey) [1095]
- *Lampetra planeri* (Brook Lamprey) [1096]
- *Lampetra fluviatilis* (River Lamprey) [1099]
- *Salmo salar* (Atlantic Salmon) [1106]
- *Tursiops truncatus* (Common Bottlenose Dolphin) [1349]
- *Lutra lutra* (Otter) [1355]

6.1.2. Conservation Objectives of Qualifying Interests (QIs)

6.1.2.1. Estuaries [1130]

The conservation objectives to maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat area – The permanent habitat area is stable or increasing, subject to natural processes
- Community distribution – Conserve the following community types in a natural condition:
 - Intertidal sand to mixed sediment with polychaetes, molluscs, and crustaceans community complex
 - Estuarine subtidal muddy sand to mixed sediment with gammarids community complex
 - Subtidal sand to mixed sediment with *Nucula nucleus* community complex
 - Subtidal sand to mixed sediment with *Nephtys* spp. community complex
 - Fucoid-dominated intertidal reef community complex
 - Faunal turf-dominated subtidal reef community
 - Anemone-dominated subtidal reef community

6.1.2.2. Mudflats and sandflats not covered by seawater at low tide [1140]

The conservation objectives to maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat area – The permanent habitat area is stable or increasing, subject to natural processes
- Community distribution – Conserve the following community types in a natural condition:
 - Intertidal sand with *Scolecopsis squamata* and *Pontocrates* spp. community
 - Intertidal sand to mixed sediment with polychaetes, molluscs, and crustaceans community complex

6.1.2.3. Coastal lagoons [1150]

The conservation objectives to restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat area – Area stable or increasing, subject to natural processes
- Habitat distribution – No decline, subject to natural processes
- Salinity regime – Median annual salinity and temporal variation within natural ranges
- Hydrological regime – Annual water level fluctuations and minima within natural ranges
- Barrier connectivity between lagoon and sea – Maintain appropriate hydrological connections between lagoons and the sea, including appropriate management where necessary
- Water quality: chlorophyll a – Annual median chlorophyll a within natural ranges and less than 5 µg/L
- Water quality: Molybdate Reactive Phosphorus (MRP) – Annual median MRP within natural ranges and less than 0.1mg/L
- Water quality: Dissolved Inorganic Nitrogen (DIN) – Annual median DIN within natural ranges and less than 0.15mg/L
- Depth of macrophyte colonisation – Macrophyte colonisation to the maximum depth of lagoons

- Typical plant species – Maintain number and extent of listed lagoonal specialists, subject to natural variation
- Typical animal species – Maintain listed lagoon specialists, subject to natural variation
- Negative indicator species – Negative indicator species absent or under control

6.1.2.4. Reefs [1170]

The conservation objectives to maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat distribution – No decline, subject to natural processes
- Habitat area – Area stable, subject to natural processes
- Community distribution – Conserve the following reef community types in a natural condition:
 - Fucoid-dominated intertidal reef community complex
 - Mixed subtidal reef community complex
 - Faunal turf-dominated subtidal reef community
 - Anemone-dominated subtidal reef community
 - *Laminaria*-dominated community complex

6.1.2.5. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]

The conservation objectives to restore the favourable conservation condition of Atlantic salt meadows in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat area – Area stable or increasing, subject to natural processes, including erosion and succession
- Habitat distribution – No decline or change in habitat distribution, subject to natural processes
- Physical structure: sediment supply – Maintain natural circulation of sediments and organic matter, without any physical obstructions
- Physical structure: creeks and pans – Maintain creek and pan structure, subject to natural processes, including erosion and succession
- Physical structure: flooding regime – Maintain natural tidal regime
- Vegetation structure: zonation – Maintain the range of coastal habitats, including transitional zones, subject to natural processes such as erosion and succession
- Vegetation structure: vegetation height – Maintain structural variation within the sward
- Vegetation structure: vegetation cover – Maintain more than 90% of the saltmarsh area as vegetated
- Vegetation composition: typical species and sub-communities – Maintain range of sub-communities with typical species as listed in the Saltmarsh Monitoring Project
- Vegetation structure: negative indicator species - *Spartina anglica* – No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%

6.1.2.6. Mediterranean salt meadows (*Juncetalia maritimi*) [1410]

The conservation objectives to restore the favourable conservation condition of Mediterranean salt meadows in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat area – Area increasing, subject to natural processes, including erosion and succession

- Habitat distribution – No decline or change in habitat distribution, subject to natural processes
- Physical structure: sediment supply – Maintain natural circulation of sediments and organic matter, without any physical obstructions
- Physical structure: creeks and pans – Maintain or restore creek and pan structure, subject to natural processes, including erosion and succession
- Physical structure: flooding regime – Maintain natural tidal regime
- Vegetation structure: zonation – Maintain the range of coastal habitats, including transitional zones, subject to natural processes such as erosion and succession
- Vegetation structure: vegetation height – Maintain structural variation within sward
- Vegetation structure: vegetation cover – Maintain more than 90% of area outside creeks vegetated
- Vegetation composition: typical species – Maintain range of sub-communities with typical species listed in the Saltmarsh Monitoring Project
- Vegetation structure: negative indicator species - *Spartina anglica* – No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%

6.1.2.7. *Salicornia* and other annuals colonising mud and sand [1310]

The conservation objectives to restore the favourable conservation condition of *Salicornia* and other annuals colonising mud and sand in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat area – Area stable or increasing, subject to natural processes, including erosion and succession
- Habitat distribution – No decline or change in habitat distribution, subject to natural processes
- Physical structure: sediment supply – Maintain natural circulation of sediments and organic matter, without any physical obstructions
- Physical structure: creeks and pans – Maintain or restore creek and pan structure, subject to natural processes, including erosion and succession
- Physical structure: flooding regime – Maintain natural tidal regime
- Vegetation structure: zonation – Maintain the range of coastal habitats, including transitional zones, subject to natural processes such as erosion and succession
- Vegetation structure: vegetation height – Maintain structural variation within sward
- Vegetation structure: vegetation cover – Maintain more than 90% of area outside creeks vegetated
- Vegetation composition: typical species and sub-communities – Maintain the presence of species-poor communities with typical species listed in the Saltmarsh Monitoring Project
- Vegetation structure: negative indicator species - *Spartina anglica* – No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%

6.1.2.8. Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation

The conservation objectives to maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation in the Lower River Shannon SAC are defined by the following attributes and targets:

- Habitat area – Area stable or increasing, subject to natural processes
- Habitat distribution – No decline, subject to natural processes
- Hydrological regime: river flow – Maintain appropriate hydrological regimes
- Hydrological regime: tidal influence – Maintain natural tidal regime
- Hydrological regime: freshwater seepages – Maintain appropriate freshwater seepage regimes
- Substratum composition: particle size range – The substratum should be dominated by the particle size ranges appropriate to the habitat sub-type (frequently sands, gravels, and cobbles)
- Water quality: nutrients – The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition
- Vegetation composition: typical species – Maintain typical species of the relevant habitat sub-type in good condition
- Floodplain connectivity – Maintain the area of active floodplain at and upstream of the habitat
- Riparian habitat – Maintain the area of riparian woodland at and upstream of the bryophyte-rich sub-type

6.1.2.9. *Petromyzon marinus* (Sea Lamprey) [1095]

The conservation objectives to restore the favourable conservation condition of sea lamprey (*Petromyzon marinus*) in the Lower River Shannon SAC are defined by the following attributes and targets:

- Distribution: extent of anadromy – Greater than 75% of main stem length of rivers accessible from estuary
- Population structure of juveniles – At least three age/size groups present
- Juvenile density in fine sediment – Juvenile density at least 1/m²
- Extent and distribution of spawning habitat – No decline in extent and distribution of spawning beds
- Availability of juvenile habitat – More than 50% of sample sites positive

6.1.2.10. *Lampetra planeri* (Brook Lamprey) [1096]

The conservation objectives to maintain the favourable conservation condition of brook lamprey (*Lampetra planeri*) in the Lower River Shannon SAC are defined by the following attributes and targets:

- Distribution – Access to all water courses down to first-order streams
- Population structure of juveniles – At least three age/size groups of brook/river lamprey present
- Juvenile density in fine sediment – Mean catchment juvenile density of brook/river lamprey at least 2/m²
- Extent and distribution of spawning habitat – No decline in extent and distribution of spawning beds
- Availability of juvenile habitat – More than 50% of sample sites positive

6.1.2.11. *Lampetra fluviatilis* (River lamprey) [1099]

The conservation objectives to maintain the favourable conservation condition of river lamprey (*Lampetra fluviatilis*) in the Lower River Shannon SAC are defined by the following attributes and targets:

- Distribution – Access to all water courses down to first-order streams
- Population structure of juveniles – At least three age/size groups of river/brook lamprey present
- Juvenile density in fine sediment – Mean catchment juvenile density of river/brook lamprey at least 2/m²
- Extent and distribution of spawning habitat – No decline in extent and distribution of spawning beds
- Availability of juvenile habitat – More than 50% of sample sites positive

6.1.2.12. *Salmo salar* (Atlantic Salmon) [1106]

The conservation objectives to maintain the favourable conservation condition of Atlantic salmon in the Lower River Shannon SAC are defined by the following attributes and targets:

- Distribution: extent of anadromy – 100% of river channels down to second-order accessible from estuary
- Adult spawning fish – Conservation Limit (CL) for each system consistently exceeded
- Salmon fry abundance – Maintain or exceed 0+ fry mean catchment-wide abundance threshold value (currently set at 17 salmon fry/5 min sampling)
- Out-migrating smolt abundance – No significant decline
- Number and distribution of redds – No decline in number and distribution of spawning redds due to anthropogenic causes
- Water quality – At least Q4 at all sites sampled by EPA

6.1.2.13. *Tursiops truncatus* (Common Bottlenose Dolphin) [1349]

The conservation objectives to maintain the favourable conservation condition of bottlenose dolphin in the Lower River Shannon SAC are defined by the following attributes and targets:

- Access to suitable habitat – Species range within the site should not be restricted by artificial barriers to site use
- Habitat use: critical areas – Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition
- Disturbance – Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site

6.1.2.14. *Lutra lutra* (Otter) [1355]

The conservation objectives to restore the favourable conservation condition of otter in the Lower River Shannon SAC are defined by the following attributes and targets:

- Distribution – No significant decline in percentage of positive survey sites
- Extent of terrestrial habitat – No significant decline; currently mapped at 596.8 ha above high water mark (HWM) and 958.9 ha along riverbanks/around ponds
- Extent of marine habitat – No significant decline; currently mapped at 4,461.6 ha
- Extent of freshwater (river) habitat – No significant decline; currently mapped at 500.1 km
- Extent of freshwater (lake/lagoon) habitat – No significant decline; currently mapped at 125.6 ha
- Couching sites and holts – No significant decline
- Fish biomass available – No significant decline

- Barriers to connectivity – No significant increase

6.1.3. Assessment of Effects

6.1.3.1. Estuarine Habitats and Species

The freshwater reaches of the River Maigue transition to estuarine waters at the High-Water Mark (HWM) near Adare, at the boundary of the SAC c. 24.2 km downstream of the proposed Wind Farm site. The River Groody, which runs c. 190 m adjacent to where the GCR terminates, discharges into the River Shannon c. 5.3 rkm downstream of this location, before reaching the HWM at Limerick Dock, c. 8.2 km downstream of the River Groody confluence.

Based on the most recent Water Framework Directive (2000/60/EC) (WFD) monitoring cycle (2016–2021) for transitional waters, both Limerick Dock and the Upper Shannon Estuary are at “Poor” ecological status, while the Fergus and Maigue estuaries are at “Moderate” status. All four are classified as being ‘at risk’ of not meeting their environmental objectives. Thus, while the hydrological connection between the proposed Wind Farm and the Lower River Shannon SAC is distant, and the GCR runs along existing infrastructure with minimal construction works required, there remains a low risk of water quality impacts exacerbating the condition of the Shannon Estuary, thereby further affecting the QIs for which it has been designated.

In the absence of mitigation, potential water quality impacts in the estuary could include increases in suspended sediment, associated nutrient enrichment as well as hydrocarbon contamination. While erosion and accretion processes are fundamental to the functioning of estuarine systems, large volumes of sediment entering and moving about in the system, may alter the natural dynamism of the estuary. The loss of sediment from the Proposed Development could lead to increases in sediment deposition within the estuary, creating conditions that promote the colonisation and spread of negative indicator species such as common cordgrass (*Spartina anglica*) and common reed (*Phragmites australis*). Additionally, nutrient influxes, particularly from Phosphorus (P) bound to finer soil fractions (especially from agricultural land), may further alter plant community dynamics by promoting the dominance of hardier species. However, given the weak hydrological connection downstream (c. 24.2 rkm), the likelihood of such effects manifesting is considered low.

Similarly, while significant effects are considered unlikely, in an extreme and uncontrolled event, a credible pathway could exist whereby nutrient-enriched runoff from the Proposed Development may indirectly alter saltmarsh and mudflat habitats in the estuary. This could occur through the promotion of macroalgal growth, leading to shifts in vegetation structure, potentially affecting key invertebrate communities associated with the QIs of the Lower River Shannon SAC.

In the event of an extreme and uncontrolled release, a hydrocarbon spill at the Proposed Development (e.g. oil or fuel) could reach the estuary *via* the connecting watercourses and persist in estuarine waters and sediments at acutely or chronically toxic levels¹³. While benthic communities are generally resilient to short-term exposure, prolonged Polycyclic Aromatic Hydrocarbon (PAH) presence may cause sub-lethal or lethal effects in estuarine invertebrates, reducing abundances and altering community structure. Bottlenose dolphin, screened in as a QI, are unlikely to experience significant

¹³ Matthiessen, P. & Law, R.J. (2002). Contaminants and their effects on estuarine and coastal organisms in the United Kingdom in the late twentieth century. *Environmental Pollution*, 120: 739-757.

effects due to their wide habitat range; however, indirect impacts could include reduced prey availability and potential sub-lethal effects *via* biomagnification.

6.1.3.2. Freshwater Habitats and Species

As outlined in the AA Screening (APEM Group Woodrow, 2025), the landholdings in which the proposed Wind Farm is located, contains an extensive drainage network that channels much of the surface runoff into a series of 1st and 2nd order streams. These streams ultimately discharge into the Morningstar River (EPA Code: IE_SH_24M020800), which flows east to west across the northern section of the proposed Wind Farm site and constitutes part of the wider River Maigue network (EPA Code: IE_SH_24M010500), which drains into the Maigue sub-estuary north of Adare.

The site visits (completed in 2022) show that the majority of streams draining the proposed Wind Farm are slow, low gradient streams dominated by pool or glide habitat. Based on macroinvertebrate assemblages, the EPA scheme and WFD intercalibration, “Poor” ecological conditions were recorded at all locations apart from two sites on the Morningstar River, which scored “Moderate”.

This broadly conforms with the latest EPA Q-value assessments completed as part of WFD monitoring (2023), which classify the Morningstar River as “Moderate” upstream of the proposed Wind Farm (Station Code: RS24M020600) and “Good” downstream near its confluence with the Maigue River (Station Code: RS24M020800). The remaining Maigue River network downstream to the HWM near Adare is also rated “Moderate”. Additionally, Inland Fisheries Ireland (IFI) data (2008–2021) from 2016 assigns “Moderate” status to the section of river upstream of Adare, based on the presence of six fish species, including salmon and lamprey spp. (albeit in low densities), which are QIs of the Lower River Shannon SAC.

Salmon and lamprey spp. (unidentified) were also recorded during the electrofishing surveys completed in 2022, but only at one site, upstream of the Planning Application Boundary, where juvenile salmon were the most frequently recorded species. Suitable salmon spawning and nursery habitat within or near the proposed Wind Farm is limited, with some likely mixed juvenile (fry/parr) habitat observed upstream on the Morningstar River.

Similar to the Shannon Estuary, potential water quality impacts in the freshwater reaches upstream of the HWM at the Lower River Shannon SAC boundary, include increased suspended solids, sedimentation, nutrient enrichment (from nutrients bound to soils), overall water quality deterioration (e.g. reduced dissolved oxygen levels), and hydrocarbon contamination of water and sediment. In addition to indirect effects arising from potential water quality impacts and given the recorded use of the Morningstar River by otter, construction activities, particularly at watercourse crossings, could temporarily reduce the availability of riparian habitat for otter in the immediate vicinity of the Planning Application Boundary. However, despite their capacity to occupy large home ranges, the extent of intervening river corridor between the Wind Farm site and the Lower River Shannon SAC reduce the likelihood of functional connectivity between the local otter population and that associated with the SAC.

The full distribution of watercourses of plain to montane levels with *Ranunculus fluitans* and *Callitriche-Batrachion* within this SAC is not well documented. However, the habitat’s selection was based on the presence of characteristic species such as *Ranunculus* (Batrachian species), *Potamogeton* spp., and *Fontinalis antipyretica*. Of the three sub-types recorded in the Lower River Shannon SAC, *Groenlandia densa* and *Schoenoplectus triqueter* are associated with tidal reaches. A significant

pollution event could introduce excessive levels of sediment and associated nutrients, particularly phosphorus (P), promoting algal growth and more tolerant macrophytes, ultimately reducing habitat area, altering vegetation composition, and diminishing habitat range. Furthermore, habitat quality could be negatively impacted by the spread of invasive plant species, such as Japanese knotweed and giant rhubarb, which were recorded within the Planning Application Boundary during site visits.

Sea, brook and river brook lamprey have distinct yet overlapping ecological requirements, particularly regarding water quality. Adults rely on clean, well-oxygenated waters for migration and spawning, with sea and river lamprey requiring unobstructed passage to access suitable upstream habitats. Severe pollution in the lower reaches of rivers, can prevent upstream migration, kill downstream migrants, and eliminate entire populations of river lamprey, despite good water quality further upstream¹⁴. Spawning redds require clean, well-aerated gravels, which could be compromised by excessive fine sediment deposition. Ammocoetes, the larval stage of all three species, inhabit silty, organic-rich deposits in river margins, where oxygen tension is a critical factor. While nutrient enrichment from P-laden soils may promote algal blooms and deplete dissolved oxygen levels, larval lamprey can demonstrate some resilience by burrowing deeper into sediment to avoid localised hypoxic conditions. However, long-term deterioration in water quality could reduce the extent and quality of their burrowing habitat, ultimately affecting recruitment and population viability within the Lower River Shannon SAC.

Similarly, salmon require very high levels of water quality in order to complete their life cycles (at least Q4 under the EPA Q-value assessment scheme). High levels of suspended solid concentrations in waterbodies can affect the feeding and health of individual species through increased turbidity (inhibiting respiration through gills) and increased siltation affecting the composition of riverbed substrate (reducing fry survival and hence abundance) and affecting spawning redds following sedimentation. Suspended solids often hold nutrients (e.g. P) that can result in eutrophication and reduced dissolved oxygen levels (with high dissolved oxygen levels being important for all life stages of salmonids). Habitat availability and quality are intrinsically linked with the survival rates of juvenile salmon. Therefore, small amounts of debris entering a section of river important for vulnerable life stages of salmon can have deleterious effects, even in the short-term, particularly on the survival of juveniles.

Juvenile salmon and lamprey spp. were recorded in watercourses within the ZOI, including the Morningstar and Camoge Rivers (see Section 4.1 of AA Screening – APEM Group Woodrow, 2025). Suitable habitat was present for mixed juvenile salmonids (fry/parr), but there was limited suitability for spawning or for holding adults within the sites assessed and in the immediate vicinity of the Planning Application Boundary. Tributaries generally exhibited degraded conditions, with elevated nutrients and low dissolved oxygen. These surveys confirm the presence of salmonids and lamprey, particularly juveniles. Any further deterioration of these river sections would adversely affect juvenile survival, given that they are already impacted.

While no holts or resting places were observed within the riparian areas of the Planning Application Boundary during the site visits, frequent otter activity was observed along the Morningstar River. An Irish telemetry study (Ó Néill *et al.*, 2009) found that while female otter typically had a home range of 7.5 km $\pm$ 1.5 km SD, males can range up to 19.3 km, particularly following the death of a conspecific.

¹⁴ Maitland, P.S. (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

Although it is unlikely that the SAC population extends as far as the proposed Wind Farm (given a hydrological distance of c. 24.2 rkm), and alternative habitat is available in the surrounding area, soil sealing or riparian habitat loss could reduce available territory, while construction works may hinder habitat connectivity. More critically, indirect impacts such as a fish kill following an extreme pollution event could have a deleterious effect on otter by reducing fish biomass and overall prey availability. PAHs that persist in water and sediment at toxic levels, may biomagnify through the food web, potentially leading to sub-lethal effects in otter, similar to those described for bottlenose dolphin.

To mitigate these risks, comprehensive mitigation measures will be implemented throughout all phases of the Proposed Development. As outlined in **Section 6.3**, these measures will prevent emissions to surface waters and estuarine habitats while also ensuring no obstruction or loss of potential otter habitat. Specific safeguards will be in place during construction, operation, and decommissioning to minimise impacts. With these mitigation measures in place, the Proposed Development is not expected to result in adverse effects on any QI of the Lower River Shannon SAC.

6.2. River Shannon and River Fergus Estuaries SPA

6.2.1. Special Conservation Interests of River Shannon and River Fergus Estuaries SPA

The River Shannon and River Fergus Estuaries SPA is located c. 36.9 rkm downstream of the proposed Wind Farm and c. 12.6 rkm downstream of the GCR at its nearest point (i.e. near the point of termination at Killonan substation). This site was screened in, taking account of the potential effects of the Proposed Development on SCIs associated with this SPA, particularly feeding and roosting grounds.

As with the Lower River Shannon SAC, the hydrological connection between the proposed Wind Farm and the SPA is weak, and with all works along the GCR option confined to the existing road network, significant water quality impacts are only anticipated in the event of an extreme pollution event.

Nonetheless, the following SCIs have been screened in for further assessment:

- Cormorant (*Phalacrocorax carbo*) [A017]
- Whooper Swan (*Cygnus cygnus*) [A038]
- Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]
- Shelduck (*Tadorna tadorna*) [A048]
- Wigeon (*Anas penelope*) [A050]
- Teal (*Anas crecca*) [A052]
- Pintail (*Anas acuta*) [A054]
- Shoveler (*Anas clypeata*) [A056]
- Scaup (*Aythya marila*) [A062]
- Ringed Plover (*Charadrius hiaticula*) [A137]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Grey Plover (*Pluvialis squatarola*) [A141]
- Lapwing (*Vanellus vanellus*) [A142]
- Knot (*Calidris canutus*) [A143]
- Dunlin (*Calidris alpina*) [A149]
- Black-tailed Godwit (*Limosa limosa*) [A156]

- Bar-tailed Godwit (*Limosa lapponica*) [A157]
- Curlew (*Numenius arquata*) [A160]
- Redshank (*Tringa totanus*) [A162]
- Greenshank (*Tringa nebularia*) [A164]
- Black-headed Gull (*Chroicocephalus ridibundus*) [A179]
- Wetland and Waterbirds [A999]

6.2.2. Conservation Objectives of Special Conservation Interests

6.2.2.1. Cormorant (*Phalacrocorax carbo*) [A017]

The conservation objectives to maintain the favourable conservation condition of cormorant in the River Shannon and River Fergus Estuaries SPA are defined by the following attributes and targets:

- Breeding population abundance: apparently occupied nests (AONs) – No significant decline
- Productivity rate – No significant decline
- Distribution of breeding colonies – No significant decline in number, location, or area of colonies
- Prey biomass available – No significant decline in key prey items (fish and crustaceans)
- Barriers to connectivity – No significant increase in structures or activities that could restrict movement
- Disturbance at the breeding site – Human activities should not adversely affect the breeding population
- Population trend (non-breeding season) – Long-term population trend should remain stable or increase
- Distribution (non-breeding season) – No significant decrease in range, timing, or intensity of use of areas, except from natural variation

6.2.2.2. Remaining Special Conservation Interests

The conservation objectives to maintain the favourable conservation condition of all remaining SCIs in the River Shannon and River Fergus Estuaries SPA are defined by the following attributes and targets:

- Population trend – Long-term population trend should remain stable or increase
- Distribution – No significant decrease in range, timing, or intensity of use of areas, except from natural variation

6.2.3. Assessment of Effects

Potential effects on the SCIs of the River Shannon and River Fergus Estuaries SPA are expected to be indirect, primarily linked to water quality impacts within the estuaries. These impacts could alter foraging and roosting ranges by affecting prey abundance (e.g. benthic invertebrates) and habitat extent or quality. While some SCIs have been recorded within the Planning Application Boundary and its surroundings, the Proposed Development lies outside any reported core or maximum foraging ranges for these species (SNH, 2016)¹⁵. Therefore, there will be no direct effects on SPA-linked SCIs.

¹⁵ SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs) – Guidance, version 3. NatureScot (formerly Scottish Natural Heritage).

I-WeBS mean core count data (2016/17–2020/21)¹⁶ indicate continued use of the European Site by many SCIs in decent numbers, particularly dunlin (*Calidris alpina*) (>1% of the national population), curlew (*Numenius arquata*), wigeon (*Mareca penelope*), teal (*Anas crecca*), golden plover (*Pluvialis apricaria*), lapwing (*Vanellus vanellus*), redshank (*Tringa totanus*), black-headed gull (*Chroicocephalus ridibundus*), and cormorant (*Phalacrocorax carbo*). However, due to the vast size of the site, survey coverage throughout the life of I-WeBS has been challenging¹⁷, likely leading to an underestimation of actual numbers.

While eelgrass (*Zostera* spp.) is somewhat limited in the Shannon Estuary, it remains an important food resource for wildfowl. Any further reduction in its extent could significantly impact reliant species, particularly light-bellied brent goose (*Branta bernicla hrota*), which according to I-WeBS data, was absent from the site between 2013/14 and 2020/21. Additionally, the spread of common cordgrass in salt meadows may further reduce available habitat for certain species including teal and ringed plover.

The formation of extensive algal mats over intertidal flats (see **Section 6.1.3**) could alter macroinvertebrate communities, which serve as a critical food resource for wintering birds. Excessive algal cover can lead to localised hypoxic conditions, smothering benthic habitats, reducing prey availability, and potentially displacing foraging waders. Furthermore, hydrocarbon contamination from accidental spillages could also reduce invertebrate prey availability. Several waders, such as dunlin, exhibit high site fidelity, meaning any decline in food resources could have knock-on effects on their foraging distribution. Additionally, the ingestion of prey items contaminated with PAHs may promote toxicity to SCI species and give rise to sub-lethal effects.

To mitigate these risks, comprehensive water quality protection measures will be implemented throughout all phases of the Proposed Development. As outlined in **Section 6.3**, these measures will prevent emissions to estuarine habitats, safeguarding the foraging and roosting habitats of SCI bird species within the River Shannon and River Fergus Estuaries SPA. Specific safeguards will be in place during construction, operation, and decommissioning to minimise potential impacts on prey availability and habitat quality. With these mitigation measures in place, the Proposed Development is not expected to result in adverse effects on any SCI of the River Shannon and River Fergus Estuaries SPA.

6.3. Mitigation Measures

Sections 6.1 to 6.2 above details the potential effects associated with the Proposed Development. The following sections outline the measures that will be implemented to mitigate any potential adverse negative effects during the construction, operation and decommissioning phase of the Proposed Development.

6.3.1. Construction Phase Mitigation

6.3.1.1. Measures to Protect Water Quality

¹⁶ I-WeBS Core Count Data. Available at: <https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/> [Accessed March 2025].

¹⁷ Fitzgerald, N., Burke, B. & Lewis, L.J. (2021) Irish Wetland Bird Survey: Results of waterbird monitoring in Ireland in 2016/17 and 2017/18. BirdWatch Ireland, Wicklow.

The following measures will be implemented to ensure the protection of downstream watercourses and hence, QIs of the European Sites that are linked to the Proposed Development *via* hydrological or potential geohydrological pathways. This is particularly pertinent to the Morningstar River, which flows east to west through the proposed Wind Farm, and which will be intersected by a clear span bridge, requiring near-stream works. The measures have been based on the following best practice guidelines to ensure that watercourses are adequately protected during construction work:

- Construction Industry Research and Information Association (CIRIA), (2001). C532 Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors.
- CIRIA, (2005). C650 Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site.
- BPGCS005, Oil Storage Guidelines.
- CIRIA, (2007). C697 The SUDS Manual.
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.
- CIRIA, (2006). C648 Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006).
- CIRIA, (2006). C648 Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006).
- Inland Fisheries Ireland (IFI), (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.
- Fisheries Protection during Proposed Development Works (Foyle and Carlingford areas) Environmental Guidelines Series – No. 1. Loughs Agency.
- NRA (Now TII) (2008). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority, Ireland.

Contractors will be required to implement standard practice construction methods and mitigation measures for near stream works. The following measures are to be read in conjunction with the Construction Environment Management Plan (CEMP) (EIAR **Volume III, 2A**) and Surface Water Management Plan (EIAR **Volume III, 2E**) and measures outlined in EIAR Chapter 9 (Hydrology and Hydrogeology) in the accompanying EIAR:

- A site surface water management system will be constructed on the site to attenuate runoff, guard against soil erosion and safeguard downstream water quality. The drainage system will be implemented along all work areas including all internal site access tracks, storage areas, crane hardstand areas and temporary site construction compounds.
- Prior to construction, interception drains will be installed upslope of the works area to intercept any existing overland flows (clean water) and convey it downslope to limit the extent of surface water coming into contact with the works. The clean water conveyed will be discharged *via* a level spreader downslope of the works over existing vegetation.
- Swales will be installed when required. To effectively reduce velocity and promote sediment settlement, clean gravel check dams will be placed along swales in order to intercept and slow down the flow of water, allowing sediment and suspended solids to settle out before they have a chance to enter the existing drainage network. The spacing, and sizing of the check dams will be designed in such a way as to ensure their effectiveness without causing any unintended issues such as excessive pooling or flooding.
- Prior to the commencement of the construction works, small defined works areas will be fenced off at the location of the culverts / surface water drainage system outfalls (between the main construction site and the watercourses). Silt fences will be attached to these fences. The silt

fence will provide a solid barrier between the proposed works, and the existing surface water drains and tributaries of the Morningstar River. The necessary works (culvert/pipe/headwall) will be undertaken within this defined area.

- Silt traps and fencing will be placed in working areas that have the potential to carry silt-laden material from the working area to aquatic environments.
- Entry to the Morningstar River and its tributaries by vehicles will be avoided, while vehicle usage along the banks will be restricted as much as practicable.
- A suitably qualified Environmental Clerk of Works (ECoW) will be appointed for the duration of the works.
- An ECoW will be present on site to oversee near-stream works to ensure there is no potential for surface water runoff to the receiving waterbodies. The ECoW will undertake regular monitoring of water quality upstream and downstream of the works area to detect any changes and take corrective actions if necessary.
- Information obtained through consultation with IFI will be fully implemented prior to any watercourse crossings to ensure compliance with the Fisheries Acts and Habitat Regulations.
- Strict water quality protection and breakout prevention measures will be implemented during horizontal directional drilling, including bunded containment (using Terram Geotextiles and sandbags) around the bentonite plant, sealed tanks or sumps for fluid returns, immediate spill response protocols, and continuous monitoring of drilling pressures and flow rates to detect and halt any potential breakouts.
- Only non-toxic, biodegradable drilling fluids (e.g. Clear Bore Drilling Fluid or equivalent) will be used. All fluids, lubricants, and waste materials will be securely contained on-site and removed for off-site disposal to prevent any risk of contamination to surrounding soils or watercourses.
- Sand bag dams, silt traps and all equipment preventing the release of sediment, will be routinely inspected and maintained.
- Any new development at watercourse crossings (upgrading/new tracks) will take fish passage into consideration.
- Watercourse crossings will be constructed during low-flow periods, adhering to any working period restrictions imposed.
- All open water bodies adjacent to areas of proposed works, including settlement ponds, will be protected by fencing. A 10 m buffer will be retained for construction works. Site traffic will only be permitted within this buffer to facilitate instream and near-stream works.
- For works occurring within 50 m of a watercourse, weather forecasts will be monitored prior to and during works to avoid working in adverse weather conditions.
- In the event of heavy rainfall, open excavations will be secured, and emergency drainage measures will be implemented to prevent water backup and pollution.
- Deposition areas for spoil will be enclosed with silt fencing to prevent mobilisation of solids during adverse weather conditions and no drainage from these areas will be directed into the temporary drainage systems. A Sustainable Urban Drainage System (SUDS) will be implemented to allow controls to be designed for the retention of large volumes of water that may arise from spoil deposition areas.
- Re-seeding of all areas of bare ground or the placement of jute matting will take place as soon as practicable to prevent runoff

- The amount of time that stripped ground and soil stockpiles are exposed will be minimised, and only the vegetation from the specific area that needs to be exposed will be removed at any work stage.
- Hessian, mulches or tackifiers will be used where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Where dewatering of shallow groundwater is required or where surface water runoff must be pumped from the excavations, water will be managed in accordance with best practice standards.
- There will be no unauthorised discharge of water to ground during the Construction Phase.
- To reduce the volume of cementitious water, washout of concrete trucks will not take place on site. Concrete trucks will be washed out off site at the source quarry.
- To reduce the volume of cementitious water, only concrete truck chutes will be washed down at a designated chute wash down area in the site compound. The wash down area will consist of a polythene lined bunded area with a capacity of approximately 20m³.
- The Environmental Manager will monitor the pH of the water in the chute wash down bund, and ensure water achieves neutrality before discharge.
- Refuelling of machinery will take place in designated areas located at least 10 m away from any watercourse or surface water drain.
- Refuelling operations will be conducted using double-bunded mobile bowzers with a minimum capacity of 110% of the fuel volume. These will be operated by trained personnel equipped with spill containment equipment. Plant nappies or absorbent mats will be placed under refuelling points during all refuelling activities to absorb drips and will also be provided beneath small mobile plant such as generators and pumps.
- All mobile bowzers, tanks, and drums will be stored in secure, impermeable bunded areas located away from surface water features and drainage infrastructure.
- A complete mechanical check of all hoses and fluid reservoirs of machinery will be carried out by a competent member of the construction team before the machinery arrives at the site.
- During the construction phase wastewater on site will be managed by temporary welfare facilities (port-a-loos). The stored effluent will be collected on a regular basis from site by a permitted waste contractor and removed to a licenced waste facility for treatment and disposal.

The contractor will be required to implement the following standard practice construction methods and mitigation measures for HDD operations and frac-out:

- Any groundwater or rainwater that collects in the HDD drilling pit will be pumped away. Then it will be discharged through a filter medium onto the adjacent land, not directly into a waterway. This will avoid the build-up of silt, as some granular material will, inevitably, be pumped out with the water from the pit.
- The contractor and the ECoW will monitor weather conditions and will carry out daily inspections of the mud pit to ensure the volume of the mud pit does not 'overtop' to the surrounding land. Where required, measures such as pumping to secure containment will be used where required to prevent overtopping.

- Any bentonite, which comprises 95% water and 5% bentonite clay which is a non-toxic, natural substance, (or similar HDD drilling head lubrication material) will be handled and removed by the drilling contractor.
- In order to eliminate the migration of drilling fluids through the subsurface to waterbodies the following measures will be employed:
- Drilling pressures will be closely monitored and not exceed those needed to penetrate the formation.
- Exit and entry points for the HDD on land (entry point for landfall HDD is on the seabed) will be enclosed by silt barriers (e.g. straw or silt fence) to prevent any runoff into surface water bodies.
- If pressure drops during drilling or if there is a lack of returns, the drilling will stop immediately to allow an assessment of a potential leakage of drilling fluid into the surrounding formation. A leak stopping compound, such as mica, may be used to prevent the leak from migrating further into the formation. If the leak stopping compound is not successful, the drilling direction may need to change to avoid the area where the leak occurred.

While the bentonite drilling fluid is non-toxic, if sufficient quantity enters a watercourse, it can potentially settle on the bottom, smothering benthic flora and affecting faunal feeding and breeding sites.

In event of managing a breakout or frac-out on land, the following measures will be adopted:

- Stop drilling immediately
- Contain the bentonite by constructing a bund e.g. using sandbags – Recover the bentonite from the bund by pumping to a suitable container or back to the entry pit for recycling
- If necessary, inert and non-toxic lost circulation material (mica) will be pumped into the bore profile, which will swell and plug any fissures
- The area will be monitored closely to determine if the breakout has been sealed and
- Check and monitor mud volumes and pressures as the works recommence

In event of managing a breakout or frac-out under water, the following measures will be adopted:

- Stop drilling immediately
- Pump lost circulation material (mica), which will swell and plug any fissures
- Check and monitor mud volumes and pressures as the works recommence
- Repeat process as necessary until the breakout has been sealed
- Any bentonite will be managed and removed by the specialist drilling contractor on completion of the operation.
- Water will be brought to site in tankers (to make up drilling fluid) for lubrication of the bore and to provide the requisite volumes of water to the compound. The water used will be non-saline and non-potable water.

- On completion of the operation the drill fluid will be disposed of to an appropriately licensed facility.

6.3.1.2. Measures to Protect Otter

The following measures will be implemented to mitigate disturbance to otter during the construction phase. Mitigation measures set out in the previous section (**Section 6.3.1.1**) for protection of water quality will be implemented to negate any effects on otter prey resource. While ecological connectivity with the SAC population is considered unlikely due to the distances involved and the extent of intervening river corridor habitat, mitigation measures are applied on a precautionary basis in the event that such connectivity does occur. In any case, these measures are necessary to protect otter, a species of Community interest listed under Annex II and Annex IV of the EU Habitats Directive, and therefore subject to strict protection:

- A pre-construction otter survey will be completed prior to works beginning on the bridge intersecting the Morningstar River. This will be completed in accordance with TII guidance¹⁸ and will cover a linear distance of 150 m upstream and downstream of the works area, in order to confirm the absence of holts or resting sites.
- Where a holt is found, appropriate exclusion or timing restrictions will be implemented in consultation with NPWS.
- Until such time as otters have been successfully evacuated from active holts, the following provisions should apply to all construction works:
 - No works will be undertaken within 150 m of otter holts with breeding females or cubs.
 - No wheeled or tracked vehicles will be used within 20 m of active, non-breeding otter holts.
 - No light works will be undertaken within 15 m of active, non-breeding holts.
- Artificial lighting associated with construction activities will be of a design that limits light spill beyond the working areas.
- Construction works being largely limited to daylight hours allowing nocturnal animals like otters to forage through the night.
- The 10 m riparian buffer described in **Section 6.3.1.1** also constitutes part of otter habitat (NPWS, 2019)¹⁹. In addition to protecting water quality, it will function as a buffer strip for otter, ensuring habitat connectivity is maintained throughout the Planning Application Boundary.
- Any works involving stream crossings will maintain or improve connectivity upstream and downstream of the works area.
- Where possible, riparian vegetation will be retained or reinstated to provide cover and foraging opportunities post-construction.

6.3.1.3. Measures to Avoid the Spread of Invasive Alien Plant Species

¹⁸ TII (2008) Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. Transport Infrastructure Ireland (formerly National Roads Authority), Ireland.

¹⁹ NPWS (2019). Lutra lutra (1355) Conservation Status Assessment Report. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Available at: <https://www.npws.ie/sites/default/files/general/otter-conservation-status-report.pdf> [Accessed September 2025].

During site visits it was confirmed that both Japanese knotweed and *Gunnera* sp. are present within the Planning Application Boundary, with the latter occurring along the Morningstar River. These are highly invasive plant species and have the potential to spread to other locations *via* construction equipment if specific measures are not taken to avoid this. While specific measures to minimise the spread of these species are outlined in the Species and Habitat Management Plan (SHMP) of the accompanying EIAR, the following general guidelines will be followed:

- The contractor will prepare a method statement, outlining measures to prevent introducing or spreading invasive plant species, including detailed procedures for equipment that may come into contact with watercourses.
- Any machinery, tools, or materials that come into contact with Japanese knotweed-infested areas will undergo thorough wash-down and disinfection at designated locations. Checks will be conducted to ensure no plant fragments remain on vehicles or equipment.
- Excavation and movement of soil near infested areas will be strictly controlled to prevent unintentional spread. Where necessary, infested material will be contained, treated, or disposed of in line with best practice guidance.

6.3.2. Operational Phase Mitigation

6.3.2.1. Measures to Protect Water Quality and Aquatic Receptors (including Otter)

The following measures will be implemented during the operational phase to protect watercourses from water quality impacts, and riparian habitats for otter:

- Surface water will be managed in accordance with the principles and objectives of SuDS to treat and attenuate surface runoff.
- The Surface Water Management Plan implemented during the construction phase of the Proposed Development will be retained and maintained for the operational phase of the Proposed Development.
- Cyclical maintenance of swales and any existing SuDS installed during the construction phase, will include unblocking and removal of silt build-up from settlement features.
- Hard stands and access tracks will be maintained throughout the lifespan of the Wind Farm.
- Permanent welfare facilities will be installed as part of control building / substation facilities. Foul effluent will be collected in a sealed tank with periodic removal by a licensed waste haulier for licensed offsite disposal (i.e. there shall be no emission on the site).
- A minimum riparian setback of 2 m should be maintained along all EPA-registered watercourses, in particular the Morningstar River. This setback will establish a continuous, undisturbed buffer zone of natural vegetation that protects water quality and aquatic ecosystems by intercepting sediment and nutrient runoff from existing land use as well as the Proposed Development. In addition to its water quality function, the riparian margin will provide a secure corridor for otter movement, foraging, and resting.

6.3.3. Decommissioning Phase Mitigation

Mitigation measures, described above for the construction phase (**Section 6.3.1**) and which are relevant to decommissioning, updated to reflect good practice at the time, will be implemented for the decommissioning phase.

6.3.4. Efficacy of Mitigation

The environmental measures set out above are proven to work and provide certainty that the integrity of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA will not be affected by the proposed works. Each mitigation measure has been proposed to reduce the significance of potential impacts identified which could affect QI/SCI of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. The mitigation measures proposed cover the protection of surface water, the reduction of disturbance impacts, and protection of biosecurity, i.e. reducing the potential for significant effects with respect to IAS.

These measures will ensure that suspended solids or other pollutants will not be discharged to surface waters during construction, operation and decommissioning and that there will be no effect on the water quality downstream of the Site. The measures proposed for disturbance ensure no significant impacts relating to disturbance will negatively affect QIs/SCIs of the SAC/SPA. Finally, measures proposed to ensure IAS are not introduced or spread are considered to be sufficient to ensure that no significant impacts arise with respect to IAS.

Table 2: Summary of Mitigation Measures, Responsibilities and Efficacy in Preventing Adverse Effects on European Sites

Effect	Mitigation Measures	Responsibility for Implementation	Efficacy of Mitigation	Adverse effect on integrity of European Sites
Deterioration of Water quality	Surface water management during construction	Developer and Contractor	Established and proven working near watercourse measures	No
	Pollution Prevention	Developer and Contractor	Established and proven working near watercourse measures	No
	Sediment control	Developer and Contractor	Established and proven working near watercourse measures	No
	Water quality monitoring during works	Developer and Contractor	Established and proven working near watercourse measures	No
	HDD	Developer and Contractor	Established and proven working near watercourse measures	No
Disturbance	Pre-construction checks for otter holts and fish habitat	Developer	Established and proven working near watercourse measures	No
	Following best practice for working in streams – timing of works	Developer and Contractor	Established and proven working near watercourse measures	No
IAS	Biosecurity Measures	Developer and Contractor	Established and proven working within terrestrial habitats and near watercourse measures	No
	Management and removal of IAS	Developer and Contractor	Established and proven working within terrestrial habitats and near watercourse measures	No

6.4. Monitoring

6.4.1. Construction Phase Water Quality Monitoring

During the Construction Phase of the Proposed Development the following monitoring measures will be implemented:

- Inspections will be undertaken by the main contractor or appointed delegate during excavations and other groundworks to ensure that measures that are protective of water quality outlined in the EIAR and the CEMP are fully implemented and effective.
- A suitably qualified ECoW will be appointed for the duration of the works. The ECoW will be present on site during near stream works (i.e. bridge crossings) to ensure there is no potential for surface water runoff to the receiving waterbodies. The ECoW will undertake regular monitoring of water quality upstream and downstream of the works area to detect any changes and take corrective actions if necessary.
- The silt fences and settlement ponds will be monitored to ensure that they remain functional throughout construction of the Proposed Development. Where necessary, maintenance will be carried out on the fences and settlement ponds to ensure that they continue to be effective.
- The main contractor in consultation with the ECoW, will provide and implement a monitoring schedule for water quality monitoring throughout the construction phase of the Proposed Development. The frequency of monitoring and the monitoring parameters will be in line with best practice and guidance and will be agreed with Limerick City & County Council (LCCC) prior to commencement of the works. Inspection records and summary reports from site supervision by the ECoW will be made available to LCCC upon request. Should any deviation from the proposed mitigation or exceedance of the agreed quality “trigger” limits be noted, this will be reported to LCCC, and corrective measures will be agreed. Water quality monitoring to include:
 - Baseline sampling will occur at least twice, coinciding with both low flow and high flow stream conditions. The high flow sampling event will take place following sustained rainfall, while the low flow event will take place after a dry period.
 - Regular (monthly) sample analysis will examine relevant parameters and regulatory limits, including Environmental Quality Standards (EQSs). Samples will be taken from each watercourse / land drain draining from the construction site. Daily monitoring of surface water to include Turbidity, pH/EC and colour upstream and downstream of the works areas and where required, at the outlets from settlement ponds. Where water from the settlement ponds fails to meet the required standards, the water will be recirculated to the inlet of the sediment pond to provide further time for settlement. A penstock or similar valve will be provided on the outlet from the sediment pond to control discharge from the site. Works will be ceased until the cause of the difference is identified and (if it is associated with the works) rectified.
- Routine monitoring and inspections will be undertaken by the main contractor or appointed delegate during refuelling, concrete works to ensure no impacts and compliance with avoidance, mitigation and remedial measures.

6.4.2. Operational Phase Water Quality Monitoring

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be undertaken throughout the lifetime of the Proposed Development.

6.5. Conclusion of Appropriate Assessment (Alone)

With these measures in place, as provided in **Section 6.3**, the Proposed Development will have no adverse effect on the integrity of the Lower River Shannon SAC, or the River Shannon and River Fergus Estuaries SPA.

7. APPROPRIATE ASSESSMENT (IN-COMBINATION)

Article 6 of the EU Habitats Directive states that any plan or project that may, either alone or in combination with other plans or projects, significantly affect a European Site should be the subject of an AA. The assessment of in-combination effects is therefore an important part of the assessment process.

Different types of actions can cause cumulative impacts and effects. As such, these types of impacts may be characterised as:

- Additive/incremental – in which multiple activities/projects (each with potentially insignificant effects) add together to contribute to a significant effect due to their proximity in time and space (CIEEM, 2018); and
- Associated/connected – a development activity enables another development activity e.g., phased development as part of separate planning applications. Associated developments may include different aspects of the project which may be authorised under different consent processes. It is important to assess the potential impacts of the ‘project’ as a whole and not ignore impacts that fall under a separate consent process (CIEEM, 2018).

It has been established that any potential effects from the Development related to European Sites is linked to hydrological / geohydrological pathways. Proposals with potential to result in in-combination effects on the European Sites are outlined below in **Table 3**.

While it is understood that in-combination effects can introduce pathways (e.g., air, noise) when the impacts of other projects are combined, due to the distance between the Development and the projects included for assessment of in-combination effects (minimum 3.3 km) below and the ZoI of the impacts of the Development (refer to **Section 5**), there is no potential for other in-combination pathways.

7.1. Associated / Connected Developments

The Proposed Development comprises the GCR, and all major works required along the TDR as integral components. As such, these elements have been assessed as part of the Appropriate Assessment (alone).

The only associated or connected projects with respect to the Proposed Development is the TDR, specifically any works occurring outside the Planning Application Boundary. The proposed TDR follows the R516 from Croom for c. 15 km to the northern boundary of the Wind Farm site, passing mainly through agricultural land. Any works outside the Planning Application Boundary will be minor, involving vegetation trimming and removal along existing roads, with no potential to contribute to effects from the Proposed Development.

As such, no associated or connected effects have been identified as a result of additional or supporting works that facilitate the consent or operation of the Proposed Development.

7.2. Additive / Incremental Effects

The European Sites that could potentially be affected as a result of other projects and plans are the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. The Proposed

Development is considered to lie outside of any reported core or maximum foraging ranges for SCIs of the SPA, and so there are no in-combination effects anticipated in that regard. In-combination effects are only likely to manifest from projects which share hydrological and/or geohydrological connectivity to the European Sites mentioned. As such, in-combination effects are primarily concerned with water quality impacts, namely elevated levels of suspended sediment, subsequent sediment deposition, associated nutrient enrichment as well as hydrocarbon contamination.

Table 3 below provides details of proposals within the vicinity of the Proposed Development. Particular cognisance is given to projects that are either under construction, or are yet to be constructed, and which share connectivity to the European Sites. In addition, projects that have been submitted and are awaiting a decision, as well as any large-scale developments in the area that are currently in the pre-planning stage, are also considered. Particular regard has been given to projects located within close proximity of the River Maigue network, and which are within c. 30 rkm from the boundary of the Lower River Shannon SAC. Areas downstream of the River Groody were also considered, given its connectivity to the SAC and River Shannon and Fergus Estuaries SPA at the northern extent of the Proposed Development.

Existing Wind Farms within 20 km of the Proposed Development are also included given potential in-combination effects that may arise during the operation and decommissioning phases. However, only those located in the Shannon hydrological catchment are considered further.

Apart from single-dwelling developments, there are just three projects that have been finalised along the River Maigue network and within 30 rkm of the Lower River Shannon SAC boundary. These include the construction of five dwellings within an existing housing estate (c. 3.3 rkm upstream of the Proposed Development), a solar farm with an underground cable near the Maigue River, and the demolition of farm buildings, decommissioning of a slurry storage facility, and erection of new farm structures c. 70 m from the Morningstar River (c. 3.7 rkm downstream of the Planning Application Boundary). Additionally, downstream of Killonan 220/110 kV substation, the demolition and replacement of Ballysimon Bridge over the River Groody received conditional planning approval in 2021.

In the context of Wind Farm projects, four proposed / permitted proposals occur within the same hydrological catchment as the current Development, however only two of these involve the construction of a new Wind Farm. The remaining two involve either extension of life or minor modifications to a previously permitted development. A further two, operational wind farms also exist within the catchment however these are relatively small in size, comprising just one and two turbines respectively. Two further Wind-Farm projects are at the pre-planning stage and considered also.

The likelihood of in-combination effects on the Lower River Shannon SAC, as well as the River Shannon and River Fergus Estuaries SPA, is primarily associated with the development of three Wind Farm projects on the northern side of the Shannon Estuary, namely Knockshanvo, Oatfield, and Ballycar, Co. Clare. Additionally, a similarly sized Wind Farm proposal in Garrane, near Bruree, Co. Limerick, which has been recently submitted, is also considered (see **Table 3**). The Knockshanvo and Oatfield proposals are hydrologically connected to the Shannon Estuary *via* the Blackwater (Clare) River (EPA Code: IE_SH_25B060250), while Garrane Wind Farm is connected *via* the Maigue River.

Although these three projects are situated considerable distances from the Shannon Estuary (>10 rkm), the Ballycar proposal is just c. 1.6 rkm upstream of the Lower River Shannon SAC boundary,

connected through a network of small watercourses. Where construction coincides with that of the Proposed Development (Ballinlee Wind Farm) and in the absence of best practice control and mitigation measures, these projects have the potential for in-combination effects on water quality within the estuary.

The likelihood of in-combination effects arising from the construction of Ballysimon Bridge over the River Groody are considered slight, given that virtually all works along the GCR will be confined to existing infrastructure. The AA Screening Report for this project concluded that, as these are upgrade works and any potential contaminants would be degraded or diluted before reaching the SAC, there is no potential for LSE on the QIs/SCIs of the European Sites in question, and these were therefore screened out at Stage 1 AA.

7.3. Conclusion of Appropriate Assessment (In-Combination)

With the full implementation of the mitigation measures outlined in **Section 6.3**, the Proposed Development will not adversely affect the integrity of the European Sites, when considered in isolation. Given the downstream separation between the Proposed Development and the Shannon Estuary, similar distances to other projects within the same catchment, the application of robust mitigation measures for these large-scale projects (including the Wind Farm proposal at Ballycar, Co. Clare), and the potential to stagger construction phases, any potential effect is considered slight and would not occur at a magnitude that could result in a perceptible impact on the two European Sites in question. Therefore, there is no potential for any other plan or project, including strategic development plans (e.g. the Strategic Integrated Framework Plan for the Shannon Estuary), to adversely affect the integrity of these European Sites in combination with the Proposed Development.

Table 3: Projects and plans considered for in-combination assessment

Project (Planning Reference)	Applicant	Brief Description	Location	Distance from the Proposed Development	Granted
Solar Farm System (19455)	Cappamore Kilmallock Area Planner	Construction of 114KWP solar farm system, underground cable, an inventor building and all site works	Garrooe, Bruree House, Bruree, Co. Limerick.	c. 15 rkm upstream of proposed Wind Farm <i>via</i> the River Maigue	2019
Farm Buildings (22457)	Fergal Hanrahan	Demolition of existing buildings and decommissioning of existing slurry storage. Construction of agricultural buildings	Coolboy, Athlacca, Co. Limerick	c. 3.7 rkm downstream of proposed Wind Farm	2022
Dwelling Houses (2360796)	OMC Houses	Construction of 5-dwelling houses, access off existing housing estate	The Grove, Bruff, Co. Limerick	c. 3.3 rkm upstream of proposed Wind Farm	2024
Bridge (218006)	-	Demolition of Ballysimon Bridge over the River Groody, and construction of a new bridge.	Golf Links Road, Ballysimon, Ballysimon (Staunton), Garryglass, Co. Limerick	c. 2 rkm downstream of the GCR <i>via</i> the River Groody	2021
Wind Farm (PC03.319215)	SID FuturEnergy Knockshanvo Designated Activity Company	The proposed development of 9 no. wind turbines, 110kV substation and ancillary development	Knockshanvo and adjacent townlands, Co. Clare	c. 33 km north of proposed Wind Farm	Pre-planning
Wind Farm (PA03.318943)	Ballycar Green Energy Ltd.	Proposed development of 12 no. wind turbines, an electrical substation, met mast, access tracks, borrow pits, deposition area, and grid connection.	Ballycar and adjacent townlands, Co. Clare	c. 26.5 km north of proposed Wind Farm	Submitted 2024

Project (Planning Reference)	Applicant	Brief Description	Location	Distance from the Proposed Development	Granted
Wind Farm (PC03.315239)	Ørsted Onshore Ireland Midco Limited (Ørsted)	Proposed wind farm development consisting of approximately 10 no. wind turbines, 110kV substation, grid connection and site infrastructure.	Oatfield and adjacent townlands, Co. Clare	c. 30 km north of proposed Wind Farm	Pre-planning
Wind Farm (2360016)	John Cleary	Continuing the use of the wind energy development as constructed beyond the time limit specified	Glenaree, Sliabh Reagh Mountain, Kilfinane, Co Limerick	c. 14 km south-east of proposed Wind Farm	2023
Wind Farm (031367)	John Cleary	Operational single turbine	Glenbrohane, Kilfinane, Co Limerick	c. 14 km south-east of proposed Wind Farm	2003
Wind Farm (PL13.238964)	Kilmeedy Wind Farm Limited	Operational two-turbine Wind Farm and substation	Ballinruane and Ballyhahil, Kilmeedy, Co. Limerick.	c. 20 km west of the proposed Wind Farm	2011
Substation (191250)	EirGrid plc, with the consent and approval of the ESB	Minor modifications to a previously permitted development. Extension of the exiting Killonan 220/110 kV substation compound	Milltown and Coolyhenan, Co. Limerick	Located at the termination of the GCR	2020
PAX91.323448	Garrane Green Energy Ltd.	The proposed development of 9 no. wind turbines, 110kV substation and ancillary development	Garrane, Bruree, Co. Limerick	c. 8.2 km south-west of the proposed Wind Farm	Recently submitted

8. CONCLUSIONS

The Appropriate Assessment (AA) Screening adopted a highly precautionary approach and concluded that Likely Significant Effects (LSE) could not be excluded for the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA.

This NIS has rigorously assessed on the basis of, the AA screening result, in accordance with the best available scientific knowledge and applying the precautionary principle, whether the Proposed Development, either alone or in combination with other plans or projects, could have an adverse effect on the integrity of any European Site.

The European sites were therefore subject to detailed assessment as part of the AA process. While a number of potential effects relating to water quality and otter were identified, including possible in-combination effects, it is important to note that these were identified on a highly precautionary basis. The mitigation measures outlined in **Section 6.3** have been prescribed to ensure robust protection; however, even in the absence of these measures, the assessment determined that adverse effects on site integrity would not have occurred unless as part of an extreme event.

Accordingly, applying the precautionary principle and considering the conservation objectives of the relevant European Sites, it is concluded, based on the best scientific knowledge, that the Proposed Development will not have an adverse effect on the integrity of any European Site, either alone or in combination with other plans or projects.

9. REFERENCES

APEM Group Woodrow (2025). Ballinlee Wind Farm. Appropriate Assessment (AA) Screening Report. Ballinlee Green Energy Ltd., 02 April 2025.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3. Chartered Institute of Ecology and Environmental Management, Winchester.

CIEEM (2021) Advice on Ecological Assessment of Air Quality Impacts. Chartered Institute of Ecology and Environmental Management. Winchester, UK.

Department of Environment, Heritage and Local Government (2010). Appropriate Assessment of Plans and Projects in Ireland – Guidance for Local Authorities.

European Commission (2019). Managing Natura 2000 Sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

European Commission (2021). Commission Notice - Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.

European Commission (2021). ANNEX to the Commission Notice - Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.

European Commission (2000). Managing Natura 2000 Sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

European Commission (1992). Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

Fitzgerald, N., Burke, B. & Lewis, L.J. (2021) Irish Wetland Bird Survey: Results of waterbird monitoring in Ireland in 2016/17 and 2017/18. BirdWatch Ireland, Wicklow.

Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

Office of the Planning Regulator (OPR) (2021) OPR Practice Note PN01 Appropriate Assessment Screening for Development Management.

O'Neill, L., Veldhuizen, T., de Jongh, A., Rochford, J., & O'Meara, D. B. (2009). Ranging behaviour and socio-biology of Eurasian otters (*Lutra lutra*) on lowland mesotrophic river systems. European Journal of Wildlife Research, 55: 363–370.

SNH (2016). Assessing Connectivity with Special Protection Areas (SPAs): Guidance. Scottish Natural Heritage, Inverness.