

Natura Impact Statement

Laurel Ridge Solar Farm

Milltown

Co. Kerry

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Report prepared for Laurel Ridge Solar Farm Ltd

By Karen Banks MCIEEM

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Tel: 0834218641

Email: greenleafecology@outlook.com

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Appendix A: Appropriate Assessment Screening Report (AASR)

1 Introduction

This Natura Impact Statement (NIS) prepared by Greenleaf Ecology provides information in support of the Appropriate Assessment (AA), on behalf of Laurel Ridge Solar Farm Ltd, in respect of the proposed Laurel Ridge Solar Farm (hereafter referred to as the “proposed development”). An Appropriate Assessment Screening Report (AASR) was previously undertaken in respect of this development which concluded that likely significant effects of the proposed development on a European site could not be ruled out. A copy of the AASR is enclosed within Appendix A of this report.

This report provides information and appraises the potential for the proposed development, alone or in combination with other plans and projects, to have an adverse effect on the integrity of European sites in view of best scientific knowledge and the conservation objectives of the sites. European sites are those identified as sites of European Community importance designated as Special Areas of Conservation (SAC) under the Habitats Directive (92/43/EEC) or as Special Protection Areas (SPA) under the Birds Directive (79/409/ECC as codified by Directive 2009/147/EC).

The proposed development is described in Section 2 of this report and the proposed site location is illustrated in Figure 1-1. The proposed site layout can be found in Appendix A to this report.

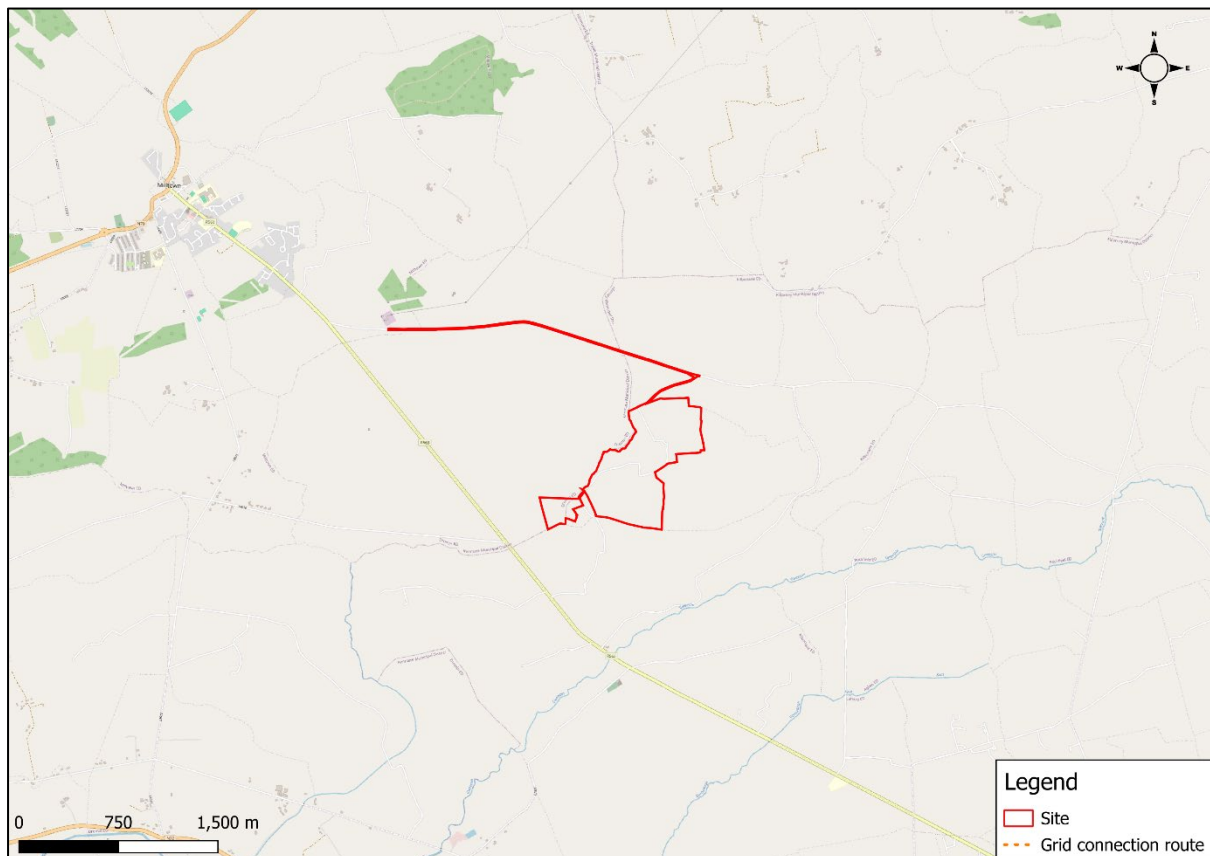


Figure 1-1: Site Location Map

1.1 Statement of Competence

This NIS has been prepared by Karen Banks. Karen is an ecologist with 19 years’ experience in the field of ecological assessment. She holds a BSc (Hons) in Environment and Development from Durham University and is a full member of the Chartered Institute of Ecology and Environmental Management. Karen has extensive experience in ecological field survey and impact assessment. In her career as an

ecologist Karen has completed reports to inform Appropriate Assessments (AA) covering the transport, energy and land use sectors, with work including assessment of Plans at the national, regional and local level, and numerous AAs of projects.

Lauren Williams BSc PGDip MCIEEM carried out aquatic ecology baseline studies and impact assessment for this project. She is a qualified freshwater ecologist with over 22yrs professional consultancy experience. Lauren holds a BSc in Zoology (University of Otago, NZ); a Certificate in Environmental Law (Open Polytechnic of NZ) and a Post Graduate Diploma in Environmental Monitoring Assessment and Engineering with Distinction from Trinity College Dublin. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). Lauren specialises in water quality assessment, monitoring, aquatic ecological impact assessment, fisheries and protected aquatic species and habitat surveys; regularly undertaking specialised aquatic field studies and preparing Ecological Impact Assessment reports in relation to a wide range of large infrastructural developments. She carries out aquatic sampling, monitoring, and reporting as part of national river monitoring programmes and is a nationally recognised aquatic protected species surveyor (freshwater pearl mussel and white-clawed crayfish).

1.2 Findings of the Screening for Appropriate Assessment

The AASR (Appendix A) considered the potential for likely significant effects on European sites within 15km of the proposed development. Source – pathway – receptor dynamics were assessed for the European sites within 15km of the proposed development and potential connectivity was identified for 3 no. European sites: Castlemaine Harbour SAC, Castlemaine Harbour SPA and Killarney National Park SPA. The AASR found that the proposed development will require site clearance, earthworks, installation of solar panels, construction of access tracks and other solar farm infrastructure and 3 no. undercrossings of streams. There is potential for run-off of deleterious substances associated with these works to the surrounding environment. Potential conduits to the River Laune and Castlemaine Harbour SAC include the Kealbrogreen stream and the Lissavane West stream. Applying the precautionary principle, there is potential for likely significant effects on the aquatic QI species Atlantic salmon, sea lamprey and river lamprey for Castlemaine Harbour SAC as a result of degradation of water quality. An assessment of the potential for likely significant effects on other QI species and habitats for Castlemaine Harbour is provided within the AASR (Appendix A). In view of the nature, size, scale and location of the proposed works the potential slight, short-term localised reduction in water quality within the River Laune is not likely to result in significant impacts on the foraging resources for the SCI for Castlemaine Harbour SPA. No potential for disturbance impacts on SCI within Castlemaine Harbour SPA and Killarney National Park SPA or ex-situ disturbance impacts were identified (see Appendix A).

1.3 Study Area and Zone of Influence

Determination of this project's Zone of Influence (Zoi) was achieved by assessing all elements of the proposed development against the ecological receptors within the proposed development footprint, in addition to all ecological receptors that could be connected to and subsequently impacted by the proposed development through impact pathways. To this end, the zone of influence extends outside of the proposed development works footprint to include ecological receptors connected to the development through overlap / intersection, proximity and connectivity through features such as watercourses.

As described in Section 1.2, the AASR identified the potential for a slight, short term, localised reduction in water quality within the River Laune, which forms part of Castlemaine Harbour SAC (Site Code: 000343), and is located c.5.1km downstream of proposed site (see Figure 4-1). No potential for

likely significant effects on any other European site was identified. Therefore, the study area for this NIS comprises the proposed project footprint and Castlemaine Harbour SAC.

1.4 NIS Objectives

This NIS considers impacts to Castlemaine Harbour SAC. As described in Section 1.2, in the absence of mitigation, and applying the precautionary principle, there is potential for likely significant effects on the aquatic QI species Atlantic salmon, sea lamprey and river lamprey for Castlemaine Harbour SAC as a result of degradation of water quality. Therefore, this study focuses on the suitability and importance of the study area for the aquatic species Atlantic salmon, sea lamprey and river lamprey designated as part of this European Site. Potential impacts, such as the release of water borne pollutants to Castlemaine Harbour SAC are considered in this assessment.

2 Project Description

Statutory Description

Laurel Ridge Solar Farm Ltd intend to apply for a 10 Year Planning Permission for a solar farm, 38kV substation and underground cabling grid connection, and energy storage compound with a total area of circa 57 hectares in the townlands of Ballyoughtragh South, Commons, Farranmanagh, Knocknahan and Lisheennashingane, Milltown, County Kerry. The proposed development will consist of a solar farm comprising of c.230,000 sq.m of solar photovoltaic panels on ground mounted frames, associated string inverters mounted to rear of panels and 14 no. single storey electrical transformer stations. The energy storage compound will consist of 36 no. containerised energy storage modules and associated plant and equipment, 9 no. transformers and 2 no. auxiliary transformers, 2 no. spare parts containers and 1. no. office unit. Planning permission is also sought for 1 no. 38kV substation and associated electrical compound, including single storey control building, line bay, transformer and accompanying apparatus, and associated grid connection between the proposed substation and Oughtragh 110kV substation comprising 38kV underground electricity cabling of c.3.87km in length to be provided in an excavated trench on private lands and the L11003, L8003 and L80030 public roads, and all associated site development and reinstatement works. The project will also include 33kV underground interconnector electrical cabling within the development site and within the L11003 public road, temporary construction compounds, security fencing, CCTV, access tracks, landscaping (including hedgerow removal and planting), drainage and all ancillary development works and apparatus necessary to facilitate the proposed development. Construction and operational access will be via 6 no. entrances from the L11003 and L80030, with 1 no. of these entrances used for the temporary construction phase only. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration. A Natura Impact Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application. The NIS will be available for inspection or purchase at a fee not exceeding the reasonable cost of making a copy during office hours at the offices of the Planning Authority. The planning application may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours and a submission or observation in relation to the application may be made to the authority in writing on payment of the prescribed fee within the period of 5 weeks beginning on the date of receipt by the authority of the application.

Solar Panels

The working title for the project is Laurel Ridge Solar Farm. The civil works for the panels themselves use a simple, ground-mounted system that avoids undue ground disturbance and works with the existing site topography. The PV panels will sit on angled racks comprised of galvanized steel arranged in portrait or landscape configuration depending on the final system deployed¹. It is envisaged that these will be screw or driven-piled following geotechnical assessment². Across the majority of the site, the panels will be positioned on the rack at a minimum height of 0.8 m above the ground and rise to a maximum height of up to 3.5 m.

The PV panels will be orientated to the south in order to capture maximum solar energy. The panels will be positioned at a tilt angle between 10-20 degrees from the horizontal having regard to natural

¹ Refer to technical drawings for panel and array system options. Final technical specification to be agreed with Kerry County Council prior to construction. The final design will be subject to standard micro-siting arising from site survey work.

² The exact nature of the foundations will be determined at detailed design stage. Other alternative foundations arrangements include ballasting systems and piles. Final foundation type will be confirmed with Kerry County Council prior to construction.

site topographical and orientation conditions to ensure the best solar absorption. The panels will be stationary with no movable parts. Low voltage direct current cabling will connect the panels to the inverter/transformer stations across the site.

Inverters / Transformers / Substation and Grid Connection

A total of 14 no. transformer stations are incorporated into the layout to convert direct current generated by the PV panels into alternating current which can be subsequently used by the electricity network. These units are manufactured offsite and delivered installation ready. These units are 3.20 m in height and will be installed on a hardcore or concrete slab base. The transformer units are equipped with a weather station, ventilation and a security light.

The proposed development includes c. 136 no. string inverter units. These are small units which are mounted at the top underside of the solar panels and positioned at the end of the array rows. These units collect the electricity from the solar panels before onward passage to the transformers.

A 38 kV distribution substation and electrical compound is proposed to the south of the site. This will function as the delivery point to ESB networks for transfer electricity to the electricity grid by means of underground cabling to the Oughtragh 110kV substation. The substation control building has a floor area of approximately 128 m² with the associated compound containing outdoor Air Insulated Switchgear equipment comprising of a line bay, grid transformer and accompanying apparatus, including telecoms pole and lightning mast. The size and specification of the substation has been designed to ESB Networks standards. Existing site levels will be reprofiled for the purposes of accommodating the substation, following pre-commencement site investigations.

The 38kV underground cabling grid connection route is approximately 3.87km in length and traverses in a mainly eastern direction from the existing Oughtragh 110kV substation to the proposed Laurel Ridge Solar Farm 38kV substation. C.0.28 km of the route is within the existing solar farm lands, with c.2.92 on the L8003 and L80030 local roads. The ducting and cabling will be placed in a trench approximately 1.22 metres deep, with reinstatement in public roads in fully accordance with guidelines for managing openings in roads.

Interconnector Cabling

The different solar farm field parcels will be connected by means of interconnector cabling totalling c.3.83km in length, the majority of which will be in private solar farm lands. A total of c.50m of cabling will be in the L8003 local road. The cabling route includes a crossing beneath the Kealbrogeen Stream within the western parcel of the solar farm. Joint slabs will be located below ground and finished/reinstated to the required roads/landowner specification. The collector network is described in the submitted plans, technical details and construction methodology by TLI Group.

Access

A compacted gravel access track up to 3.5 m wide will provide internal access to the solar arrays and associated infrastructure. Stripped soil arising from the construction of these access tracks will be sustainably reused across the site as part of landscaping, filling in the verges of access tracks and grass reinstatement in the areas of temporary construction compounds.

It is proposed to access the site via 6 no. entrances from the L80030, with 1 no. of these entrances used for the temporary construction phase only. Three of the entrances are new entrances located to improve existing accesses to agricultural lands, with the remaining subject to upgrade works, to

include widening, small elements of hedgerow removal, and provision of roadside drainage, as described in the submitted plans.

The design includes the removal of some hedgerow on private lands at the corner of the L80030 and L8003 for the purposes of accessing the site for transformer delivery during the construction phase. A 1.2m high post and wire fence will be erected as part of a revised set-back boundary. Clause 804 will be laid as a temporary surface treatment at this location for construction access. Post construction, this will be taken up, with a grass margin sown between the fence and public road.

Other Infrastructure

A perimeter fence up to 2.2 m in height will be erected to provide security and restrict unauthorised entry to the solar farm. This fence will be stock proof in nature, sympathetic to the agricultural character of the site. The footings for the fence will either be pre-moulded or localized in-situ concrete, to be determined once a contractor is appointed. The installed fencing will incorporate mammal friendly access, with a maximum 100 mm gap retained at the bottom between the fence and the ground, as per the submitted technical plans.

The proposed development will be an unmanned facility; however, it will be monitored 24 hours a day remotely by the Applicant's operation system and the Engineer Procurement and Construction provider. The site will be subject to routine inspections. The CCTV will be orientated towards this infrastructure rather than any third-party lands.

Energy Storage Compound

The proposed development will be contained within a secure, fenced development compound, enclosed by a 2.4m high palisade perimeter fence.

The layout includes 36 no. modular containers housing electrical and control equipment for energy storage. These units are manufactured offsite and delivered installation ready and have an individual floor area of approximately 12 m². The energy storage modules are low lying in nature, and may be sourced in a 'moss green' colour (RAL colour code of 6005 or similar) aiding assimilation in the local landscape³. 9 no. transformers and 2 no. auxiliary transformers support the energy storage function on site. 2 no. spare parts containers and a small office unit (c.15m² in area each) are also provided to assist with operational management, including to monitor development performance post energisation to include review of security systems, environmental sensors, and performance monitoring tools to ensure safety, efficiency, and optimal energy production / storage.

The system as proposed will incorporate battery modules connected to inverters that convert direct current (DC) to alternating current (AC) in turn connecting to grid infrastructure via associated transformers within the compound. Fire protection for the facility will be designed in accordance with required standards. The level of protection is subject to detailed design by the plant's supplier, utilising industry safety standards and certification.

Landscaping & Biodiversity

A total of 178 linear metres of permanent hedgerow will be removed throughout the site to facilitate site entrance, access tracks and underground cabling. An additional 20 linear metres of hedgerow will be removed and replanted behind the sightlines at the westernmost entrance (Entrance No. 6). Permanent removal will be offset by 553 linear metres of new hedgerow planting (Type 2), as well as the bolstering of an additional 7,077 linear metres (Type 1) where necessary, to fill any gaps in existing

³ Final colour will be subject to available electrical infrastructure. Prepared photomontages illustrate in grey.

hedgerows. Ecology on the site will be further fostered to deliver significant biodiversity gains to the receiving environment through the establishment of focused ecological biodiversity areas and species rich grasslands.

The solar farm will contribute directly to a carbon dioxide emission reduction of 9,087 tonnes per annum or the equivalent of approximately 363,480 tonnes of CO₂ over the 40 year lifetime of the project.

3 Methodology

3.1 Legislative Background 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 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. As defined under the Habitats Directive (Article 3(1)) Natura 2000 is a European ecological network composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

In Ireland, these sites are designated as European sites and include SPAs, established under the EU Birds Directive (79/409/EEC, as codified by 2009/147/EC) for birds and SACs, established under the Habitats Directive 92/43/EEC for habitats and species.

The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Act (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended. In the context of the Proposed Development, the governing legislation is Part XAB of the Planning and Development Act (as amended).

Articles 6(3) and 6(4) of the Habitats Directive sets out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites. Article 6(3) establishes the requirement for Appropriate Assessment (AA):

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 or 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.

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in this report to inform the assessment has had regard to the following legislation and guidance listed in Section 2.2:

- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (also known as the ‘Habitats Directive’);
- Council Directive 2009/147/EC on the conservation of wild birds, codified version, (also known as the ‘Birds Directive’);
- The European Communities (Birds and Natural Habitats) Regulations 2011 to 2015; and
- The Planning and Development Act (as amended).

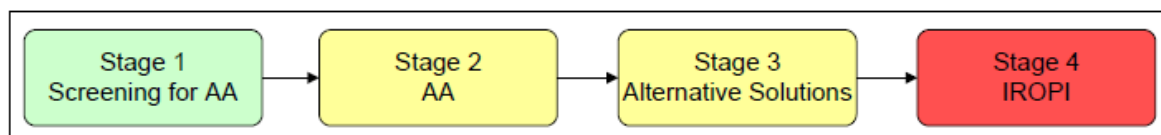
3.2 Stages of Appropriate Assessment

Article 6(3) & (4) of the Habitats Directive defines a stepwise procedure where plans or projects are considered. The Department of the Environment, Heritage and Local Government guidelines (DoELHG, 2009, rev 2010) outlines the European Commission's methodological guidance (EC, 2002) promoting a four-stage process to complete the AA and outlines the issues and tests at each stage. An important

aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in Figure 3-1. Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

Figure 3-1: Four stages of appropriate assessment⁴



Stage 1 Appropriate Assessment

Stage 1 AA comprises the Screening process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) as follows:

- i. whether a plan or project (in this instance the proposed project) is directly connected to or necessary for the management of the European sites, and
- ii. whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on the European sites in view of their conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA).

Stage 2: Appropriate Assessment

The aim of the stage 2 AA process is to identify any adverse impacts that the plan or project might have on the integrity of relevant European sites. As part of the assessment, a key consideration is 'in combination' effects with other plans or projects. Where adverse impacts are identified, mitigation measures can be proposed that would avoid, reduce or remedy any such negative impacts and the plan or project can be amended and / or conditions and restrictions imposed. If it is considered that mitigation measures will not be able to satisfactorily reduce potential adverse impacts on a Natura 2000 site, then an assessment of alternative solutions is considered in Stage 3. This is then followed by Stage 4 in the event that adverse impacts remain, and the proposed activity or development is deemed to be of Imperative Reasons of Overriding Public Interest (IROPI), allowing an assessment of compensatory measures to be considered.

This NIS informs Stage 2 of the AA process and determines if the project is likely to affect the integrity (structure and function) of European sites. As the screening process identified that potential impacts to Castlemaine Harbour SAC are unknown, uncertain or cannot be ruled out without further assessment, then AA is required including the preparation of an NIS.

The NIS represents a detailed, targeted assessment of the nature and potential significance of direct and indirect impacts arising from the proposed project. An assessment of cumulative impacts (both from the project objectives, and other policies, plans and programmes) is also completed as part of

⁴ IROPI – Imperative Reasons for Overriding Public Interest

the NIS. The NIS also incorporates standard best practice and mitigation measures to eliminate potential adverse impacts.

This NIS has been prepared having regard to the following guidance and legislation:

Guidance

- Department of the Environment, Heritage and Local Government (DoEHLG) (2009, rev 2010a), Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities.
- Department of the Environment, Heritage and Local Government (DoEHLG, 2010b), Department of Environment Heritage and Local Government Circular NPWS 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities (DoEHLG, 2010).
- EPA (2013) Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioners Manual. Environmental Protection Agency.
- European Commission (2018), Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg.
- European Commission (2000a), Communication from the Commission on the Precautionary Principle, Office for Official Publications of the European Communities, Luxembourg.
- European Commission Notice Brussels C (2021) 6913 final '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' (EC, 2021).
- European Commission (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission. Office for Official Publications of the European Communities, Luxembourg.
- European Commission (2013), Interpretation Manual of European Union Habitats. Version EUR 28.
- European Commission (2006), Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities.

4 European Sites within Project Zone of Influence

As described in Section 1.2, the AASR [Appropriate Assessment Screening Report] identified the potential for likely significant effects on one European site, namely, Castlemaine Harbour SAC.

Table 4-1 details this European site and its proximity and connectivity to the proposed development. Figure 4-1 provides an illustration of the location of the proposed development in relation to Castlemaine Harbour SAC.

Table 4-1: Connectivity between Castlemaine Harbour SAC and the proposed development

European Site	Distance from Proposed Site (km) ⁵	Connectivity
Castlemaine Harbour SAC (000343)	0.54km	Hydrological connectivity via the Kealbrogreen Stream, which flows into this SAC c.5.1km downstream. The proposed site and part of this SAC are within the Scartaglin Ground Waterbody.

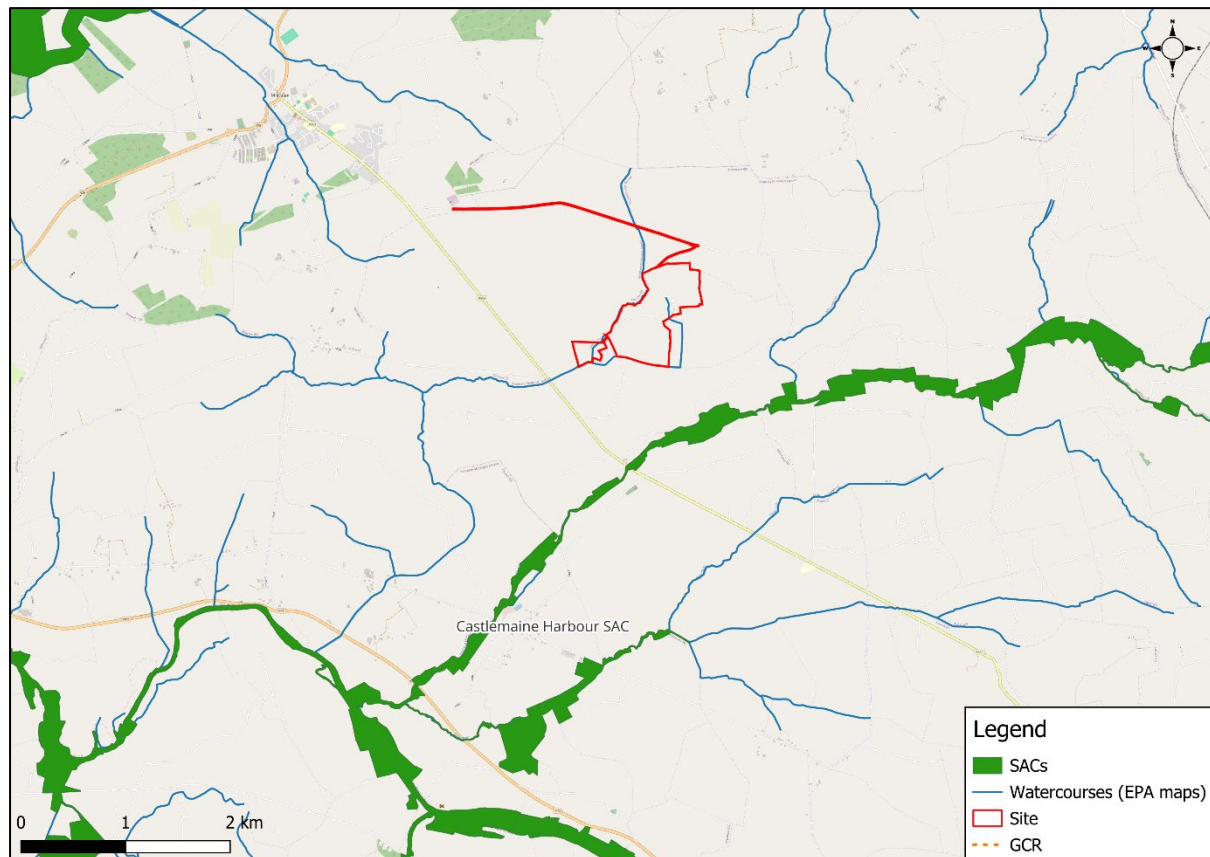


Figure 4-1: Map illustrating the location of the proposed development in relation to Castlemaine Harbour SAC

⁵ Distance measured “as the crow flies”, noting that the hydrological connectivity is 5.1km via Kealbrogreen Stream (Laune)_010 river water body.

4.1 Summary of European Sites Relevant to the Stage 2 Appropriate Assessment

4.1.1 Castlemaine Harbour SAC (Site Code: 000343)

According to the Standard Data Form for Castlemaine Harbour SAC⁶, this is a large coastal site occupying the innermost part of Dingle Bay in Co. Kerry. The site comprises the estuaries of the Rivers Maine and Laune, both substantial rivers, and has very extensive areas of intertidal sand and mud flats. The site has a significant sand dune element in the form of Inch and Rossbehy sand spits. These spits, which overlie shingle bars, form the western boundary to the site and provide effective shelter for Castlemaine Harbour. The Inch sand spit, c.5 km in length, has a particularly well-developed dune system which grades into salt marsh and *Spartina* swards on the sheltered east side. A further spit on shingle protrudes into the site at Cromane. Salt marsh fringes this spit and continues almost uninterrupted along the south shore to the mouth of the River Laune. All of the River Laune from the estuary to Lough Leane is included in the site. Other habitats which have a minor presence include wet grassland, reedbeds, heath, scrub and wet woodland. Land uses include fishery and aquaculture activities, grazing, and recreational activities.

The site is of major ecological importance for its diversity and range of coastal habitats and species. The Inch sand spit is the largest and arguably one of the best remaining intact dune systems in the country. The dune systems are highly dynamic and possess very fine examples of embryonic dunes, shifting marram dunes, fixed dunes and dune slacks. Salt marshes, both of the Atlantic and Mediterranean types, are also particularly well developed and extensive in area. The site has one of the largest expanses of intertidal sand and mud flats in the country. A fine stand of native alluvial forests occurs on the River Laune. The fixed dunes have *Petalophyllum ralfsii* and three Red Data Book vascular plant species are known from the site. Castlemaine Harbour supports important populations of wintering waterfowl, with internationally important numbers of *Branta bernicla hrota* and nationally important populations of a further 16 species. *Pluvialis apricaria* and *Limosa lapponica*, both listed on Annex I of the EU Birds Directive, occur regularly. The site provides habitat for *Bufo calamita*, a very localised species in Ireland and listed in the Red Data Book. The site is also utilized by *Lutra lutra* and supports important populations of *Salmo salar*, *Petromyzon marinus* and *Lampetra fluviatilis*.

Qualifying habitats and qualifying species for Castlemaine Harbour SAC are presented in Table 4-2 and Table 4-3 below.

Table 4-2: Castlemaine Harbour Annex I (Qualifying) Habitats

Habitat Name and Code (SAC Qualifying Feature)	Cover (ha)	Representivity ⁷
Estuaries [1130]	5695.9	A
Mudflats and sandflats not covered by seawater at low tide [1140]	4286.7	A
Annual vegetation of drift lines [1210]	1.9	A
Perennial vegetation of stony banks [1220]	0.05	B
Salicornia and other annuals colonising mud and sand	1.24	C

⁶ Available at [N2K IE0000343 dataforms \(europa.eu\)](https://n2k.ie0000343/dataforms/europa.eu), accessed 23/08/2025

⁷ The degree of representativity of the natural habitat type on the site: A: excellent representativity, B: good representativity, C: significant representativity and D: non-significant presence

Habitat Name and Code (SAC Qualifying Feature)	Cover (ha)	Representivity ⁷
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]	49.13	A
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	224.02	A
Embryonic shifting dunes [2110]	15.20	A
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]	36.22	A
Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	437.54	A
Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>) [2170]	0.34	B
Humid dune slacks [2190]	34.20	A
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]	17.67	B

Table 4-3: Castlemaine Harbour SAC Annex II (Qualifying) Species

Species Name and Code	Population Significance ⁸
<i>Petromyzon marinus</i> (Sea Lamprey) [1095]	C
<i>Lampetra fluviatilis</i> (River Lamprey) [1099]	C
<i>Salmo salar</i> (Salmon) [1106]	C
<i>Lutra lutra</i> (Otter) [1355]	C
<i>Petalophyllum ralfsii</i> (Petalwort) [1395]	B

4.2 Conservation Objectives of European Site

Article 6.3 of the Habitats Directive and Part XAB of the Planning and Development Act (as amended) require that the impact of the project (either alone or in combination with other projects or plans) on the integrity of the European site is considered with respect to the conservation objectives of the site and to its structure and function. The European Commission guidance on Natura 2000 (MN2000) states that:

“The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site’s conservation objectives” (MN2000, Section 4.6.4).”

The maintenance of favourable condition of qualifying interests at the site level will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of habitats and species is described in the Guidance as follows:

⁸ Size and density of the population of the species present on the site in relation to the populations present within national territory. A: 100% >= p > 15% B: 15% >= p > 2% C: 2% >= p > 0% D: non-significant population

- **Favourable conservation status of a habitat** can be described as being achieved when: “its natural range, and the area it covers within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable”.
- **Favourable conservation status of a species** can be described as being achieved when: “population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, sufficiently large habitat to maintain its populations on a long term basis”.

Site-specific conservation objectives aim to define favourable conservation conditions for the qualifying interests, i.e. Annex I habitat and Annex II species, as applicable. The conservation objectives are presented as a list of attributes against which targets have been set. All of the attributes in relation to each qualifying interest (QI) of relevance to this NIS (i.e. Atlantic salmon, sea lamprey and river lamprey) have been considered in relation to the potential impacts associated with the proposed development. Site specific conservation objectives (SSCOs) for the QI species sea lamprey, river lamprey and Atlantic salmon for Castlemaine Harbour SAC are detailed in Table 4-4.

Table 4-4: Site Specific Conservation Objectives, Attributes and Targets for the Relevant QI Species of Castlemaine Harbour SAC (NPWS, 2011, available at: [Site specific cons obj \(npws.ie\)](http://www.npws.ie/site-specific-conservation-objectives))

Conservation Objectives Castlemaine Harbour SAC (Site specific cons obj (npws.ie))			
Sea Lamprey <i>Petromyzon marinus</i> [1095]			
To maintain the favourable conservation condition of Sea lamprey in Castlemaine Harbour SAC, which is defined by the following list of attributes and targets:			
Attributes	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas.
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	
Juvenile density in fine sediment	Juveniles/m ²	Juvenile density at least 1/m ²	Juveniles burrow in areas of fine sediment in still water.
Extent and distribution of spawning habitat	m ² and occurrence	No decline in extent and distribution of spawning beds	Lampreys spawn in clean gravels.
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers can prevent juvenile lampreys from accessing the full extent of suitable habitat.

River Lamprey <i>Lampetra fluviatilis</i> [1099] To maintain the favourable conservation condition of River lamprey in Castlemaine Harbour SAC, which is defined by the following list of attributes and targets:			
Attributes	Measure	Target	Notes
Extent of anadromy	% of river accessible	Greater than 75% of main stem length accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	It is impossible to distinguish between brook and river lamprey juveniles in the field, hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m ²	Mean catchment juvenile density of brook/river lamprey at least 2/m ²	Juveniles burrow in areas of fine sediment in still water.
Extent and distribution of spawning habitat	m ² and occurrence	No decline in extent and distribution of spawning beds	Lampreys spawn in clean gravels. Artificial barriers can prevent lampreys from accessing suitable spawning habitat. Attribute and target based on spawning bed habitat mapping by IFI
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers can prevent juvenile lampreys from accessing the full extent of suitable habitat.

Atlantic Salmon <i>Salmo salar</i> (only in fresh water) [1106] To maintain the favourable conservation condition of Salmon in Castlemaine Harbour SAC, which is defined by the following list of attributes and targets:			
Attributes	Measure	Target	Notes
Extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas.
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment

Atlantic Salmon <i>Salmo salar</i> (only in fresh water) [1106] To maintain the favourable conservation condition of Salmon in Castlemaine Harbour SAC, which is defined by the following list of attributes and targets:			
			relationship". . The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels.
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL). For assessments of favourable conservation condition, this measure should be taken in conjunction with other direct means of stock assessment.
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (<i>Lepeophtheirus salmonis</i>).
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA. 85% of relevant sites currently at least Q4 on Laune.	Salmon spawn in clean gravels. Artificial barriers can prevent salmon from accessing suitable spawning habitat.

5 Existing Environment

Ecology surveys of the proposed site were undertaken by ecologist Ms. Karen Banks between 30th July 2024 and 26th June 2025. The surveys assessed the potential for Qualifying Interests (QIs) of European sites within the likely ZoI [zone of influence] of the proposed development.

Aquatic ecology surveys in relation to the proposed development was undertaken by freshwater ecologist Ms. Lauren Williams on the 17th May and 24 September 2024 and 23 August 2025.

This chapter provides a summary of habitats and species present at the proposed site and describes the results of the desktop study and field surveys undertaken for qualifying interests of Castlemaine Harbour SAC. A full description of the receiving environment of the proposed development is included in the Ecological Impact Assessment accompanying the planning application.

5.1 Habitats

The footprint of the proposed solar farm supports improved agricultural grassland (GA1), with areas of relatively species poor neutral grassland (GS1) and wet, rush dominated grassland (GS4). The fields are managed by livestock and pony grazing. The fields are fringed by hedgerows (WL1), treelines (WL2) and earth banks (BL2); the Kealbrogheen stream (FW2) bounds the site to the north-west and the Lissavane West stream is located on the southern site boundary. The proposed grid connection is located within improved agricultural grassland (GA1) as it leaves the 38kV substation, then runs along local roads (buildings and artificial surfaces BL3) to the Oughtragh 110kV substation.

5.2 Species

Fauna were surveyed through observation of field signs such as direct observation, tracks, feeding signs and droppings. Habitats were assessed for their potential for use, or confirmed use, by protected species of fauna during the ecology surveys undertaken in 2024 and 2025.

5.2.1 Otter

The NBDC⁹ does not hold any records of otter from the proposed site and its environs. No evidence of otter was recorded during the site survey and the Kealbrogheen stream and Lissavane West stream are unlikely to provide a sustained foraging resource for this species. However, there is potential for otter to utilise the Kealbrogheen stream occasionally to commute through the landscape.

5.3 Surface Water

5.3.1 Overview

The Kealbrogheen Stream near the proposed development commences as a small 1st order stream, which is joined by the 1st order Lissavane West tributary to form a 2nd order watercourse through the westernmost land parcel. The Kealbrogheen then flows another 5.1km to meet the River Laune, a large 6th order channel that flows westward through Killorglin to Castlemaine Harbour and Dingle Bay.

The solar farm land parcels drain to the Kealbrogheen and the Lissavane West streams. The Grid Connection Route (GCR) crosses the Kealbrogheen Stream and its small tributary in their very upstream reaches where they are already culverted beneath the local road (L8003).

There are no instream works proposed on the solar farm or the grid connection route. Watercourse crossings will be undercrossings at existing culverts.

⁹ <https://maps.biodiversityireland.ie/Map>

5.3.2 Biological Water Quality

The EPA don't monitor the small streams draining the proposed solar farm development site. The nearest EPA river monitoring stations are on the River Laune. Table 5-1 shows recently available (2016-2021) river monitoring results from relevant EPA water bodies on the River Laune, upstream and downstream of the Kealbrogreen confluence. The Laune has been Q4, meriting 'good' ecological status at river stations 22L010300 (1.9km upstream) and 22L010400 (350m downstream) between 2016 and 2022. This is compliant with WFD objectives to remain at 'good' status or better. Q-values were assessed as part of field studies for this project (see Section 5.3, below, for results). The Kealbrogreen was sampled in May 2024 (Site LR3, LR7) and August 2025 (Sites LR4, LR12) meriting Q4, ¹⁰representative of 'good' status.

Table 5-1 Relevant EPA Q-value data (2016-2022)

EPA Code	Water body type / name	Lake / River Station Name	2016	2019	2022	Ecological Status WFD (2016-2021)
RS22L010300	River Laune	Ballymalis Castle	Q4	Q4	Q4	Good
RS22L010400	River Laune	1.5 km d/s Gweestin R confl.	Q4	Q4	Q4	Good

5.3.3 Existing Fisheries Data

Inland Fisheries Ireland (IFI) conducted catchment wide electrofishing (CWEF) surveys in the Laune, most recently in 2017 (IFI, 2019). The Kealbrogreen Stream was not sampled, The Laune catchment had a mean catch of 21.41 salmon fry/5min, which is above the 17 salmon fry threshold which underpins the management of the Laune fishery. It is noted that most 2nd order streams (as is the Kealbrogreen) sampled in the catchment wide survey had trout fry, but not salmon fry. The main channel of the River Laune downstream of the Kealbrogreen confluence is mainly a holding and migration route for salmonids with some reaches of nursery habitat in faster water and limited patchy spawning habitat.

The theoretical ¹¹Conservation Limit (CL) for salmon in the "1²SW Laune and Cottoners" by the ¹³SSCS is currently 2,071 returning fish per annum. Data shows that the River Laune exceeded this CL by 2699 fish in 2024. MSW fish on the Laune also exceeded the CL (815) by 239 in 2024, thus the river has an exploitable surplus for angling purposes (TEGOS, 2025).

Castlemaine Harbour is a mixed-stock harvest fisheries, one of only four potential commercial salmon fisheries currently operating in Irish estuaries (given that salmon are nationally in decline and most fisheries are closed to commercial netting). The fishery is only able to be harvested commercially if all three rivers feeding into it (Maine, Laune and Caragh) are above their CL for salmon. Scientific salmon stock evidence shows the harbour fishery has had an exploitable salmon surplus since 2011 (TEGOS, 2025).

¹⁰ Q-values reported outside of the EPAs formal river monitoring programme are "representative" of ecological status as the EPA is the only authority for assigning formal WFD status.

¹¹ Scientifically derived sustainable stock level, i.e., the number of returning salmon that would be required to maintain the carrying capacity of the system based on its accessible area of fluvial habitat.

¹² 1SW = one sea winter fish ('grilse'); MSW = Multi sea winter fish.

¹³ Standing Scientific Committee on Salmon

5.3.4 Aquatic Ecology Field Survey Results

Aquatic Ecology survey for the proposed project was undertaken by Ms Lauren Williams, MCIEEM, on 17th May, 24th September 2024 and 23rd August 2025, focusing on potentially affected watercourses, their proposed crossing points (where applicable) and the downstream Zone of Influence. Figure 5-1 shows field survey locations in relation to the project Red Line Boundary (RLB). Four sites (LR10-LR13) were investigated on the Kealbrogheen Stream between the proposed development and the confluence with the River Laune (SAC boundary) on 23 August 2025. The aim was to identify potential Annex II species habitats and any obvious fish passage barriers, the latter in relation to bridge / culvert crossings on public roads. Survey locations downstream of the proposed development are shown on Figure 5-2.

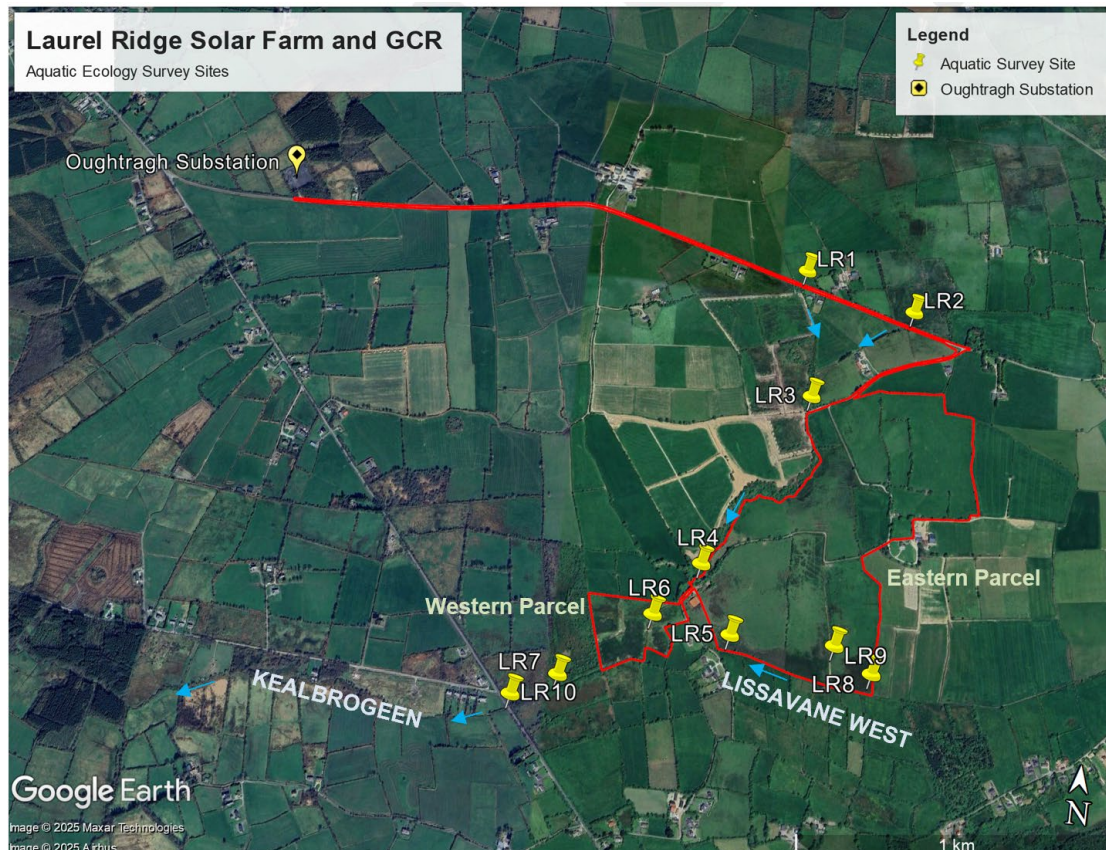


Figure 5-1 Aquatic Ecology survey sites Laurel Ridge Solar Farm

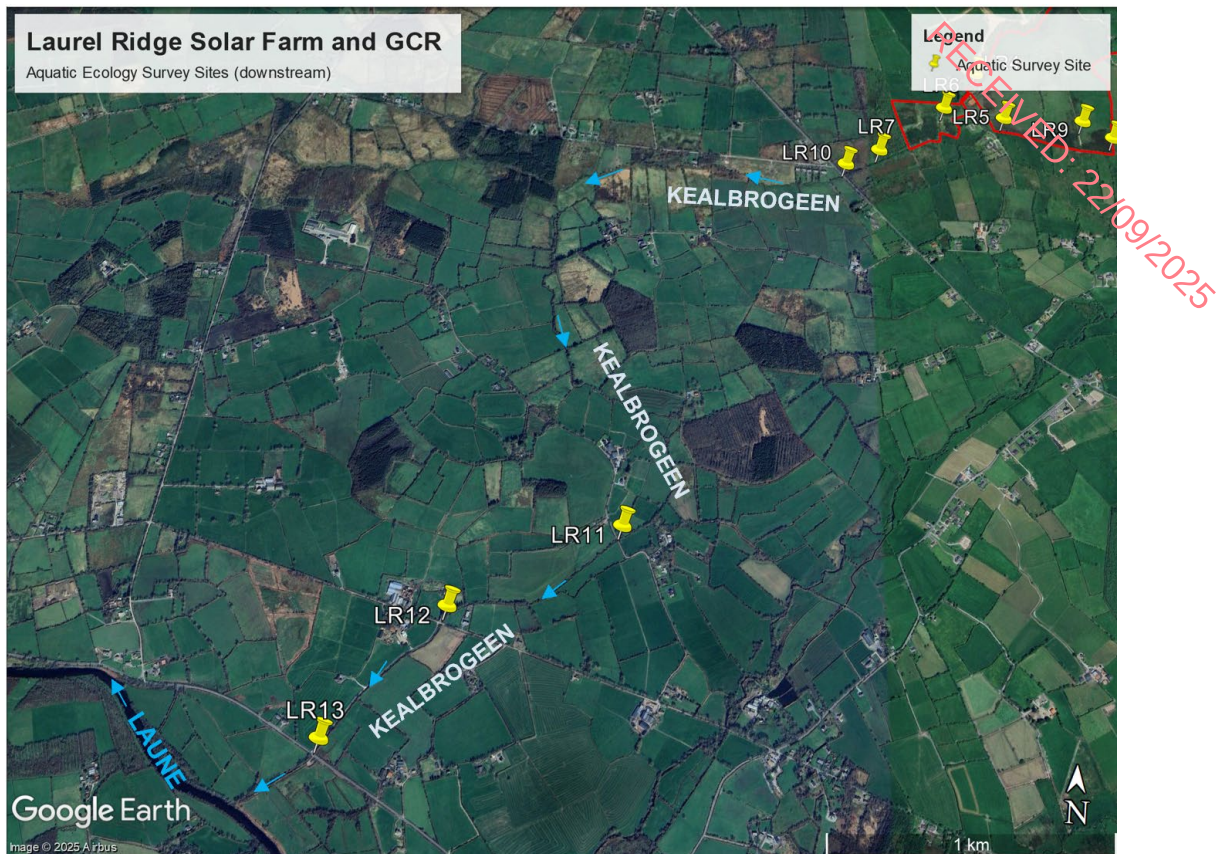


Figure 5-2 Aquatic Ecology survey sites – Kealbrogheen Stream to River Laune

Table 5-2 Aquatic Survey Site Locations (ITM)

EPA Waterbody name and code	EPA Watercourse Name	Site Code	Easting (ITM)	Northing (ITM)
Kealbrogheen Stream (Laune)_010 IE_SW_22K040500	Kealbrogheen	LR1	485871	599409
	Unnamed trib. of Kealbrogheen	LR2	486274	599288
	Kealbrogheen	LR3	485939	598965
	Kealbrogheen	LR4	485626	598396
	Lissavane West	LR5	485706	598168
	Kealbrogheen	LR6	485464	598204
	Kealbrogheen	LR7	485186	597999
	Lissavane West	LR8	486181	598074
	*Un-named Drain	LR9	486048	598158
	Kealbrogheen	LR10	485035	597925
	Kealbrogheen	LR11	484120	596327
	Kealbrogheen	LR12	483480	595993
	Kealbrogheen	LR13	483062	595520

5.3.4.1 Kealbrogheen Stream

The Kealbrogheen stream and its small tributary are small and channelized in the upper reaches where the GCR will pass under existing pipe culverts (Sites LR1 and LR2).

Good trout spawning and nursery habitat with reasonably natural hydromorphology is present within this stream along the western boundary of the proposed development between LR3 and LR4, where it is enclosed in a woodland gully. The lower gradient reach from running through the westernmost parcel and continuing downstream of the site boundary (LR6 to LR7) comprised good trout spawning and nursery, with evidently high density of juvenile trout locally, attesting to habitat quality. The stream is suitable for brook lamprey spawning but lacks juvenile nursery habitat in proximity to the proposed development owing to the moderately steep, spate nature of gully stream. Potential brook lamprey nursery habitat is present mainly downstream of the development lands where there are patches of sediment deposition at channel margins in which lamprey ammocoetes can burrow. No lamprey ammocoetes were captured in manual searches during field survey.

Owing to its small size and lack of silt deposition (nursery habitat) the Kealbrogheen stream, in the vicinity of the proposed development, does not comprise habitat that could support Annex II species sea and river lamprey of the Castlemaine Harbour SAC, located 5.1km downstream. The presence of sea and river lamprey in the Kealbrogheen is unlikely owing to the migration barrier formed by the road culvert in the lower catchment at Site LR12. The small size / depth character of the Kealbrogheen is sub-optimal for salmon in close proximity to the proposed development lands, but if salmon can pass the barrier (road culvert) at Site LR12 (see below), juvenile salmon cannot be ruled out as occurring in small numbers in the vicinity of Site LR6 and LR7 in early spring, perhaps dropping further downstream to Sites LR11-LR12 as flows decrease into summer. There is greater potential for salmon spawning / nursery once the stream becomes 3rd order, from 1.7km downstream of the proposed solar farm site (LR11), although habitat is not ideal for the species owing to historical and contemporary drainage and a partial fish passage barrier in the lower reaches.

Photographic images and details on macroinvertebrate fauna recorded during the field survey are enclosed in the Aquatic EclA, in Appendix A to this report.

5.3.4.2 *Lissavane West*

The Lissavane West stream is a low volume, heavily drained, but subsequently overgrown 'drain-like' channel along the southern boundary of the easternmost solar farm parcel. No salmonid habitat or potential. Eel and stickleback may be present towards the deeper glides, but the channel almost completely dries out, particularly in the upper reaches, during summer months, meaning even eel and stickleback may not persist over summer.

Photographic images and details on macroinvertebrate fauna recorded during the field survey are enclosed in the Aquatic EclA, in Appendix A to this report.

5.3.5 *Flooding*

The Office of Public Works (OPW) flood mapping (<http://www.floodinfo.ie/map/floodmaps/>) indicates the flood extents for watercourses in the environs of the proposed site. As indicated in Figure 5-3, there are no flood extents or past flood events mapped at the proposed site (red x on the map marks the centre of the site).



Figure 5-3: OPW Flood Risk Mapping at the Proposed Site

5.4 Soil, Geology and Hydrogeology

The Geological Survey of Ireland (GSI) online database (www.gsi.ie) was consulted for available edaphic, geological and hydrological information of the site and its environs. The site is overlaid by AminDW, acid brown earths, brown podzolics, with Mineral alluvium soils at the south of the site. In terms of bedrock geology, the Namurian formation, composed of shale and sandstone underlies the site.

The bedrock units which underlie the site are mapped by the GSI as part of the same Locally Important Aquifer. Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated. The study area is of 'low' to 'moderate' groundwater vulnerability. There are no karst features located in the vicinity of the proposed development.

5.5 Invasive Species

Japanese Knotweed has been recorded at Beaufort, c.0.4km to the south-east of the proposed development, last recorded in 2009.

No invasive species were recorded during the site survey conducted in 2024 and 2025.

6 Impact Assessment

Impacts can be direct and indirect and the impacts that could potentially occur through the construction and operation of the proposed development are as follows:

- Changes in key indicators of conservation value such as decrease in water quality within the Castlemaine Harbour SAC.

The assessment of impacts identifies the potential construction and operational phase impacts on the Castlemaine Harbour SAC in the absence of mitigation.

6.1 Direct Impacts

The proposed development is not located within lands designated for nature conservation, including Castlemaine Harbour SAC. Further, there are no resource requirements (e.g. excavation or abstraction) from European sites for the proposed development. Consequently, none of the lands designated as part of European sites will be directly impacted or removed as a result of the proposed development. Therefore, there will be no direct impacts to European sites in this regard.

6.2 Indirect Impacts

The proposed works include, *inter alia*, installation of solar panels, construction of access tracks, construction of a 38kV substation and energy storage modules and installation of underground cabling. There are no instream works required at any location within the solar farm or on the grid connection route. The following watercourse crossings will be achieved using under crossings by trenching up to the existing culvert on either side and passing beneath with no bed disturbance:

- 1 no. undercrossing of Kealbrogreen Stream at Site LR6 (under the existing Ø 1.5m pipe culvert).

2 no. under crossings of minor, flowing watercourses at Site LR1 (upper Kealbrogreen Stream) and Site LR2 (upper tributary of Kealbrogreen), as part of the grid connection cabling. Both locations have an existing pipe culvert under the L3008 road that will be under crossed. The full project description is included in Section 2 of this report.

There is potential for run-off of deleterious substances from these works to the surrounding environment.

Potential conduits to Castlemaine Harbour SAC and Castlemaine Harbour SPA are the Kealbrogreen stream and Lissavane West stream, which flow into these European sites c.5.1km and 14.2km downstream respectively.

The potential significant effects on European sites as a result of the proposed development are primarily related to a change in water quality within Castlemaine Harbour SAC, as discussed below.

6.2.1 Construction Phase

Potential impacts resulting from construction phase civil engineering works near watercourses are primarily related to three sources of possible water borne pollutant loss: suspended sediment, concrete and hydrocarbons.

Suspended Solids: The principal source of potentially negative effects on aquatic receptors arises from the escape of excessive amounts of suspended sediment during the construction phase. Sediment export can occur as a result of earthworks and erosion of soil stockpiles and excavated areas relating to, e.g., access tracks, site compounds and underground cabling (trenching, watercourse under crossings). Machinery traversing lands during PV panel piling, mounting and installation, may generate

suspended solids, depending on the ground conditions. Low load bearing machines will be used to traverse ground, and only minimal soil disturbance is expected for this element of construction, however, whilst the majority of the land is 'high and dry' with inherently low risk of erosion, there is very wet ground bordering the ephemeral Lissavane West stream which will require management in the construction phase.

Installation of new access tracks involves linear construction within green fields on lands that are, in general, gently rolling to flat. This increases the potential effectiveness of runoff controls (e.g. temporary check dams, silt fencing), i.e., compared to broad-scale excavations or full field ploughing, the latter of which is ordinarily practiced in agricultural settings. Permeable (compacted gravel) access tracks will have over-the-edge drainage to vegetated ground, with existing onsite drainage features (ephemeral field perimeter drains) and infiltration patterns remaining unchanged.

Escaped solids (if this did occur) can settle in watercourses; smothering of plants and macroinvertebrates, causing fish to abandon the area at least in the short-term. At worst, such sedimentation could occur over localised trout spawning beds of the Kealbrogreen Stream. This could (depending on the amount and the timing) result in reduced recruitment of young fish from affected reaches because of localised egg and fry mortalities. Elevated concentrations of suspended solids and resulting turbidity within the water column can also potentially damage the gills, physiology and behaviour of fish (e.g., respiration, migration) and/or benthic macroinvertebrates (e.g., respiration, drift responses). Brook lampreys also depend on clean gravels for spawning, and although very little lamprey nursery habitat was identified in the upper Kealbrogreen Stream, brook lamprey could be spawning locally with juveniles dropping downstream to areas of silt deposition for their nursery stage.

The Lissavane West tributary of the Kealbrogreen receives most of the drainage from the proposed development. It is ephemeral (dry in August 2025) with no fisheries significance and any escaped solids would likely settle out within a short distance of their source especially given the instream aquatic plant density and low gradient nature of the channel.

As detailed within the Aquatic EclA (Appendix B), the greater proportion of soil stripping occurs in the Lissavane West water subcatchment (temporary works compound, substation, ESS compound, access tracks, panel arrays, Interconnectors) which has a high level of inherent attenuation owing the land form and naturally depositing nature of the watercourse. The lesser proportion of construction works occur in the direct water drainage subcatchment of the Kealbrogreen itself.

Placed in context, the proposed soil stripping activity is of a low magnitude, set back from watercourses and is mainly linear (i.e., access tracks, cabling), which is of a much lesser scale compared to e.g., entire field ploughing, which routinely occurs in the absence of dedicated controls in these types of agricultural settings.

While the risk of uncontrolled sediment loss from the proposed works is considered to be low, in the absence of appropriate construction strategy and environmental controls, the potential for adverse effects on water quality (temporarily elevated turbidity) of the Kealbrogreen Stream cannot be excluded.

Castlemaine Harbour SAC is located 5.1km downstream of the proposed site via the Kealbrogreen Stream. At that separation distance, whilst unlikely to occur, temporary to short term significant effects cannot be ruled out (in the absence of site-specific mitigation in the area of sediment loss controls). Such effects would be related to impact on salmon and lamprey spawning / nursery habitat, primarily of the lower Kealbrogreen Stream where there is habitat diversity suitable to support salmon.

For example, sediment loss may affect ex-situ salmon and lamprey habitat of the Kealbrogreen Stream which contributes (in a small way in a catchment context) to the Conservation Objectives for these Annex II QI species of the SAC.

Cement: Relatively small amounts of liquid cement usage will be required during the solar farm construction phase, e.g., transformer plinths. There will be no on-site batching of concrete and no washing out of concrete batch delivery trucks on-site. Interconnector and GCR joint bays utilise precast concrete units. Owing to its highly alkaline and corrosive nature, cement is potentially toxic to instream fauna and can cause fish and invertebrate kills downstream if it did reach watercourses. However, the likelihood of this occurring is very low and inherently limited using best construction practice around concrete usage. Concrete usage during the solar farm construction period will have no likely significant negative effects on aquatic receptors as there are limited sources of concrete contamination and very distant (and attenuated) pathways to sensitive aquatic habitats.

Hydrocarbons: Hydrocarbon spills and leakages can result in oil slicks and tainting of fish, or (if large enough) fish and invertebrate kills. They can be very detrimental to salmonid eggs and young fry in spawning areas. Hydrocarbons can reach drains and watercourses as a result of spills and leakage from poorly secured or non-bunded fuel storage areas; spills during re-fuelling; leaks from on-site vehicles, plant and equipment.

It is considered that the main area of risk for hydrocarbon contamination is in relation to the temporary construction compound in the western parcel (near Site LR6), noting, that there is a 10m undisturbed buffer zone between the compound and the watercourse built into the proposal.

Temporary compounds in the eastern parcel are distant from watercourses (>100m) that possess fisheries significance, and it is very unlikely owing to the long pathways (comprising ephemeral, vegetated drains), that sources of hydrocarbon contamination would reach sensitive aquatic receptors.

Whilst likelihood of hydrocarbon loss occurring from a well-managed construction site is low, i.e., employing best construction practice in terms of fuel storage and management, if there was no mitigation and an accidental leak or spillage occurred, the effects could be (at worst) localised, short term, significant negative, affecting aquatic receptors (fish and macroinvertebrates) primarily at the Kealbrogreen Stream (Site LR6) and downstream.

Stream Undercrossings: Whilst there are no instream works involved, under crossings require trenching up to the existing culvert or drain, with risk of contaminants entering, primarily suspended solids. In the absence of dedicated environmental controls elevated levels of suspended solids may escape downstream, potentially affecting fisheries and macroinvertebrate habitat, at least locally. Given that there are no instream works involved, and considering the small scale and temporary nature of the proposed under crossing works, the impact on downstream aquatic receptors is likely to be at worst, temporary, reversible, imperceptible to slight negative locally at LR6 (33kV Interconnector) owing to brief turbidity and/or temporary sedimentation, the latter of which will wash out during a subsequent rain event in this spate driven system.

6.2.2 Operational Phase

During the operational phase, the proposed solar arrays are on generally flat-to-gently-rolling topography and will continue to be drained by existing on-site field drains which flow, mainly towards the ephemeral Lissvane West watercourse and a proportion to the Kealbrogreen Stream. The discharge rates shall be the equivalent of greenfield conditions, with no alteration to natural flow patterns and hence no significant change to the hydrological regime of the lands in question. It is envisaged that

either mowing or low intensity sheep grazing will be the principal means of managing grass growth levels on the site during operation, meaning the site will continue to be vegetated. This is consistent with best practice measures contained within the UK BRE Planning Guidelines for the development of ground mounted solar PV systems. Because of the proposed management, run-off rates will not differ significantly from existing green-field rates and the potential for erosion linked to concentrated run-off from panels is therefore considered low.

There will be no additional soil disturbance during the 40-year operation phase, meaning a negligible release of sediment to the watercourses associated with the proposed development. The sediment export rates will likely be similar or less compared to the current situation because there will be no ploughing/reseeding of fields (as would otherwise be common agricultural practice over a 40-year time scale). The development includes a 10m set-back at a minimum from all watercourses and drains. These buffers, which currently comprise improved/ neutral grassland or wet grassland, will be enhanced through management as tussocky grassland. The proposal also includes introduction of 553 linear metres of new hedgerow planting, as well as the bolstering of an additional 7,077 linear metres where necessary, some of which is in riparian zones. Once established, these setbacks and plantings will enhance filtering function and on-site nutrient and sediment attenuation, helping to protect receiving watercourses and downstream European sites. Panels will be cleaned with pure water (no chemical additives). No herbicide use is proposed during the operational phase.

Given there are no significant sources of contaminants from the operational panel array, nor their maintenance, and no further soil disturbance, there is virtually no risk of contaminated run-off having any significant impact on watercourses during operation. Overall, the effect over the 40-year lifespan of the project is potentially a long-term positive on water quality and aquatic receptors, including downstream European sites, as there will be a likely reduction in intensity of agricultural activity on the land parcels and consequent net reduction over 40-years in commonly associated agriculture emissions to surface waters.

6.3 Assessment of Habitats and Species of Conservation Interest

The site-specific Conservation Objectives for relevant qualifying interests for Castlemaine Harbour SAC are presented in Section 4.2. This section assesses the likelihood of the proposed development impacting the site-specific conservation objectives assigned for the relevant qualifying interests of Castlemaine Harbour SAC, namely sea lamprey, river lamprey and Atlantic salmon.

Attributes and proposed targets to maintain favourable conservation condition for these species, in addition to potential impacts are presented in Table 6-1 below.

Table 6-1: Potential Impacts on the Specific Conservation Objectives for the Relevant Qualifying Species of Castlemaine Harbour SAC (NPWS, 201)

Conservation Objectives Castlemaine Harbour SAC (Site specific cons obj (npws.ie))			
Sea Lamprey <i>Petromyzon marinus</i> [1095] To maintain the favourable conservation condition of Sea lamprey in Castlemaine Harbour SAC, which is defined by the following list of attributes and targets:			
Attribute	Measure	Target	Potential Impacts
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	No: the proposed development will not introduce barriers to lamprey

Population structure of juveniles	Number of age/size groups	At least three age/size groups present	No: no alteration in the population structure of juveniles is expected to arise from the proposals
Juvenile density in fine sediment	Juveniles/m ²	Juvenile density at least 1/m ²	No: there is no juvenile sea lamprey nursery habitat in the 1st and 2nd order Kealbrogheen Stream adjacent to the proposed development and the stream is too small and unsuitable for sea lamprey spawning for at least 1.7km or more downstream of the proposal, with very limited sediment deposition to provide juvenile habitat that could act as larval pheromone attractant to sea lamprey to use this tributary. This is in combination with the migration barrier posed by the road culvert at Site LR12. The proposed development will not affect this attribute.
Extent and distribution of spawning habitat	m ² and occurrence	No decline in extent and distribution of spawning beds	No: there is no sea lamprey spawning habitat in the Kealbrogheen Stream adjacent to the proposed development and the stream is too small and unsuitable for sea lamprey spawning for at least 1.7km or more downstream of the proposal, with very limited sediment deposition to provide juvenile habitat that could act as larval pheromone attractant to sea lamprey to use this tributary. This is in combination with the migration barrier posed by the road culvert at Site LR12. The proposed development will not affect this attribute.
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	No, the proposal will not affect the availability of juvenile lamprey habitat in any way.
River Lamprey <i>Lampetra fluviatilis</i> [1099] To maintain the favourable conservation condition of Sea lamprey in Castlemaine Harbour SAC, which is defined by the following list of attributes and targets:			
Attribute	Measure	Target	Potential Impacts
Extent of anadromy	% of river accessible	Greater than 75% of main stem length accessible from estuary	No: the proposed development will not introduce barriers to lamprey
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	No: no alteration in the population structure of juveniles is expected to arise from the proposals

Juvenile density in fine sediment	Juveniles/m ²	Mean catchment juvenile density of brook/river lamprey at least 2/m ²	No, there is no juvenile lamprey nursery habitat in the Kealbrogheen Stream adjacent to the proposed development and the stream is too small and unsuitable for sea lamprey spawning for at least 1.7km or more downstream of the proposal, with very limited sediment deposition to provide juvenile habitat that could act as larval pheromone attractant to river lamprey to use this tributary. This is in combination with the migration barrier posed by the road culvert at Site LR12. The proposed development will not affect this attribute.
Extent and distribution of spawning habitat	m ² and occurrence	No decline in extent and distribution of spawning beds	There is no river lamprey spawning habitat in the 1st or 2nd order Kealbrogheen Stream adjacent to the proposed development and the stream is too small and unsuitable for sea lamprey spawning for at least 1.7km or more downstream of the proposal, with very limited sediment deposition to act as juvenile habitat that would attract lamprey (i.e., no larval lamprey pheromone) into this tributary. The proposed development will not affect this attribute.
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	No, the proposal will not affect the availability of juvenile lamprey habitat in any way.
Atlantic Salmon <i>Salmo salar</i> (only in fresh water) [1106] To maintain the favourable conservation condition of Sea lamprey in Castlemaine Harbour SAC, which is defined by the following list of attributes and targets:			
Attribute	Measure	Target	Potential Impacts
Extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	No: the proposed works will not result in a change in the accessibility of rivers.
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	Yes, applying the precautionary principle and in the absence of mitigation, there is conservatively potential for adverse impacts on adult salmon as a result of excessive sedimentation or the mobilisation of contaminants within surface water

			run-off to the downstream 3rd order reaches of the Kealbroggen during the construction phase.
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Yes, applying the precautionary principle and in the absence of mitigation, there is conservatively potential for adverse impacts on salmon fry as a result of excessive sedimentation or the mobilisation of contaminants within surface water run-off during the construction phase.
Out-migrating smolt abundance	Number	No significant decline	No: the proposed works would not be expected to have an adverse impact on out-migrating smolt
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Yes, applying the precautionary principle and in the absence of mitigation, there is conservatively potential for adverse impacts on salmon spawning redds, more likely in the lower Kealbroggen where it becomes 3rd order (1.7km downstream of the proposed development site) as a result of excessive sedimentation or the mobilisation of contaminants within surface water run-off during the construction phase.
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA. 85% of relevant sites currently at least Q4 on Laune.	Yes, applying the precautionary principle and in the absence of mitigation, there is conservatively potential for a reduction in Q value in the River Laune, cumulatively with other catchment activities, as a result of mobilisation of contaminants and excessive sedimentation within surface water run-off during the construction phase.

6.4 In-combination Impacts

It is a requirement of Appropriate Assessment that the in-combination effects of the proposed development together with other Plans or projects are assessed. In-combination impacts can result from the successive, incremental, and/or combined effects of a development (plan, project or activity) when added to other existing, planned, and/or reasonably anticipated developments.

A search of the Kerry County Council planning enquiry system¹⁴ and An Coimisiún Pleanála website was conducted for developments that may have in-combination effects on European sites with the proposed development. The search included developments that are proximal to the proposed site and

¹⁴ <http://maps.kerrycoco.ie/flexviewers/kerrymaps/>

those that may have an adverse cumulative or in-combination impact with the proposals on the water quality of Castlemaine Harbour SAC.

Plans relevant to the area were searched in order to identify any elements of the Plans that may act cumulatively or in-combination with the proposed development.

A list of those projects and Plans which may potentially contribute to cumulative or in-combination impacts with the proposed development was generated for as listed in Table 6-2 below.

Table 6-2: List of Potential Plans which may Contribute to Cumulative Impacts

Plan / Programme/Policy	Key Objectives/Policies/Proposals	Potential for In-combination Effects and Mitigation
Kerry County Development Plan 2022-2028	Kerry County Development Plan includes the following Objectives of relevance to this report: KCDP 11-1: Ensure that the requirements of relevant EU and national legislation, are complied with by the Council in undertaking its functions, including the requirements of the EU Birds and Habitats Directives. KCDP 11-2: Maintain the nature conservation value and integrity of Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). This shall include any other sites that may be designated at national level during the lifetime of the plan in co-operation with relevant state agencies. KCDP 11-16: Ensure invasive species are managed in compliance with the provisions of the EC (Birds and Habitats) Regulations (SI 477 of 2011), as amended, particularly Sections 49, 50 and the Third Schedule. Best practices, as produced and updated by relevant authorities, are to be adhered to in the management of invasive species particularly on sites proposed for development.	Policies and objectives of the Kerry County Development Plan 2022-2028 ensure that local planning applications comply with proper planning and sustainability and with the requirements of relevant EU Directives and environmental considerations, there is no potential for adverse in-combination effects on European Sites.
Water Action Management Plan 2024	The Water Action Plan includes targeted measures for all water bodies, with the objective of either protecting water bodies at good or high status or restoring water bodies to at least good status. Where further specific measures are needed in addition to those set in this plan, integrated catchment planning approaches will be used to identify and decide on further specific measures for each water body. This will be reported in 46 Catchment Management Work Plans. These will be used to locate measures within each catchment. The list of water bodies and their associated status, significant pressures/issues and targeted measures, which are to be included in the Catchment Management Work Plans, will	The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination effects with the proposed development.

	include targets for the third-cycle, along with Key Performance Indicators to monitor progress and outcomes.	
Uisce Éireann Capital Investment Plan 2020-2024 and Strategic Funding Plan 2025-2029	Proposals to upgrade and secure water services and water treatment services countrywide.	Likely net positive impact due to water conservation and more effective treatment of water.
WWTP discharges	Milltown	Discharges from municipal WWTPs are required to meet water quality standards. Irish Water Capital Investment Plan 2020-2024 and Strategic Funding Plan 2025-2029 to upgrade water treatment services countrywide. The long-term in-combination impact is predicted to be negligible.
IPPC Programme	Temmler Ireland Limited (P0813), located c.7km to the west of the site	Discharges from these facilities are governed by strict limits to ensure compliance with quality standards. The long-term in-combination impact is predicted to be negligible.
Solar Farm (KCC Planning Ref: 171305)	10 years permission for a solar farm within a site area of 10.19 hectares comprising: (a) approximately 32,000 sqm of photovoltaic panels on ground mounted frames, (b) a new vehicular entrance onto R563, (c) 1 no. single storey substation, (d) 2 no. single storey inverter stations, (e) 1 no. switchgear station, (f) 1 no. battery storage station, (g) security fencing, (h) satellite mast, (i) CCTV, (j) underground cable ducts, (k) a temporary site compound area and ancillary facilities and (l) all associated ancillary landscape and development works at a site at Knockreagh, Milltown, Killarney, Co. Kerry.	The AASR prepared for the development found that no significant effects arising from the development are likely to occur in relation to Natura 2000 sites. The development site is not part of any designated Natura 2000 site and does not require any resources from them. There is hydrological connectivity between the proposed site and Castlemaine Harbour SAC and Castlemaine Harbour SPA, however no likely significant effects were envisaged. This site is in a separate water catchment to the Laurel Ridge Solar Farm proposal. It is set in the Maine_050 RWB. The Laurel Ridge GCR does run for 1.1km within the upper Maine_050 RWB, but with no watercourse or drain interactions. There is no potential for likely significant cumulative effects on aquatic ecological receptors. No potential for likely significant in-combination effects has been identified.

Maine Solar Farm (KCC Planning Ref: 1783)	Permission for ten years for the development of a solar pv farm consisting of up to 26,550 sq.m. of solar panels on ground mounted steel frames, 4 no. inverter cabins, 1 no. single storey substation / control building, access tracks, boundary fencing, CCTV stands, 3 no. new site entrances, underground services, temporary construction compound and all associated ancillary development works	The AASR completed for the development concluded that no significant impacts to Natura 2000 sites were likely to ensue from the proposed solar farm. The site is 3.5km downstream of the proposed Laurel Ridge Solar Farm on the Kealbrogeen Stream. If construction phases coincided some cumulative waterborne pollutant losses could occur to the Kealbrogeen, but this would be extremely unlikely give the separation distance and the level of on-site attenuation offered by the Laurel Ridge lands. There are no significant cumulative effects on aquatic ecological receptors predicted. No potential for likely significant in-combination effects has been identified.
Housing Development (KCC Planning Ref: 19553)	1) Permission to construct access road and services and 2) Outline Permission to construct 3 no. dwelling houses c/w treatment units and polishing filters, all in accordance with plans and particulars submitted at Listry, Co. Kerry.	No Appropriate Assessment reporting for the development was found during a search of the planning database. However, the site is in a separate water catchment to the Laurel Ridge Solar Farm proposal (It is set in the Gweestin_040 RWB.). No significant cumulative effects on aquatic ecological receptors are predicted. No potential for likely significant in-combination effects on European sites has been identified.
Battery Arrays (KCC Planning Ref: 21/739)	Installation of battery arrays, located within container units (20 number units, each 30m² by c.2.6m tall), a control building (c.160m² by c.6.4m tall) and transformer (c.5m tall). The development will include for ancillary infrastructure including step-up transformers, security fencing, lighting, CCTV, internal access roads and drainage.	The NIS for the development prepared by Malone O'Regan found that there is potential hydrological connectivity between the proposed site and Castlemaine Harbour SAC and Castlemaine Harbour SPA. The NIS concluded that the Proposed Development, including the appropriate mitigation measures will not result in any adverse impacts to Natura 2000 sites. No potential for likely significant in-combination effects has been identified.

Retention permission (ABP Ref: 308030)	Retention permission for existing excavation works and construction of a new calf rearing house.	The ABP planning inspectors report concluded that: On the issue of appropriate assessment screening under the Habitats Directive (92/43/EEC) having regard to the nature and scale of the proposed development and nature of the receiving environment, the possible impacts arising from the project relate to possible impacts arising from farm waste. As the proposal relates to an existing farm enterprise with provision for adequate effluent storage and compliance with SI No 605/2017 – European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017 I consider that it is reasonable to conclude that there is no potential for significant effects and that therefore Appropriate Assessment is not required. It is not considered that the proposed development would be likely to have a significant effect individually or in combination with other plans or projects on a European Site. No potential for likely significant in-combination effects has been identified.
Housing Development (ABP Ref: 315563)	Planning permission for 3 houses and associated site works	The ABP planning inspectors report concluded that: Having regard to the modest nature and scale of development and absence of connectivity to European sites, it is concluded that no Appropriate Assessment issues arise as the proposed development would not be likely to have a significant effect individually or in combination with other plans or projects on a European site. No potential for likely significant in-combination effects has been identified.

No aspects of the projects or Plans summarised in Table 6-2 are anticipated to have a significant adverse effect upon the European Sites in combination with the proposed development.

6.5 Conclusion of Impact Assessment

The proposed site is located c.5.1km upstream of Castlemaine Harbour SAC. In the absence of mitigation, there is potential for run-off of deleterious substances within surface water to reach the River Laune and Castlemaine Harbour SAC via the Kealbrogheen stream and Lissavane West stream to impact on the aquatic QI species Atlantic salmon.

The proposed site and its environs support a low number of relatively small-scale developments that have been granted planning permission. These developments have been granted planning permission on the basis that, where relevant, targeted and site-specific mitigation is completed to minimise potential impacts to Castlemaine Harbour SAC. With the implementation of best practice construction methods and mitigation measures for all other developments, then no significant negative cumulative and in-combination impacts on the water quality of Castlemaine Harbour SAC with the proposed development are expected.

All possible sources of effects from the proposed development, in combination with all other sources in the existing environment and any other effects likely to arise from other proposed plans or projects have been identified.

Robust and effective mitigation measures to avoid and or ameliorate these impacts are provided in Section 7.

7 Mitigation

As stated in MN2000:

“Mitigation measures may be proposed by the plan or project proponent and/or required by the competent national authorities in order to avoid the potential impacts identified in the appropriate assessment or reduce them to a level where they will no longer adversely affect the site’s integrity” (Section 4.6.6).

Potential impacts identified in the above chapters primarily relate to the deterioration in the water quality of the River Laune, which forms part of Castlemaine Harbour SAC, during the construction phase of the proposed development. Mitigation measures to avoid or reduce the potential impacts on Castlemaine Harbour SAC are provided in the following sections.

7.1 Construction Phase

7.1.1 General

Measures to be used to protect aquatic ecology and fisheries during the construction works shall follow the relevant sections of the following Guidelines and TII Standards:

- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII/NRA, 2008).
- Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016).
- CIRIA C648 (Murnane et al. 2006) Control of water pollution from linear construction projects. Technical guidance.
- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020)

The CEMP (HWP, 2025) and CMS (TLI, 2025) set out best practise methods and specific measures in relation to the solar farm (plus interconnectors), substation, ESS compound and GCR covering the construction, operation and decommissioning phases. Contractors will be obliged to adopt the CEMP and the CMS as their own and adhere to its contents, updated to include any requirements conditioned in the planning permission. A Site Environmental Manager (SEM) acting as Ecological Clerk of Works (ECoW) shall be appointed within the contractor team to ensure all construction phase mitigation measures are implemented.

IFI will be notified well in advance of the construction commencement in relation to the 2 no. under crossings of the Kealbrogheen (Sites LR6 and LR1) and its small tributary stream (Site LR2). These under crossings are not subject to timing restrictions as they do not involve instream works, but IFI will be made aware that works are to commence and will be provided with a copy of the construction method statement. Table 7-1 and Table 7-2 below, detail construction phase and operation phase impact mitigation and standard construction practices.

7.1.2 Construction Phase Mitigation

Table 7-1: Construction Phase Mitigation Measures

Objective	Measure	Details of Mitigation
Water quality and Aquatic habitat protection	Temporary Works Drainage Management	During excavation and construction of access tracks and associated over the edge drainage: on tracks that run directly downhill towards watercourses and field boundary drains, there must be a series of temporary gravel check-dams, as necessary, installed along the parallel drainage flow path to attenuate and slow run-off velocities during the construction phase. These must remain in place until such time as the track surfaces have bedded in and over-the-edge drainage pathways have revegetated. Temporary check dams may be removed following revegetation of these drainage pathways. During soil excavation associated with temporary site compound area construction there must be temporary silt fencing installed on the downslope leading to any minor field drain. Any existing preferential over-land flow paths or inactive field drains between e.g., access tracks, temporary compound areas, must be bunded or have temporary check dams installed prior to works commencing to prevent escapement of suspended solids to downstream drains / streams. The ephemeral drain represented by Site LR9 (see Aquatic EclA, Appendix A) will generally be dry, however, during the main period of soil stripping for the temporary works compound, substation and ESS compound it will have a series of check dams installed (staked down geotextile wrapped hay bales) to slow run-off and facilitate onsite attenuation of sediment.
Water quality and Aquatic habitat protection – culvert under crossings	IFI Consultation	There are no instream works required, but IFI will be contacted and consulted prior to culvert under crossing works commencing at Site LR6 (33kV Interconnector), LR1 and LR2 (GCR). A copy of the CMS relating to the construction methods must be provided.
Water quality and Aquatic habitat protection – culvert under crossings	Timing of Under Crossing Works	The culvert under crossings (LR6, LR1, LR2) are not likely to be subject to timing restrictions that apply to the closed fisheries season, so long as suitable mitigation measures are in place to prevent sediment wash out. However, the timing of these works will be agreed with IFI well in advance of their commencement.
Water quality and Aquatic habitat protection – culvert under crossings	Best Practice during Culvert Under Crossing Works	There must be no discharge of suspended solids or any other deleterious matter to watercourses during the under crossing work. Any silt contaminated water from the works area must be treated prior to discharge. The contractor shall employ best practice sediment control methods to ensure sediment and other pollutants are not entrained to the watercourse. There must be no direct discharge (e.g., pumping) of silt/sediment laden water from the works to the active watercourse at any time.
Water quality and Aquatic habitat protection – drain under crossings	Best Practice during Drain Under Crossing Works	The on-site land drains dry out regularly, especially from late spring to early autumn. Drain undercrossing construction shall be timed (where possible) to coincide with them being dry.
Water quality and Aquatic habitat protection	Best Practice during	The 10m exclusion zone along the Lissavane West watercourse shall be staked and roped off in advance of construction works in

habitat protection	Construction – wet grassland management at Lissavane West watercourse	that vicinity. This will clearly mark out the exclusion zone for vehicles and machinery during construction and retain an undisturbed buffer. Installation of solar arrays in wet grassland towards the southern site boundary shall be carried out either in the dry summer months (when the land has dried out) or with the use of bog mats to accommodate tracking machinery. The access track will require excavation down to ground of sufficient competence before laying geotextile, stone and gravel material to form the track surface. This will be carried out either in the dry summer months (when the land has dried out) or with the use of bog mats to accommodate tracking machinery required.
Water quality and Aquatic habitat protection	Best Practice during Construction – riparian management, Kealbrogheen Stream	The 10m exclusion zone along the Kealbrogheen Stream at the western boundary of the easternmost parcel shall be staked and roped off during the entire construction period. This will clearly mark out the exclusion zone for vehicles and machinery during construction and retain an undisturbed buffer.
Prevention of spread of pathogens and invasive species	Biosecurity Measures	Transfer of invasive plant species between sites within catchments and to other catchments must be prevented. An invasive species management plan will include the requirement for a pre-construction invasive alien plant survey at watercourse crossings and along any cable trenching routes. The final Construction Method Statement shall set out methods for management and prevention of invasive species transfer.
Prevention and control of sediment loss	Best Management Practice – Cable Trenching	All trenching works shall be undertaken using a cut and fill procedure to ensure that only short sections of the trench ($\leq 100\text{m}$) are open at any time as set out in the CEMP. Any run-off water which gathers in an excavated trench must be collected and treated appropriately using Best Practice methods (e.g., silt bags, settlement systems) before being discharged. There will be no discharge of silt contaminated pump-out water to on-site drains or watercourses. Spoil heaps are unlikely to accumulate because trenches will be immediately back filled following ducting installation. Any freshly excavated spoil must be retained in an area over 10m away from any drain or watercourse until such time as the trench is refilled. The spoil heap must be located on either a well vegetated area surrounded by silt fencing or with the use of containment measures (geotextile mat or bag) and covered to reduce potential for sediment export. A ready supply of these materials must be always onsite to deal with such eventualities. Where ancillary onsite drains are crossed with underground ducting, the release of sediment over baseline conditions will be prevented by the use of silt traps, check dams and/or bunds (including the use of staked down geotextile wrapped haybales) in dry or stagnant drains. These will be put in place on either side of the dry drain crossing location in advance of construction works.
Prevention and control of sediment loss	Water management -	Drain crossings (4 no.) will be carried out using open trenching and timed to occur when the drain is dry, which it is for the majority of the year. However, in the unlikely event there was

	Interconnector drain crossing	water in the drain, a dam and pump over system will be employed to create a dry working area for cable installation. There is no timing restriction for instream works in this ephemeral drain as it has no aquatic ecological or fisheries value.
Prevention and control of sediment loss	Best Management Practice – Soil storage	Soil stripped in the construction of access tracks, temporary compound areas, substation and ESS compound may be stored temporarily for reuse in reinstatement. Such material will be stored not less than 10m from any on-site drain and must be tamped down, reseeded with grass and allowed to revegetate for the duration of the construction phase. The stockpiles will be surrounded by well staked silt fencing.
Prevention and control of sediment loss	Best Management Practice – Soil spreading	Stripped soil that is used for site infill, will be tamped down and immediately rolled and reseeded with an appropriate grass seed mix to establish vegetative cover and reduce potential solids washout. Any localised agricultural drains should have temporary bunds (e.g., earthen or stake + geotextile) installed to prevent waterborne sediment run-off until such time as the surrounding areas have revegetated.
Avoid Hydrocarbon Loss	Best Management Practice – Hydrocarbons	No storage of hydrocarbons or any polluting chemicals can occur within 50m of watercourses or surface water features. Any diesel or fuel oils stored on site will be bunded to 110% of the capacity of the storage tank. Design and installation of fuel tanks to be in accordance with best practice guidelines and oil storage guidelines. Drip trays and spill kits must be kept available on site. Temporary parking and refuelling areas must be designated within the construction compound. These areas will be at least 50m away from watercourses and drains.
Overseeing of environmental controls	Monitoring during Construction	A suitably qualified Site Environmental Manager acting as an Ecological Clerk of Works (ECow) will be employed to oversee the construction phase, including any advance works period, to ensure compliance with methods, mitigation measures and monitoring set out in the CMS / CEMP and Section 8 of this document. The ECow will be present during key parts of the construction phase, i.e., culvert under crossings, to protect water quality and avoid potential impacts on aquatic receptors. See the CEMP accompanying the planning application for details of the ECow role and responsibilities.

7.1.3 Operational Phase Mitigation

Table 7-2: Operation Phase Mitigation Measures

Objective	Measure	Details of Mitigation
Water quality and Aquatic habitat protection	Buffer zone management	To ensure the continued functioning of buffer zones alongside on-site drainage ditches and streams, the riparian vegetation shall be protected by exclusion of continual grazing and shall be managed as tussocky grassland. Vegetation growth in these areas will need to be managed by either grazing or mowing between September 15 th and February 28 th to encourage a rich and diverse sward which enhances the filtering and attenuation function. The riparian habitat adjacent to the Kealbrogeen Stream in the westernmost parcel of the solar farm is currently open, with

		disturbed vegetation dominated by Gorse. This area of riparian habitat will be enhanced with scattered plantings of suitable native tree species, (e.g., alder, hawthorn, willow). These shall be set back from the watercourse in groups so as not to create a tunnelling effect. The watercourse through this reach will be appropriately fenced so as not to exclude wildlife, such as otter, but to prevent stock access which is currently degrading the reach. An alternative drinking supply for animals shall be provided so the stream is not continually accessed by stock during the operational phase.
Water quality and Aquatic habitat protection	Drainage Maintenance	Access tracks will be embedded in with over-the-edge drainage to vegetated ground. The access tracks and any parallel, vegetated flow paths will be subject to routine maintenance and repair, as required, to ensure no obvious erosion and sediment washout is occurring. Over the course of the operation phase, observations shall be made during regular site visits. If there are any obvious erosion hot-spots on preferential flow paths from access tracks, then necessary surface repairs will be carried out as soon as practicable, with additional check-dams installed (and allowed to revegetate) into the preferential drainage flow path, where required to increase attenuation and slow run-off velocity locally.

7.2 Monitoring

A suitably qualified Site Environmental Manager (SEM) acting as an Ecological Clerk of Works (ECoW) will be appointed to oversee the implementation of the outlined mitigation strategy during the construction, operational and eventual decommissioning stage of the project. The role and responsibilities of the ECoW are set out in the CEMP. Monitoring shall be conducted as described below.

Daily water quality checks (twice daily during wet weather conditions) at watercourses downstream of active works sites including:

- A visual check of turbidity levels for obvious signs of sediment loss from the construction site;
- Upstream / downstream measurements during and after rainfall events (i.e., when the site is hydrologically active) using a calibrated hand-held turbidity probe. This applies to the Kealbrogeen Stream at Site LR3 (upstream) and between Sites LR6 and LR7 (downstream of the Lissavane West stream confluence). Refer to Figure 5-1 and Table 5-2 (above) for monitoring site locations. If there is a difference in turbidity readings that can be attributed to the construction site activity, additional on-site silt control measures shall be implemented.
- A visual check for evidence of oil slicks.
- Daily inspections of all silt fencing and other silt control measures for integrity and efficacy.
- Monitoring the condition of roads around the temporary work compound, construction areas and local roads, with additional erosion prevention measures and road washing to be implemented where necessary.
- Checking weather forecasts to ensure suitable programming of earthworks activities and suspending earthworks during heavy rain.
- Twice daily visual checks of culvert undercrossing construction site areas will be conducted by the ECoW to ensure all standard sediment control measures are in place.
- The ECoW shall ensure all sediment control and water quality protection measures are in place until such time as the structures have been installed and surrounding vegetation has re-established.

Pre-construction Q-value sampling and analysis will be conducted on the Kealbrogheen Stream at Sites LR3, LR4 and LR7 in the summer/autumn prior to the construction phase and will be carried out in the same season: (1) during construction, and (2) the year post-construction. The results shall be provided to Kerry County Council to pass on to the Local Authority Waters Programme (LAWPRO). Refer to Figure 5-1 and Table 5-2 (above) for monitoring site locations. This will be carried out by a suitably qualified and experienced operator using standard EPA protocols for river monitoring (Toner et al., 2005).

7.3 Likely Success of Mitigation

The project specific mitigation provided in Section 7.1 supplements standard best practice measures provided in current best practice pollution prevention guidelines. With the effective implementation of these measures, there is a high level of confidence in their likely success. The measures in Section 7.1 are established and proven.

8 Analysis and Conclusions

8.1 Integrity of the European Site

From “Managing Natura 2000 sites: The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC” (EC, 2018), the meaning of integrity is described as follows:

‘The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site’s conservation objectives.’ (MN2000, Section 4.6.4).

8.2 Integrity of the Castlemaine Harbour SAC

Site specific Conservation Objectives were published for Castlemaine Harbour SAC in 2011. This document provides specific attributes and targets by which the maintenance of favourable conservation conditions of the relevant qualifying interests within Castlemaine Harbour SAC are measured. The overarching conservation objective for this European Site is as follows:

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected (see Section 4).

While potential exists for impacts to the qualifying interests of Castlemaine Harbour SAC during the construction phase of the proposed development, these can be readily mitigated through the implementation of the measures outlined in Section 7.

Following examination and analysis of the potential that is likely to result from the construction stage of the project and the mitigation measures proposed to avoid impacts to the SAC, the ‘Integrity of Site’ checklist is completed for Castlemaine Harbour SAC in Table 8-1 below.

Table 8-1: Integrity of Site Checklist for Castlemaine Harbour SAC

Conservation Objectives		
Does the project have the potential to:	Yes or No	Comment
Cause delays in progress towards achieving the conservation objectives of the site?	No	The Proposed Development will not cause delays in achieving the conservation objectives of the site. Potential impacts in the form of water quality deterioration to the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Interrupt progress towards achieving the conservation objectives of the site?	No	The Proposed Development will not interrupt progress towards achieving the conservation objectives of the site. Potential impacts in the form of water quality deterioration to the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Disrupt those factors that help to maintain the favourable conditions of the site?	No	The Proposed Development will not disrupt factors that help to maintain the favourable conditions of the site. Potential impacts in the form of water quality deterioration to the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .

Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No	The Proposed Development will not interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site. Potential impacts in the form of water quality deterioration to the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Other Indicators		
Does the project or plan have the potential to:		
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	No	Potential impacts in the form of water quality deterioration to the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No	Potential impacts in the form of water quality deterioration to the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No	Potential impacts in the form of water quality deterioration to the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Reduce the area of key habitats?	No	There will be no direct loss of key habitats within Castlemaine Harbour SAC. Potential indirect impacts may occur as a result of contaminated surface water run-off during the construction phase, but this can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Reduce the population of key species?	No	There will be no direct reduction of key species within Castlemaine Harbour SAC. Potential indirect impacts may occur as a result of contaminated surface water run-off during the construction phase, but this can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .
Change the balance between key species?	No	The Proposed Development will not change the balance between key species associated with Castlemaine Harbour SAC. Mitigation measures are prescribed to safeguard the River Laune and Castlemaine Harbour SAC. Required mitigation and standard best practice measures are outlined in Section 7 .
Reduce diversity of the site?	No	The Proposed Development will not reduce the diversity of Castlemaine Harbour SAC. Potential impacts through the deterioration of water quality in the River Laune and Castlemaine Harbour SAC can be readily mitigated. Required mitigation and standard best practice measures are outlined in Section 7 .

Result in disturbance that could affect population size or density or the balance between key species?	No	No impacts have been identified that would result in disturbance that could affect population size or density or balance between key species associated with Castlemaine Harbour SAC.
Result in fragmentation?	No	No impacts have been identified that would result in fragmentation of habitats for which Castlemaine Harbour SAC has been designated.
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.)?	No	No key features associated with the Castlemaine Harbour SAC will be lost as a result of construction or operation of the proposed development.

8.3 Conclusions

This NIS has been prepared having regard to the Department of the Environment, Heritage and Local Government guidance *‘Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities’* (DoEHLG, 2010a).

The assessment for the proposed development examines and analyses the potential adverse effects on the qualifying interests of European sites arising from the proposals. The assessment considers whether the proposed development works and operation, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any mitigation and standard best practice measures necessary to avoid, reduce or offset negative effects.

With the mitigation and standard best practice measures in Section 7 implemented in full, it can be objectively concluded that the proposed development at Milltown will not adversely affect the integrity of Castlemaine Harbour SAC in view of the site’s conservation objectives and that the conservation status of the qualifying interests will not be compromised by the proposed development directly, indirectly or cumulatively.

The key considerations that have contributed towards this conclusion are summarised as follows:

- The proposed development is not located within Castlemaine Harbour SAC. There are no resource requirements (e.g. excavation or abstraction) from European sites for the proposed development and no QI habitats or species have been recorded within the proposed site. Consequently, none of the lands designated as part of European sites will be directly impacted or removed as a result of the proposed development.
- No indirect impacts on the water quality of Castlemaine Harbour SAC are expected in relation to sediment or pollution laden surface water run-off during the construction phase of the proposed development due to the requirement for the proposed construction works to adhere to best practice construction guidelines and the specific mitigation measures provided in Section 7.
- No potential for likely significant effects on Castlemaine Harbour SAC during the operational phase has been identified.

The conclusion of this NIS is that there will be no potential for direct, indirect or cumulative impacts arising from the proposed Laurel Ridge Solar Farm either alone or in combination with any other plans or projects. The integrity of Castlemaine Harbour SAC will not be adversely affected. No reasonable scientific doubt remains as to the absence of such adverse effects.

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Appendix A: Appropriate Assessment Screening Report (AASR)

RECEIVED: 22/09/2025

Appropriate Assessment Screening Report

Laurel Ridge Solar Farm

Milltown

Co. Kerry

RECEIVED: 22/09/2025

Report prepared for Laurel Ridge Solar Farm Ltd

By Karen Banks MCIEEM

18th September 2025



Tel: 0834218641

Email: greenleafecology@outlook.com

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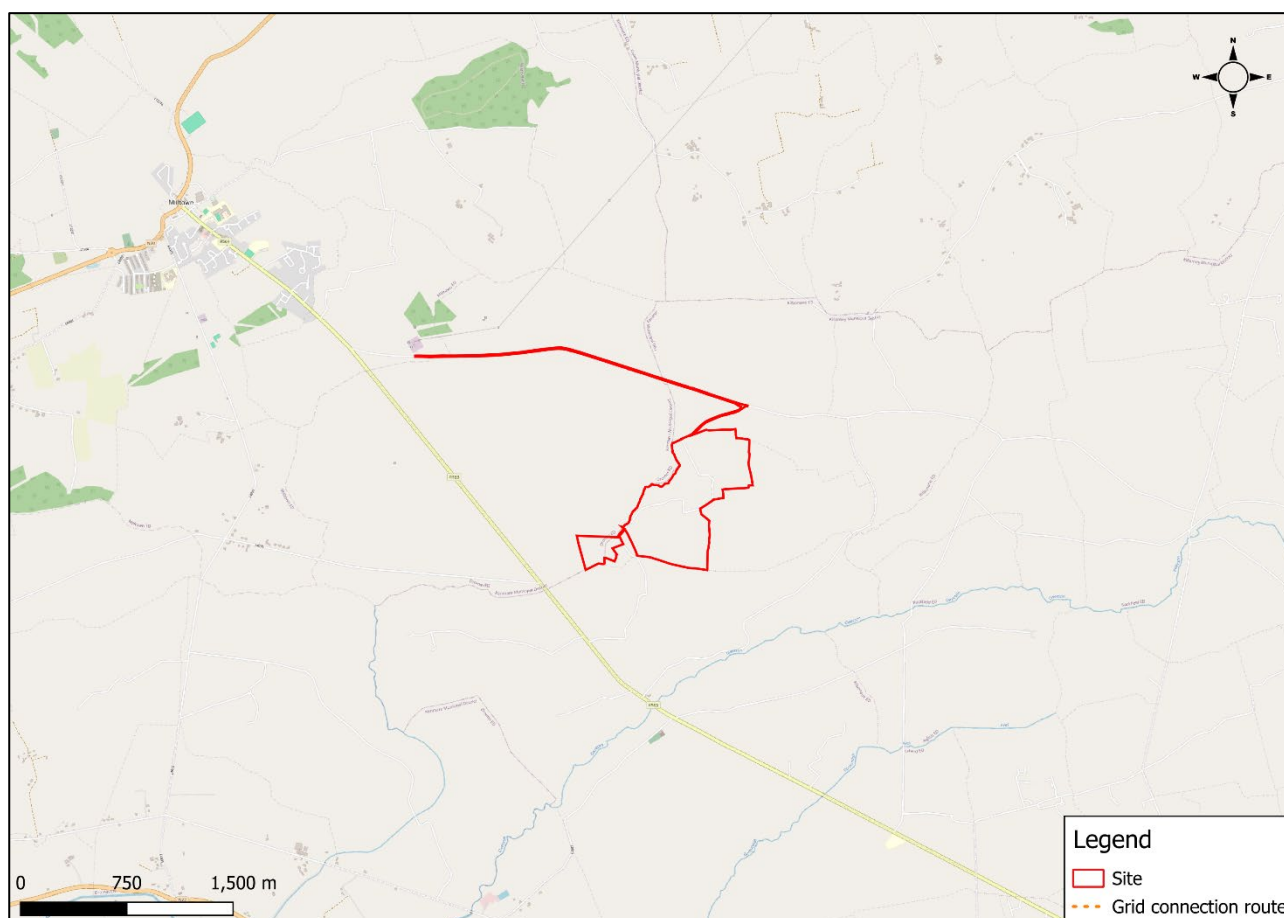
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1 Introduction

Greenleaf Ecology was commissioned by Laurel Ridge Solar Farm Ltd to prepare an Appropriate Assessment Screening Report (AASR) for the proposed development of a Solar Farm at Milltown, Co. Kerry (hereafter referred to as the “proposed development”) (see Figure 1-1).

This report comprises information in support of screening for AA to be undertaken by the competent authority for the purposes of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC), on the Conservation of Natural Habitats and of Wild Fauna and Flora as transposed by the Planning and Development Act (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) as amended.

Figure 1-1: Site Location Map



1.1 Legislative Context 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 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000.

The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Act (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended. In the context of the Proposed Development, the governing legislation is Part XAB of the Planning and Development Act (as amended).

Articles 6(3) of the Habitats Directive set out the decision-making tests for plans and projects likely to adversely affect the integrity of European sites (Annex 1.1). Article 6(3) establishes the requirement for AA:

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 or 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.

Natura 2000 sites are defined under the Habitats Directive (Article 3) as a coherent European ecological network of special areas of conservation, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range. In Ireland, these sites are designated as European sites and include Special Protection Areas (SPAs), established under the EU Birds Directive (79/409/EEC, as codified by 2009/147/EC) for birds and Special Areas of Conservation (SACs), established under the Habitats Directive 92/43/EEC for habitats and species.

The competent authority is obliged to consider, in view of best scientific knowledge, whether the proposed works are likely to have a significant effect either individually or in combination with other plans and projects. If screening determines that there is likely to be significant effects on a European site, then AA must be carried out for the proposed works at Milltown, including the compilation of a Natura Impact Statement (NIS) to inform the decision making by the Competent Authority.

1.2 Statement of Competence

This AA Screening was carried out by Karen Banks, MCIEEM. Karen is an ecologist with Greenleaf Ecology and has 19 years' experience in the field of ecological assessment. Karen has extensive experience in the production of reports to inform AA screenings and Natura Impact Statements including those for transport infrastructure, small to large scale housing and mixed-use developments, flood alleviation schemes, solar farms and wind farms.

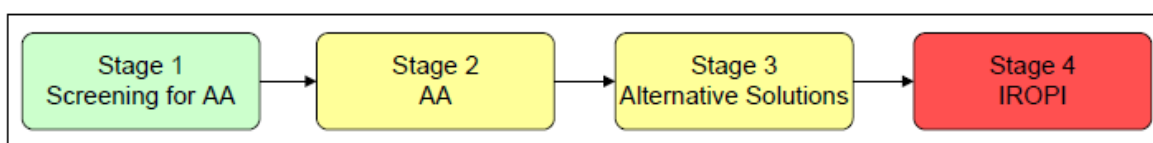
2 Methodology

2.1 Stages of Appropriate Assessment

The Department of the Environment, Heritage and Local Government guidelines (DELHG, 2009, rev. 2010) outlines the European Commission's methodological guidance (EC, 2002) promoting a four-stage process to complete the AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in Figure 2-1. Stages 1-2 deal with the main requirements for assessment under Article 6(3) of the Habitats Directive, and Regulation 42 of the European Communities (Birds and Natural Habitats) Regulations. Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

Figure 2-1: Four stages of Appropriate Assessment



Stage 1 - Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

- i. whether a plan or project (in this instance the proposed project) is directly connected to or necessary for the management of the European sites, and
- ii. whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on the European sites in view of their conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). This report fulfils the information necessary to enable the competent authority to screen the proposal for the requirement to prepare an AA.

This report forms Stage 1 of the AA process and sets out the following information:

- Description of the proposed works;
- Characteristics of the proximal European sites; and
- Assessment of significance of the proposed works on the European sites in question.

The methodology followed in relation to this assessment has had regard to the following guidance and legislation:

- European Union Habitats Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 92/43/EEC;
- Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities (DOEHLG 2009, rev 2010);
- The Planning and Development Act, 2000 (as amended);
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2018);
- European Commission Notice Brussels C (2021) 6913 final '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' (EC, 2021);
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission 2013;
- The European Union (Environmental Impact Assessment and Habitats) Regulations 2011; and

- The European Communities (Birds and Natural Habitats) Regulations, S.I. No. 477 of 2011 (as amended).

2.2 Information consulted for this report

The Screening assessment had regard to the following sources of data and information:

- Information on the location, nature and design of the proposed project provided by RPS;
- Department of Housing, Planning, and Local Government – online land use mapping [Home - My Plan](#);
- Department of Housing, Planning, and Local Government- EIA Portal [gov.ie - EIA Portal \(www.gov.ie\)](#);
- Environmental Protection Agency (EPA) – Water Quality and Water Framework Directive data [EPA Maps](#);
- Geological Survey of Ireland – Geology, soils and Hydrogeology [www.gsi.ie](#);
- National Parks and Wildlife Service – online European site network information, including site conservation objectives [www.npws.ie](#);
- National Parks and Wildlife Service – Information on the status of EU protected habitats in Ireland (NPWS 2019a, 2019b);
- National Biodiversity Data Centre – [www.biodiversityireland.ie](#);
- Ordnance Survey of Ireland – Mapping and Aerial photography [www.osi.ie](#);
- Site survey, undertaken between 30th July 2024 and 26th June 2025 by Ms K. Banks (see Section 3.2);
- Williams, L (2025) Laurel Ridge Solar Farm Aquatic Ecological Impact Assessment (Appendix B).

2.3 Screening Protocol

The sequence of events when completing the AA Screening process is provided below:

- Ascertain whether the plan or project is necessary for the management of the European site;
- Description of the plan or project and its potential impact;
- Definition of the likely zone of influence for the proposed works;
- Identification of the European sites that are situated (in their entirety or partially or downstream) within the likely zone of influence of the proposed works;
- Identification of the most up-to-date QIs and SCIs for each European site within the zone of influence;
- Identification of the environmental conditions that maintain the QIs/SCIs at the desired target of Favourable Conservation Status;
- Identification of the threats/impacts of the proposed works – actual or potential that could negatively impact the environmental conditions of the QIs/SCIs within the European sites;
- Highlighting the activities of the proposed works that could give rise to significant negative impacts; and
- Identification of other plans or projects, for which in-combination impacts would likely have significant effects.

2.3.1 Screening Determination

The proposed development is one to which Part XAB of the Planning and Development Act, 2000 as amended applies. In accordance with Part XAB of the Planning Acts as amended, and Section 177U thereof:

“(5) 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 not required if it can 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”.

This report is to inform Screening for Appropriate Assessment.

2.3.2 Zone of Influence

In accordance with EC (2021) *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*, identification of the

European sites that may be affected should be done by taking into consideration all aspects of the plan or project that could have potential effects on any European sites located within the zone of influence of the plan or project. This should take into account all of the designating features (species, habitat types) that are significantly present on the sites and their conservation objectives.

In particular, it should identify:

- Any European sites geographically overlapping with any of the actions or aspects of the plan or project in any of its phases, or adjacent to them;
- Any European sites within the likely zone of influence of the plan or project. Natura 2000 sites located in the surroundings of the plan or project (or at some distance) that could still be indirectly affected by aspects of the project, including as regards the use of natural resources (e.g. water) and various types of waste, discharge or emissions of substances or energy;
- European sites in the surroundings of the plan or project (or at some distance) which host fauna that can move to the project area and then suffer mortality or other impacts (e.g. loss of feeding areas, reduction of home range);
- European sites whose connectivity or ecological continuity can be affected by the plan or project.
- The range of European sites to be assessed, i.e. the zone in which impacts from the plan or project may arise, will depend on the nature of the plan or project and the distance at which effects may occur.

2.3.3 Likely Significant Effects

The threshold for a likely significant effect is treated in the screening exercise as being above a *de minimis* level¹. The opinion of the Advocate General in CJEU case C-258/11 outlines:

“the requirement that the effect in question be ‘significant’ exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on a European site are thereby excluded. If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill.”

In this report, therefore, ‘relevant’ European sites are those within the potential zone of influence of the construction and / or operation of the proposed development, and to which likely significant effect pathways were identified through the source-pathway-receptor model.

¹ *Sweetman v. An Bord Pleanála* (Court of Justice of the EU, case C-285/11). A *de minimis* effect is a level of risk that is too small to be concerned with when considering ecological requirements of an Annex I habitat or a population of Annex II species present on a European site necessary to ensure their favourable conservation condition. If low level effects on habitats or individuals of species are judged to be in this order of magnitude and that judgment has been made in the absence of reasonable scientific doubt, then those effects are not considered to be likely significant effects.

3 Project and Site Description

3.1 Development Description

Statutory Description

Laurel Ridge Solar Farm Ltd intend to apply for a 10 Year Planning Permission for a solar farm, 38kV substation and underground cabling grid connection, and energy storage compound with a total area of circa 57 hectares in the townlands of Ballyoughtragh South, Commons, Farranmanagh, Knocknaman, and Lisheennashingane, Milltown, County Kerry. The proposed development will consist of a solar farm comprising of c.230,000 sq.m of solar photovoltaic panels on ground mounted frames, associated string inverters mounted to rear of panels and 14 no. single storey electrical transformer stations. The energy storage compound will consist of 36 no. containerised energy storage modules and associated plant and equipment, 9 no. transformers and 2 no. auxiliary transformers, 2 no. spare parts containers and 1. no. office unit. Planning permission is also sought for 1 no. 38kV substation and associated electrical compound, including single storey control building, line bay, transformer and accompanying apparatus, and associated grid connection between the proposed substation and Oughtragh 110kV substation comprising 38kV underground electricity cabling of c.3.87km in length to be provided in an excavated trench on private lands and the L11003, L8003 and L80030 public roads, and all associated site development and reinstatement works. The project will also include 33kV underground interconnector electrical cabling within the development site and within the L11003 public road, temporary construction compounds, security fencing, CCTV, access tracks, landscaping (including hedgerow removal and planting), drainage and all ancillary development works and apparatus necessary to facilitate the proposed development. Construction and operational access will be via 6 no. entrances from the L11003 and L80030, with 1 no. of these entrances used for the temporary construction phase only. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration. A Natura Impact Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application. The NIS will be available for inspection or purchase at a fee not exceeding the reasonable cost of making a copy during office hours at the offices of the Planning Authority. The planning application may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, at the offices of the Planning Authority during its public opening hours and a submission or observation in relation to the application may be made to the authority in writing on payment of the prescribed fee within the period of 5 weeks beginning on the date of receipt by the authority of the application.

Solar Panels

The working title for the project is Laurel Ridge Solar Farm. The civil works for the panels themselves use a simple, ground-mounted system that avoids undue ground disturbance and works with the existing site topography. The PV panels will sit on angled racks comprised of galvanized steel arranged in portrait or landscape configuration depending on the final system deployed. It is envisaged that these will be screw or driven-piled following geotechnical assessment. Across the majority of the site, the panels will be positioned on the rack at a minimum height of 0.8m above the ground and rise to a maximum height of up to 3.5m.

The PV panels will be orientated to the south in order to capture maximum solar energy. The panels will be positioned at a tilt angle between 10-20 degrees from the horizontal having regard to natural site topographical and orientation conditions to ensure the best solar absorption. The panels will be stationary

with no movable parts. Low voltage direct current cabling will connect the panels to the inverter/transformer stations across the site.

Inverters / Transformers / Substation

A total of 14 no. transformer stations are incorporated into the layout to convert direct current generated by the PV panels into alternating current which can be subsequently used by the electricity network. These units are manufactured offsite and delivered installation ready. These units are 3.20m in height and will be installed on a hardcore or concrete slab base. The transformer units are equipped with a weather station, ventilation and a security light.

The proposed development includes c. 136 no. string inverter units. These are small units which are mounted at the top underside of the solar panels and positioned at the end of the array rows. These units collect the electricity from the solar panels before onward passage to the transformers.

A 38 kV distribution substation and electrical compound is proposed to the south of the site. This will function as the delivery point to ESB networks for transfer electricity to the electricity grid by means of underground cabling to the Oughtragh 110kV substation. The substation control building has a floor area of approximately 128 m² with the associated compound containing outdoor Air Insulated Switchgear equipment comprising of a line bay, grid transformer and accompanying apparatus, including telecoms pole and lightning mast. The size and specification of the substation has been designed to ESB Networks standards. Existing site levels will be reprofiled for the purposes of accommodating the substation, following pre-commencement site investigations.

The 38kV underground cabling grid connection route is approximately 3.87km in length and traverses in a mainly eastern direction from the existing Oughtragh 110kV substation to the proposed Laurel Ridge Solar Farm 38kV substation. C.0.28 km of the route is within the existing solar farm lands, with c.2.92km on the L8003 and L80030 local roads. The ducting and cabling will be placed in a trench approximately 1.22 metres deep, with reinstatement in public roads in fully accordance with guidelines for managing openings in roads.

Interconnector Cabling

The different solar farm field parcels will be connected by means of interconnector cabling totalling c.3.83km in length, the majority of which will be in private solar farm lands. A total of c.50m of cabling will be in the L8003 local road. The cabling route includes a crossing beneath the Kealbrogheen Stream within the western parcel of the solar farm. Joint slabs will be located below ground and finished/reinstated to the required roads/landowner specification. The collector network is described in the submitted plans, technical details and construction methodology by TLI Group.

Access

A compacted gravel access track up to 3.5m wide will provide internal access to the solar arrays and associated infrastructure. Stripped soil arising from the construction of these access tracks will be sustainably reused across the site as part of landscaping, filling in the verges of access tracks and grass reinstatement in the areas of temporary construction compounds.

It is proposed to access the site via 6 no. entrances from the L80030, with 1 no. of these entrances used for the temporary construction phase only. Three of the entrances are new entrances located to improve existing accesses to agricultural lands, with the remaining subject to upgrade works, to include widening, small elements of hedgerow removal, and provision of roadside drainage, as described in the submitted plans.

The design includes the removal of some hedgerow on private lands at the corner of the L80030 and L8003 for the purposes of accessing the site for transformer delivery during the construction phase. A 1.2m high

post and wire fence will be erected as part of a revised set-back boundary. Clause 804 will be laid as a temporary surface treatment at this location for construction access. Post construction, this will be taken up, with a grass margin sown between the fence and public road.

Other Infrastructure

A perimeter fence up to 2.2m in height will be erected to provide security and restrict unauthorised entry to the solar farm. This fence will be stock proof in nature, sympathetic to the agricultural character of the site. The footings for the fence will either be pre-moulded or localized in-situ concrete, to be determined once a contractor is appointed. The installed fencing will incorporate mammal friendly access, with a maximum 100 mm gap retained at the bottom between the fence and the ground, as per the submitted technical plans.

The proposed development will be an unmanned facility; however, it will be monitored 24 hours a day remotely by the Applicant's operation system and the Engineer Procurement and Construction provider. The site will be subject to routine inspections. The CCTV will be orientated towards this infrastructure rather than any third-party lands.

Energy Storage Compound

The proposed development will be contained within a secure, fenced development compound, enclosed by a 2.4m high palisade perimeter fence.

The layout includes 36 no. modular containers housing electrical and control equipment for energy storage. These units are manufactured offsite and delivered installation ready and have an individual floor area of approximately 12 m². The energy storage modules are low lying in nature and may be sourced in a 'moss green' colour (RAL colour code of 6005 or similar) aiding assimilation in the local landscape. 9 no. transformers and 2 no. auxiliary transformers support the energy storage function on site. 2 no. spare parts containers and a small office unit (c.15m² in area each) are also provided to assist with operational management, including to monitor development performance post energisation to include review of security systems, environmental sensors, and performance monitoring tools to ensure safety, efficiency, and optimal energy production / storage.

The system as proposed will incorporate battery modules connected to inverters that convert direct current (DC) to alternating current (AC) in turn connecting to grid infrastructure via associated transformers within the compound. Fire protection for the facility will be designed in accordance with required standards. The level of protection is subject to detailed design by the plant's supplier, utilising industry safety standards and certification.

Landscaping & Biodiversity

A total of 178 linear metres of permanent hedgerow will be removed throughout the site to facilitate site entrance, access tracks and underground cabling. An additional 20 linear metres of hedgerow will be removed and replanted behind the sightlines at the westernmost entrance (Entrance No. 6). Permanent removal will be offset by 553 linear metres of new hedgerow planting (Type 2), as well as the bolstering of an additional 7,077 linear metres (Type 1) where necessary, to fill any gaps in existing hedgerows. Ecology

on the site will be further fostered to deliver significant biodiversity gains to the receiving environment through the establishment of focused ecological biodiversity areas and species rich grasslands.

The solar farm will contribute directly to a carbon dioxide emission reduction of 9,087 tonnes per annum or the equivalent of approximately 363,480 tonnes of CO² over the 40 year lifetime of the project.

3.2 Existing Environment

3.2.1 Habitats

The footprint of the proposed solar farm supports improved agricultural grassland (GA1), with areas of relatively species poor neutral grassland (GS1) and wet, rush dominated grassland (GS4). The fields are managed by livestock and pony grazing. The fields are fringed by hedgerows (WL1), treelines (WL2) and earth banks (BL2); the Kealbrogreen stream (FW2) bounds the site to the north-west and the Lissavane West stream is located on the southern site boundary. The proposed grid connection is located within improved agricultural grassland (GA1) as it leaves the proposed 38kV substation, then runs along local roads (buildings and artificial surfaces BL3) to the Oughtragh 110kV substation.

Terrestrial habitats are described in full within the Ecological Impact Assessment (EclA) accompanying the planning application.

The watercourses at the proposed site are described in 3.2.4 of this report and within the Aquatic EclA enclosed in Appendix B.

3.2.2 Species

Otter

The NBDC² does not hold any records of otter from the proposed site and its environs. No evidence of otter was recorded during the site survey and the Kealbrogreen stream and Lissavane West stream are unlikely to provide a sustained foraging resource for this species. However, there is potential for otter to utilise the Kealbrogreen stream occasionally to commute through the landscape.

Avifauna

The NBDC holds records of six species included in Annex I of the EU Bird's Directive from the 10km OS grid square within which the site is located (V89), namely Corn Crake, Golden Plover, Kingfisher, Little Egret, Merlin and Peregrine Falcon.

Nine BoCCI Red List species (Gilbert, G. *et al* (2021)) have been recorded from the 10km OS grid squares within which the site is located: Barn Owl, Black-headed Gull, Corn Crake, Eurasian Curlew, Golden Plover, Herring Gull, Lapwing, Redshank and Yellowhammer.

During the site walkover survey undertaken on 30th July 2024 and 26th June 2025, the occurrence and activity of avifauna using the habitats and hinterland of the proposed site were identified and noted along with any evidence of breeding activity.

A list of avifaunal species identified during the site walkover survey undertaken on 30th July 2024 and 26th June 2025 is presented in Table 3-1 below.

² <https://maps.biodiversityireland.ie/Map>

Table 3-1: Avifaunal species identified during the site ecology survey on 30th July 2024 and 26th June 2025

Common Name	Species Name	Conservation Status ³	Activity and occurrence within the study area
Blackbird	<i>Turdus merula</i>	Green	Foraging and singing within hedgerows and treelines across the proposed site.
Buzzard	<i>Buteo buteo</i>	Green	Heard calling overhead to the west of the site
Great Tit	<i>Parus major</i>	Green	Foraging within hedgerows and treelines within the proposed site.
House Martin	<i>Delichon urbicum</i>	Amber	Flying over fields at the west of the site
House Sparrow	<i>Passer domesticus</i>	Amber	Foraging within hedgerows at the east of the site
Magpie	<i>Pica pica</i>	Green	Within a field to the east of the site
Meadow Pipit	<i>Anthus pratensis</i>	Red	Heard calling at the south-west of the site but no song flight was observed
Pied Wagtail	<i>Motacilla alba yarrellii</i>	Green	At a farm track at the west of the site
Raven	<i>Corvus corax</i>	Green	Flying overhead
Robin	<i>Erithacus rubecula</i>	Green	Foraging and singing within hedgerows and treelines across the proposed site.
Rook	<i>Corvus frugilegus</i>	Green	Field feeding at the south of the site
Stonechat	<i>Saxicola rubicola</i>	Green	Singing in scrub at the south-west of the site
Swallow	<i>Hirundo rustica</i>	Amber	Flying over fields at the east and south of the site
Wood Pigeon	<i>Columba palumbus</i>	Green	At the south of the site
Wren	<i>Troglodytes troglodytes</i>	Green	Foraging and singing within hedgerows and treelines across the proposed site.

Avifaunal species recorded at the proposed development reflected the habitats present. The fields of agriculturally improved pasture supported relatively low levels of avifaunal diversity, with species recorded during the site walkover restricted to corvids, and House Martin and Swallows foraging overhead.

The treeline and hedgerow habitats at the field boundaries supported a higher diversity of bird species. Passerines such as Robin, Wren, Great Tit, and House Sparrow were recorded, in addition to several Blackbird. Meadow Pipit was recorded within wet grassland at the south-west of the site, but no breeding behaviour (e.g. song flight) was recorded. Of the bird species recorded at the proposed development site, Meadow Pipit is on the Red list (Highest Conservation Concern), House Martin, House Sparrow and Swallow are on the Amber List (Moderate Conservation Concern); the remaining species are on the Green List (Least Conservation Concern).

No species were confirmed as breeding within the site; however the hedgerows and treelines provide suitable nesting habitat. Areas of tussocky grassland would provide suitable habitat for ground nesting birds, however, no evidence of breeding ground nesting birds was recorded during site surveys conducted in July 2024 and June 2025.

³ Conservation status assigned in accordance with the Birds of Conservation Concern in Ireland (Gilbert *et al.*, 2021).

No Annex I species or SCI species for Castlemaine Harbour SPA or Killarney National Park SPA were recorded during the site surveys.

3.2.3 Surface Water

3.2.3.1 Overview

The Kealbrogheen Stream near the proposed development commences as a small 1st order stream, which is joined by the 1st order Lissavane West tributary to form a 2nd order watercourse through the westernmost land parcel. The Kealbrogheen then flows another 5.1km to meet the River Laune, a large 6th order channel that flows westward through Killorglin to Castlemaine Harbour and Dingle Bay.

The solar farm land parcels drain to the Kealbrogheen and the Lissavane West streams. The Grid Connection Route (GCR) crosses the Kealbrogheen Stream and its small tributary in their very upstream reaches where they are already culverted beneath the local road (L8003).

There are no instream works proposed on the solar farm or the grid connection route. Watercourse crossings will be undercrossings at existing culverts.

3.2.3.2 Biological Water Quality

The EPA don't monitor the small streams draining the proposed solar farm development site. The nearest EPA river monitoring stations are on the River Laune. Table 3-2 shows recently available (2016-2021) river monitoring results from relevant EPA water bodies on the River Laune, upstream and downstream of the Kealbrogheen confluence. The Laune has been Q4, meriting 'good' ecological status at river stations 22L010300 (1.9km upstream) and 22L010400 (350m downstream) between 2016 and 2022. This is compliant with WFD objectives to remain at 'good' status or better. Q-values were assessed as part of field studies for this project (see Section 5.3, below, for results). The Kealbrogheen was sampled in May 2024 (Site LR3, LR7) and August 2025 (Sites LR4, LR12) meriting Q4, ⁴representative of 'good' status.

Table 3-2 Relevant EPA Q-value data (2016-2022)

EPA Code	Water body type / name	Lake / River Station Name	2016	2019	2022	Ecological Status WFD (2016-2021)
RS22L010300	River Laune	Ballymalis Castle	Q4	Q4	Q4	Good
RS22L010400	River Laune	1.5 km d/s Gweestin R confl.	Q4	Q4	Q4	Good

3.2.3.3 Existing Fisheries Data

Inland Fisheries Ireland (IFI) conducted catchment wide electrofishing (CWEF) surveys in the Laune, most recently in 2017 (IFI, 2019). The Kealbrogheen Stream was not sampled, The Laune catchment had a mean catch of 21.41 salmon fry/5min, which is above the 17 salmon fry threshold which underpins the management of the Laune fishery. It is noted that most 2nd order streams (as is the Kealbrogheen) sampled in the catchment wide survey had trout fry, but not salmon fry. The main channel of the River Laune downstream of the Kealbrogheen confluence is mainly a holding and migration route for salmonids with some reaches of nursery habitat in faster water and limited patchy spawning habitat.

⁴ Q-values reported outside of the EPAs formal river monitoring programme are "representative" of ecological status as the EPA is the only authority for assigning formal WFD status.

The theoretical ⁵Conservation Limit (CL) for salmon in the “⁶1SW Laune and Cottoners” by the ⁷SSCS is currently 2,071 returning fish per annum. Data shows that the River Laune exceeded this CL by 2699 fish in 2024. MSW fish on the Laune also exceeded the CL (815) by 239 in 2024, thus the river has an exploitable surplus for angling purposes (TEGOS, 2025).

Castlemaine Harbour is a mixed-stock harvest fisheries, one of only four potential commercial salmon fisheries currently operating in Irish estuaries (given that salmon are nationally in decline and most fisheries are closed to commercial netting). The fishery is only able to be harvested commercially if all three rivers feeding into it (Maine, Laune and Caragh) are above their CL for salmon. Scientific salmon stock evidence shows the harbour fishery has had an exploitable salmon surplus since 2011 (TEGOS, 2025).

3.2.3.4 Water Framework Directive

Current EPA assigned river water body (RWB) status (2016-2021) for the relevant receiving waterbodies is listed in Table 3-3.

Table 3-3 EPA Waterbody Status, Risk and Pressures

EPA Waterbody name and code	EPA Watercourse Name	Laurela Ridge Solar Farm Sites	EPA assigned Waterbody Status (2016-2021)	EPA Identified Risk / Issue / Pressures
Kealbrogheen Stream (Laune)_010 IE_SW_22K040500	Kealbrogheen	LR1, LR3, LR4, LR6, LR7	Moderate (modelled)	Under Review
	Lissavane West	LR5, LR8		
	Unnamed drain	LR2		
Laune_040 IE_SW_22L010400	River Laune	N/A	Good (monitored)	Not at risk

The Laune_040 RWB is assigned ‘good’ status by the EPA for the 2016-2021 reporting period, and is ‘*Not at Risk*’, meaning there is no evidence indicating a trend towards status decline. The Kealbrogheen Stream (Laune)_010 is currently assigned ‘moderate’ status based on “modelling” (i.e., it is not sampled by the EPA) and has assigned a risk category of ‘*Review*’. Where a water body is placed under *Review*, it may show either an improving or a deteriorating trend, but more evidence is needed before it can be classified as either *At Risk* or *Not at Risk* of achieving its WFD objective. On-site Q-value sampling (Appendix B) shows the Kealbrogheen to be Q4, indicative of ‘good’ ecological status. That does not agree with EPA modelled status, but the EPA rating is official water body status.

3.2.4 Aquatic Ecology Field Survey Results

Aquatic Ecology survey for the proposed project was undertaken by Ms Lauren Williams, MCIEEM, on 17th May, 24th September 2024 and 23rd August 2025, focusing on potentially affected watercourses, their proposed crossing points (where applicable) and the downstream Zone of Influence. Figure 3-1 shows field survey locations in relation to the project Red Line Boundary (RLB). Four sites (LR10-LR13) were investigated on the Kealbrogheen Stream between the proposed development and the confluence with the River Laune (SAC boundary) on 23 August 2025. The aim was to identify potential Annex II species habitats and any

⁵ Scientifically derived sustainable stock level, i.e., the number of returning salmon that would be required to maintain the carrying capacity of the system based on its accessible area of fluvial habitat.

⁶ 1SW = one sea winter fish (‘grilse’); MSW = Multi sea winter fish.

⁷ Standing Scientific Committee on Salmon

obvious fish passage barriers, the latter in relation to bridge / culvert crossings on public roads. Survey locations downstream of the proposed development are shown on Figure 3-2.

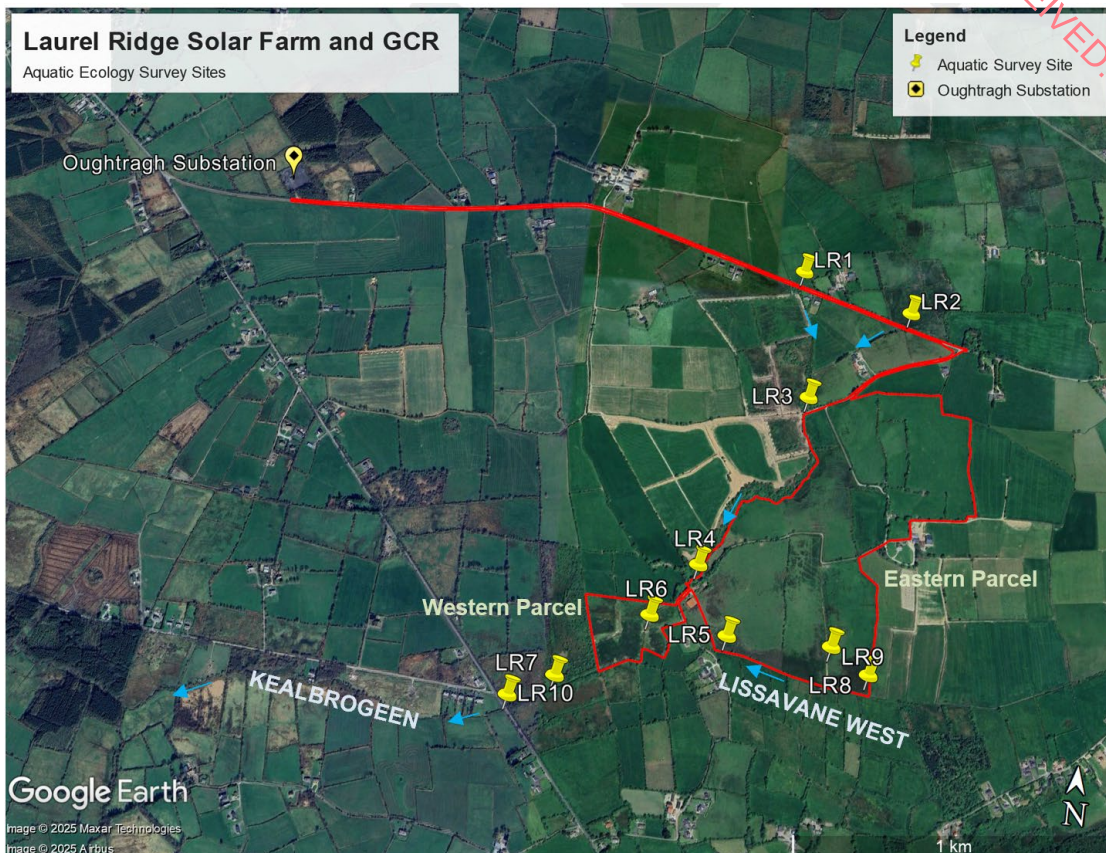


Figure 3-1 Aquatic Ecology survey sites Laurel Ridge Solar Farm

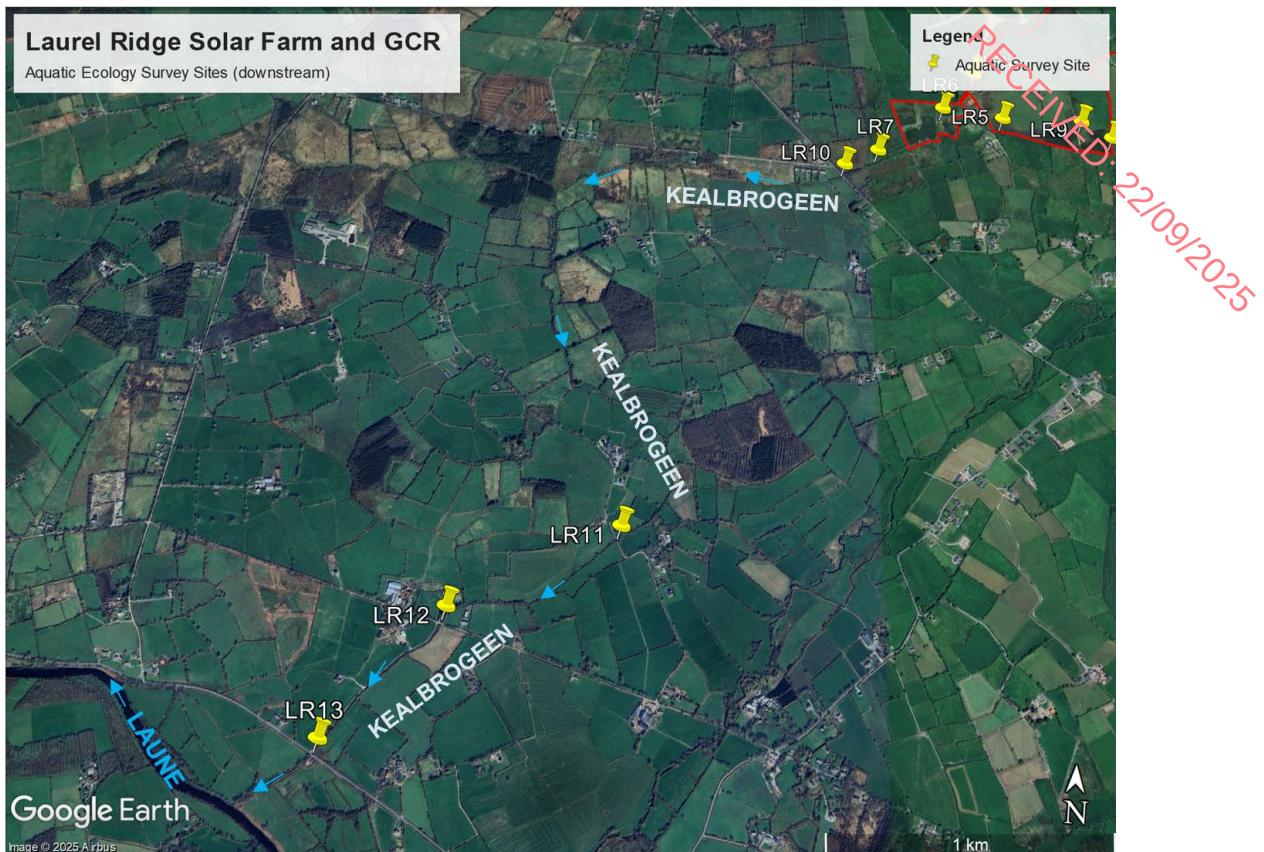


Figure 3-2 Aquatic Ecology survey sites – Kealbrogeen Stream to River Laune

Table 3-4 Aquatic Survey Site Locations (ITM)

EPA Waterbody name and code	EPA Watercourse Name	Site Code	Easting (ITM)	Northing (ITM)
Kealbrogeen Stream (Laune)_010 IE_SW_22K040500	Kealbrogeen	LR1	485871	599409
	Unnamed trib. of Kealbrogeen	LR2	486274	599288
	Kealbrogeen	LR3	485939	598965
	Kealbrogeen	LR4	485626	598396
	Lissavane West	LR5	485706	598168
	Kealbrogeen	LR6	485464	598204
	Kealbrogeen	LR7	485186	597999
	Lissavane West	LR8	486181	598074
	*Un-named Drain	LR9	486048	598158
	Kealbrogeen	LR10	485035	597925
	Kealbrogeen	LR11	484120	596327
	Kealbrogeen	LR12	483480	595993
	Kealbrogeen	LR13	483062	595520

3.2.4.1 *Kealbrogreen Stream*

The Kealbrogreen stream and its small tributary are small and channelized in the upper reaches where the GCR will pass under existing pipe culverts (Sites LR1 and LR2).

Good trout spawning and nursery habitat with reasonably natural hydromorphology is present within this stream along the western boundary of the proposed development between LR3 and LR4, where it is enclosed in a woodland gully. The lower gradient reach from running through the westernmost parcel and continuing downstream of the site boundary (LR6 to LR7) comprised good trout spawning and nursery, with evidently high density of juvenile trout locally, attesting to habitat quality. The stream is suitable for brook lamprey spawning but lacks juvenile nursery habitat in proximity to the proposed development owing to the moderately steep, spate nature of gully stream. Potential brook lamprey nursery habitat is present mainly downstream of the development lands where there are patches of sediment deposition at channel margins in which lamprey ammocoetes can burrow. No lamprey ammocoetes were captured in manual searches during field survey.

Owing to its small size and lack of silt deposition (nursery habitat) the Kealbrogreen stream, in the vicinity of the proposed development, does not comprise habitat that could support Annex II species sea and river lamprey of the Castlemaine Harbour SAC, located 5.1km downstream. The presence of sea and river lamprey in the Kealbrogreen is unlikely owing to the migration barrier formed by the road culvert in the lower catchment at Site LR12. The small size / depth character of the Kealbrogreen is sub-optimal for salmon in close proximity to the proposed development lands, but if salmon can pass the barrier (road culvert) at Site LR12 (see below), juvenile salmon cannot be ruled out as occurring in small numbers in the vicinity of Site LR6 and LR7 in early spring, perhaps dropping further downstream to Sites LR11-LR12 as flows decrease into summer. There is greater potential for salmon spawning / nursery once the stream becomes 3rd order, from 1.7km downstream of the proposed solar farm site (LR11), although habitat is not ideal for the species owing to historical and contemporary drainage and a partial fish passage barrier in the lower reaches.

Photographic images and details on macroinvertebrate fauna recorded during the field survey are enclosed in the Aquatic EclA, Appendix B.

3.2.4.2 *Lissavane West*

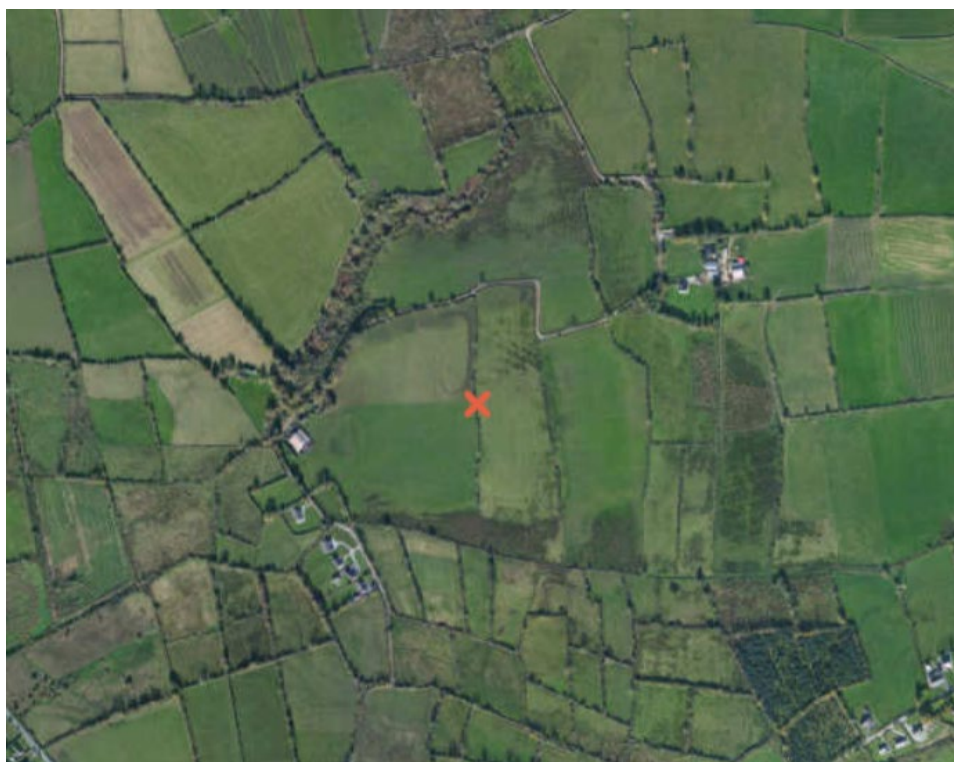
The Lissavane West stream is a low volume, heavily drained, but subsequently overgrown 'drain-like' channel along the southern boundary of the easternmost solar farm parcel. No salmonid habitat or potential. Eel and stickleback may be present towards the deeper glides, but the channel almost completely dries out, particularly in the upper reaches, during summer months, meaning even eel and stickleback may not persist over summer.

Photographic images and details on macroinvertebrate fauna recorded during the field survey are enclosed in the Aquatic EclA, Appendix B.

3.2.5 *Flooding*

The Office of Public Works (OPW) flood mapping (<http://www.floodinfo.ie/map/floodmaps/>) indicates the flood extents for watercourses in the environs of the proposed site. As indicated in Figure 3-3, there are no flood extents or past flood events mapped at the proposed site (red x on the map marks the centre of the site).

Figure 3-3: OPW Flood Risk Mapping at the Proposed Site



3.2.6 Soil, Geology and Hydrogeology

The Geological Survey of Ireland (GSI) online database (www.gsi.ie) was consulted for available edaphic, geological and hydrological information of the site and its environs. The site is overlaid by AminDW, acid brown earths, brown podzolics, with Mineral alluvium soils at the south of the site. In terms of bedrock geology, the Namurian formation, composed of shale and sandstone underlies the site.

The bedrock units which underlie the site are mapped by the GSI as part of the same Locally Important Aquifer. Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated. The study area is of 'low' to 'moderate' groundwater vulnerability. There are no karst features located in the vicinity of the proposed development.

3.2.7 Invasive Species in Proximity to the Proposed Development

Japanese Knotweed has been recorded at Beaufort, c.0.4km to the south-east of the proposed development, last recorded in 2009.

No invasive species were recorded during the site survey conducted in 2024 and 2025.

3.3 Description of European Sites

This stage of the screening for AA process describes European sites within the likely zone of influence of the proposed project. The methodology for establishing the likely zone of influence is described in Section 2.3.2.

Connectivity between the proposed project and European sites has been reviewed. Connectivity is identified via the potential source-pathway-receptor model which identifies the potential impact pathways such as land, air, hydrological, hydrogeological pathways etc. which may support direct or indirect connectivity of the proposed works to European sites and/or their qualifying features.

In view of the location and characteristics of the proposed development (i.e. solar farm see Section 3.1) and the source, pathway and receptors of potential impacts, a 15km radius is considered an appropriate zone of

influence to screen all likely significant effects that might impact upon the European sites. Establishment of the likely zone of influence is in line with EC (2021) *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*.

The European sites located within 15km are detailed in Table 3-5 and illustrated in Figure 3-4. There are 9 European sites located within 15km of the proposed works:

1. Castlemaine Harbour SAC (Site Code: 000343)
2. Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC (Site Code: 000365)
3. Lough Yganavan and Lough Nambrackdarrig SAC (Site Code: 000370)
4. Slieve Mish Mountains SAC (Site Code: 002185)
5. Ballyseedy Wood SAC (Site Code: 002112)
6. Tralee Bay and Magharees Peninsula, West to Cloghane SAC (Site Code: 002070)
7. Castlemaine Harbour SPA (Site Code: 004029)
8. Killarney National Park SPA (Site Code: 004038)
9. Tralee Bay Complex SPA (Site Code: 004188)

Source – pathway – receptor dynamics were assessed for European Sites 2, 3, 4, 5, 6 and 9 and it was determined that there are no realistic connecting pathways (via surface water, groundwater, air or other environmental vectors) between the proposed development and these sites. As a result, these sites will not be further considered as part of this screening for AA.

The proposed development supports hydrological connectivity to Castlemaine Harbour SAC and Castlemaine Harbour SPA and is in relatively close proximity to both Castlemaine Harbour SPA and Killarney National Park SPA. Therefore, these sites will be considered further in the below impact assessment.

Figure 3-4: European Sites Located within 15km of the Proposed Development

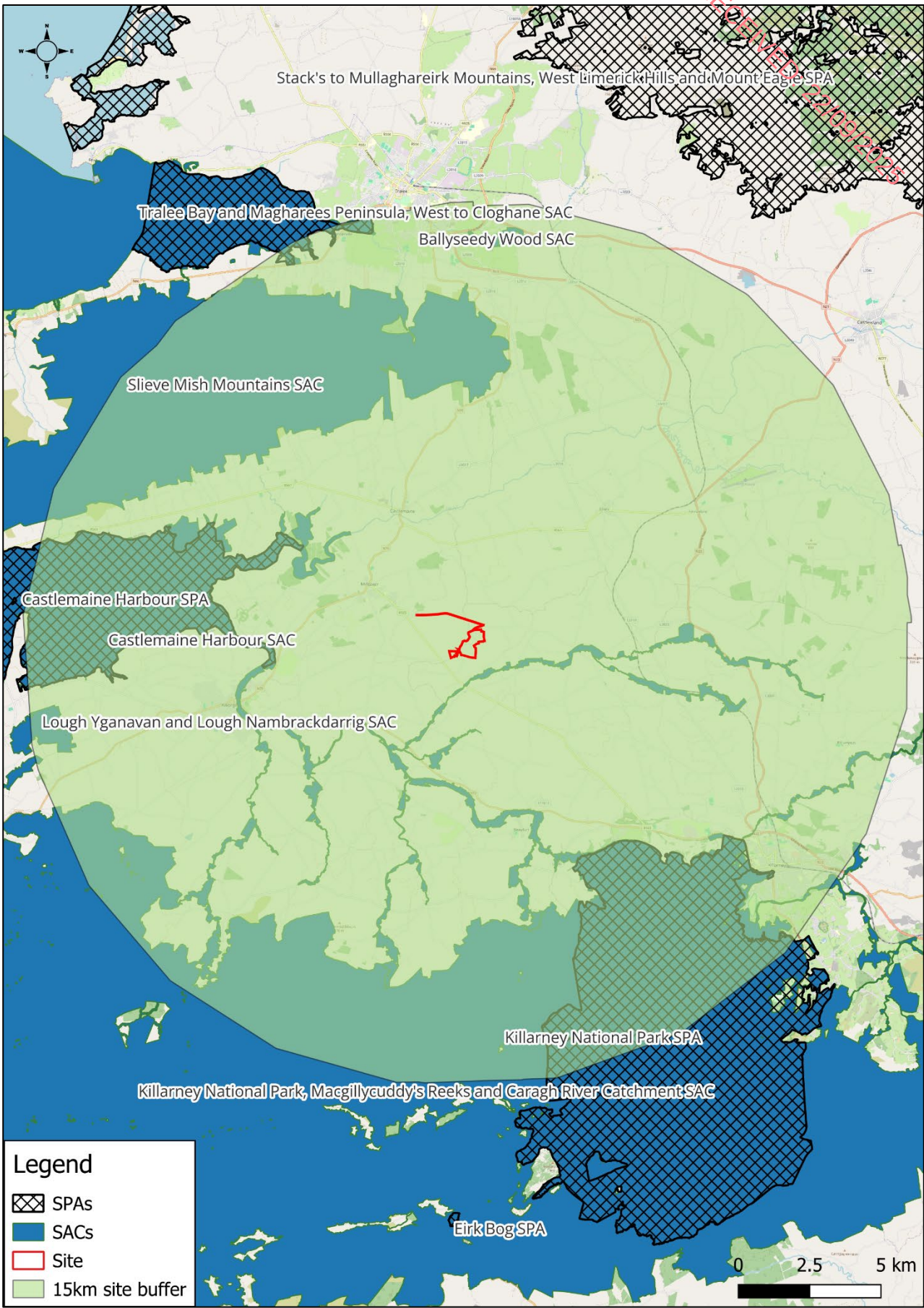


Table 3-5: European Sites within 15km of the Proposed Development

Site Name and Code	Qualifying Features (Annex I Habitats/Annex II Species)	Distance from proposed works	Connectivity
Castlemaine Harbour SAC (000343)	Annex I Habitats Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritima) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with Salix repens ssp. argentea (Salicion arenariae) [2170] Humid dune slacks [2190] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Annex II Species <i>Petromyzon marinus</i> (Sea Lamprey) [1095] <i>Lampetra fluviatilis</i> (River Lamprey) [1099] <i>Salmo salar</i> (Salmon) [1106] <i>Lutra lutra</i> (Otter) [1355] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	0.54km	Hydrological connectivity via the Kealbrogreen Stream, which flows into this SAC c.5.1km downstream. The proposed site and part of this SAC are within the Scartaglin Ground Waterbody.
Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC (000365)	Annex I Habitats Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation [3260] Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030] Alpine and Boreal heaths [4060]	8.1km	There is no connectivity via surface water, groundwater or any other pathway.

	<i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130] Calaminarian grasslands of the <i>Violetalia calaminariae</i> [6130] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caerulea</i>) [6410] Blanket bogs (* if active bog) [7130] Depressions on peat substrates of the <i>Rhynchosporion</i> [7150] Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae) [91E0] <i>Taxus baccata</i> woods of the British Isles [91J0] Annex II Species <i>Geomalacus maculosus</i> (Kerry Slug) [1024] <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029] <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065] <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> (Salmon) [1106] <i>Rhinolophus hipposideros</i> (Lesser Horseshoe Bat) [1303] <i>Lutra lutra</i> (Otter) [1355] <i>Trichomanes speciosum</i> (Killarney Fern) [1421] <i>Najas flexilis</i> (Slender Naiad) [1833] <i>Alosa fallax killarnensis</i> (Killarney Shad) [5046]		
Lough Yganavan and Lough Nambrackdarrig SAC (000370)	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110] <i>Geomalacus maculosus</i> (Kerry Slug) [1024]	13.5km	There is no connectivity via surface water, groundwater or any other pathway.
Slieve Mish Mountains SAC (002185)	Annex I Habitats Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220] Annex II Species <i>Trichomanes speciosum</i> (Killarney Fern) [1421]	7.9km	There is no connectivity via surface water, groundwater or any other pathway.

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Ballyseedy Wood SAC (002112)	91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*	13.4km	There is no connectivity via surface water, groundwater or any other pathway.
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	Species 1355 Otter (<i>Lutra lutra</i>) 1395 Petalwort (<i>Petalophyllum ralfsii</i>) Habitats 1130 Estuaries 1140 Mudflats and sandflats not covered by seawater at low tide 1150 Coastal lagoons* 1160 Large shallow inlets and bays 1170 Reefs 1210 Annual vegetation of drift lines 1220 Perennial vegetation of stony banks 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts 1310 <i>Salicornia</i> and other annuals colonising mud and sand 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) 1410 Mediterranean salt meadows (Juncetalia maritimi) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* 2170 Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (Salicion arenariae) 2190 Humid dune slacks 6410 <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) 91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*	14.2km	There is no connectivity via surface water, groundwater or any other pathway.
Castlemaine Harbour SPA (004029)	Red-throated Diver (<i>Gavia stellata</i>) [A001] Cormorant (<i>Phalacrocorax carbo</i>) [A017] Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Wigeon (<i>Anas penelope</i>) [A050] Mallard (<i>Anas platyrhynchos</i>) [A053] Pintail (<i>Anas acuta</i>) [A054] Scaup (<i>Aythya marila</i>) [A062] Common Scoter (<i>Melanitta nigra</i>) [A065] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137]	6.1km	Hydrological connectivity via the Kealbrogreen Stream, which flows into this SPA c.14.2km downstream. There is no connectivity via groundwater. The proposed site and this SPA are in relatively close proximity.

	Sanderling (<i>Calidris alba</i>) [A144] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa totanus</i>) [A162] Greenshank (<i>Tringa nebularia</i>) [A164] Turnstone (<i>Arenaria interpres</i>) [A169] Chough (<i>Pyrrhocorax pyrrhocorax</i>) [A346] Wetland and Waterbirds [A999]		
Killarney National Park SPA (004038)	Merlin (<i>Falco columbarius</i>) [A098] Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]	7.9km	There is no connectivity via surface water or groundwater. The proposed site and this SPA are in relatively close proximity.
Tralee Bay Complex SPA (004188)	Habitats Wetlands Birds A038 Whooper Swan (<i>Cygnus cygnus</i>) A046 Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) A048 Shelduck (<i>Tadorna tadorna</i>) A050 Wigeon (<i>Anas penelope</i>) A052 Teal (<i>Anas crecca</i>) A053 Mallard (<i>Anas platyrhynchos</i>) A054 Pintail (<i>Anas acuta</i>) A062 Scaup (<i>Aythya marila</i>) A130 Oystercatcher (<i>Haematopus ostralegus</i>) A137 Ringed Plover (<i>Charadrius hiaticula</i>) A140 Golden Plover (<i>Pluvialis apricaria</i>) A141 Grey Plover (<i>Pluvialis squatarola</i>) A142 Lapwing (<i>Vanellus vanellus</i>) A144 Sanderling (<i>Calidris alba</i>) A149 Dunlin (<i>Calidris alpina</i>) A156 Black-tailed Godwit (<i>Limosa limosa</i>) A157 Bar-tailed Godwit (<i>Limosa lapponica</i>) A160 Curlew (<i>Numenius arquata</i>) A162 Redshank (<i>Tringa totanus</i>) A169 Turnstone (<i>Arenaria interpres</i>) A179 Black-headed Gull (<i>Chroicocephalus ridibundus</i>) A182 Common Gull (<i>Larus canus</i>)	14.2km	There is no connectivity via surface water, groundwater or any other pathway.

3.3.1 Conservation Objectives of European Sites

The integrity of a European site (referred to in Article 6.3 of the EU Habitats Directive) involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site's conservation objectives (EC, 2018).

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as SAC and SPA. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The qualifying features for each site have been obtained through a review of the conservation objectives available from the NPWS ([Protected Sites in Ireland | National Parks & Wildlife Service \(npws.ie\)](https://www.npws.ie/Protected-Sites-in-Ireland)).

Site specific conservation objectives are available for Castlemaine Harbour SAC, Castlemaine Harbour SPA and Killarney National Park SPA; these were accessed in August 2025. For brevity, the site-specific CO's are summarised thus:

- To maintain or restore the favourable conservation condition of Annex I habitats and Annex II species for which the SAC has been selected; and
- To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA.

4 Screening Assessment Criteria

4.1 Management of European Sites

Appropriate Assessment is not required where the proposed development is connected with, or necessary to, the management of any European site.

In this case, the proposed development is not directly connected with or necessary to the management of any European site(s).

4.2 Likely Direct, Indirect or Secondary Impacts of the Project on the European Sites

The proposed project is located outside the boundary of Castlemaine Harbour SAC, Castlemaine Harbour SPA and Killarney National Park SPA therefore no direct impacts will occur through land take or fragmentation of habitats.

The proposed works will involve, *inter alia*, installation of solar panels, construction of access tracks, construction of a 38kV substation and energy storage modules and installation of underground cabling. There are no instream works required at any location within the solar farm or on the grid connection route. The following watercourse crossings will be achieved using under crossings by trenching up to the existing culvert on either side and passing beneath with no bed disturbance:

- 1 no. undercrossing of Kealbrogeen Stream at Site LR6 (under the existing ø 1.5m pipe culvert).

The full project description is included in Section 3 of this report.

There is potential for run-off of deleterious substances from these works to the surrounding environment.

Potential conduits to Castlemaine Harbour SAC and Castlemaine Harbour SPA are the Kealbrogeen stream and Lissavane West stream, which flow into these European sites c.5.1km and 14.2km downstream respectively.

The potential significant effects on European sites as a result of the proposed development are primarily related to a change in water quality within Castlemaine Harbour SAC and Castlemaine Harbour SPA and disturbance impacts, as discussed below.

4.2.1 Castlemaine Harbour SAC

Construction phase pollutant washout to surface waters

Potential impacts resulting from construction phase civil engineering works near watercourses are primarily related to three sources of possible water borne pollutant loss: suspended sediment, concrete and hydrocarbons.

Suspended Solids: The principal source of potentially negative effects on aquatic receptors arises from the escape of excessive amounts of suspended sediment during the construction phase. Sediment export can occur as a result of earthworks and erosion of soil stockpiles and excavated areas relating to, e.g., access tracks, site compounds and underground cabling (trenching, watercourse under crossings). Machinery traversing lands during PV panel piling, mounting and installation, may generate suspended solids, depending on the ground conditions. Low load bearing machines will be used to traverse ground, and only minimal soil disturbance is expected for this element of construction, however, whilst the majority of the land is 'high and dry' with inherently low risk of erosion, there is very wet ground bordering the ephemeral Lissavane West stream which will require management in the construction phase.

Installation of new access tracks involves linear construction within green fields on lands that are, in general, gently rolling to flat. This increases the potential effectiveness of runoff controls (e.g., temporary check dams,

silt fencing), i.e., compared to broad-scale excavations or full field ploughing, the latter of which is ordinarily practiced in agricultural settings. Permeable (compacted gravel) access tracks will have over-the-edge drainage to vegetated ground, with existing onsite drainage features (ephemeral field perimeter drains) and infiltration patterns remaining unchanged.

Escaped solids (if this did occur) can settle in watercourses; smothering of plants and macroinvertebrates, causing fish to abandon the area at least in the short-term. At worst, such sedimentation could occur over localised trout spawning beds of the Kealbrogreen Stream. This could (depending on the amount and the timing) result in reduced recruitment of young fish from affected reaches because of localised egg and fry mortalities. Elevated concentrations of suspended solids and resulting turbidity within the water column can also potentially damage the gills, physiology and behaviour of fish (e.g., respiration, migration) and/or benthic macroinvertebrates (e.g., respiration, drift responses). Brook lampreys also depend on clean gravels for spawning, and although very little lamprey nursery habitat was identified in the upper Kealbrogreen Stream, brook lamprey could be spawning locally with juveniles dropping downstream to areas of silt deposition for their nursery stage.

The Lissavane West tributary of the Kealbrogreen receives most of the drainage from the proposed development. It is ephemeral (dry in August 2025) with no fisheries significance and any escaped solids would likely settle out within a short distance of their source especially given the instream aquatic plant density and low gradient nature of the channel.

As detailed within the Aquatic EclA (Appendix B), the greater proportion of soil stripping occurs in the Lissavane West water subcatchment (temporary works compound, substation, ESS compound, access tracks, panel arrays, Interconnectors) which has a high level of inherent attenuation owing the land form and naturally depositing nature of the watercourse. The lesser proportion of construction works occur in the direct water drainage subcatchment of the Kealbrogreen itself.

Placed in context, the proposed soil stripping activity is of a low magnitude, set back from watercourses and is mainly linear (i.e., access tracks, cabling), which is of a much lesser scale compared to e.g., entire field ploughing, which routinely occurs in the absence of dedicated controls in these types of agricultural settings.

While the risk of uncontrolled sediment loss from the proposed works is considered to be low, in the absence of appropriate construction strategy and environmental controls, the potential for adverse effects on water quality (temporarily elevated turbidity) of the Kealbrogreen Stream cannot be excluded.

Castlemaine Harbour SAC is located 5.1km downstream of the proposed site via the Kealbrogreen Stream. At that separation distance, whilst unlikely to occur, temporary to short term significant effects cannot be ruled out (in the absence of site-specific mitigation in the area of sediment loss controls). Such effects would be related to impact on salmon and lamprey spawning / nursery habitat, primarily of the lower Kealbrogreen Stream where there is habitat diversity suitable to support salmon. For example, sediment loss may affect ex-situ salmon and lamprey habitat of the Kealbrogreen Stream which contributes (in a small way in a catchment context) to the Conservation Objectives for these Annex II QI species of the SAC.

Cement: Relatively small amounts of liquid cement usage will be required during the solar farm construction phase, e.g., transformer plinths. There will be no on-site batching of concrete and no-washing out of concrete batch delivery trucks on-site. Interconnector and GCR joint bays utilise precast concrete units. Owing to its highly alkaline and corrosive nature, cement is potentially toxic to instream fauna and can cause fish and invertebrate kills downstream if it did reach watercourses. However, the likelihood of this occurring is very low and inherently limited using best construction practice around concrete usage. Concrete usage during the solar farm construction period will have no likely significant negative effects on aquatic receptors as there

are limited sources of concrete contamination and very distant (and attenuated) pathways to sensitive aquatic habitats.

Hydrocarbons: Hydrocarbon spills and leakages can result in oil slicks and tainting of fish, or (if large enough) fish and invertebrate kills. They can be very detrimental to salmonid eggs and young fry in spawning areas. Hydrocarbons can reach drains and watercourses as a result of spills and leakage from poorly secured or non-bunded fuel storage areas; spills during re-fuelling; leaks from on-site vehicles, plant and equipment.

It is considered that the main area of risk for hydrocarbon contamination is in relation to the temporary construction compound in the western parcel (near Site LR6), noting, that there is a 10m undisturbed buffer zone between the compound and the watercourse built into the proposal.

Temporary compounds in the eastern parcel are distant from watercourses (>100m) that possess fisheries significance, and it is very unlikely owing to the long pathways (comprising ephemeral, vegetated drains), that sources of hydrocarbon contamination would reach sensitive aquatic receptors.

Whilst likelihood of hydrocarbon loss occurring from a well-managed construction site is low, i.e., employing best construction practice in terms of fuel storage and management, if there was no mitigation and an accidental leak or spillage occurred, the effects could be (at worst) localised, short term, significant negative, affecting aquatic receptors (fish and macroinvertebrates) primarily at the Kealbrogreen Stream (Site LR6) and downstream.

Stream Undercrossings: Whilst there are no instream works involved, under crossings require trenching up to the existing culvert or drain, with risk of contaminants entering, primarily suspended solids. In the absence of dedicated environmental controls elevated levels of suspended solids may escape downstream, potentially affecting fisheries and macroinvertebrate habitat, at least locally. Given that there are no instream works involved, and considering the small scale and temporary nature of the proposed under crossing works, the impact on downstream aquatic receptors is likely to be at worst, temporary, reversible, imperceptible to slight negative locally at LR6 (33kV Interconnector) owing to brief turbidity and/or temporary sedimentation, the latter of which will wash out during a subsequent rain event in this spate driven system.

Operational Phase

During the operational phase, the proposed solar arrays are on generally flat-to-gently-rolling topography and will continue to be drained by existing on-site field drains which flow, mainly towards the ephemeral Lissvane West watercourse and a proportion to the Kealbrogreen Stream. The discharge rates shall be the equivalent of greenfield conditions, with no alteration to natural flow patterns and hence no significant change to the hydrological regime of the lands in question. It is envisaged that either mowing or low intensity sheep grazing will be the principal means of managing grass growth levels on the site during operation, meaning the site will continue to be vegetated. This is consistent with best practice measures contained within the UK BRE Planning Guidelines for the development of ground mounted solar PV systems. Because of the proposed management, run-off rates will not differ significantly from existing green-field rates and the potential for erosion linked to concentrated run-off from panels is therefore considered low.

There will be no additional soil disturbance during the 40-year operation phase, meaning a negligible release of sediment to the watercourses associated with the proposed development. The sediment export rates will likely be similar or less compared to the current situation because there will be no ploughing/reseeding of fields (as would otherwise be common agricultural practice over a 40-year time scale). The development includes a 10m set-back at a minimum from all watercourses and drains. These buffers, which currently comprise improved/ neutral grassland or wet grassland, will be enhanced through management as tussocky

grassland. The proposal also includes introduction of 553 linear metres of new hedgerow planting, as well as the bolstering of an additional 7,077 linear metres where necessary, some of which is in riparian zones. Once established, these setbacks and plantings will enhance filtering function and on-site nutrient and sediment attenuation, helping to protect receiving watercourses and downstream European sites. Panels will be cleaned with pure water (no chemical additives). No herbicide use is proposed during the operational phase.

Given there are no significant sources of contaminants from the operational panel array, nor their maintenance, and no further soil disturbance, there is virtually no risk of contaminated run-off having any significant impact on watercourses during operation. Overall, the effect over the 40-year lifespan of the project is potentially a long-term positive on water quality and aquatic receptors, including downstream European sites, as there will be a likely reduction in intensity of agricultural activity on the land parcels and consequent net reduction over 40-years in commonly associated agriculture emissions to surface waters.

Invasive Species

Construction works, especially those involving earthmoving within the site and importation of materials, carry potential for introduction and/or transfer of invasive alien plant species. These can have significant negative effects on both terrestrial habitats and riparian corridors if transferred either within the site or brought onsite. No invasive plant species were recorded at the proposed site or its immediate environs during the site survey. It is further noted that there will be no importation or movement of topsoil, with any reinstatement works carried out using soil stripped from access tracks and the substation / ESS sites. There is not expected to be any significant adverse effects to European sites as a result of spread of invasive species.

Otter

A reduction in water quality may result in a reduction in prey species available for otter that may occasionally forage along the Kealbrogreen stream. However, any reduction in water quality is likely to be slight, short-term and localised. The high mobility and large foraging ranges of otter means that they are likely to be able to accommodate such localised changes in prey distribution and abundance.

There is potential for temporary visual and noise disturbance to otters foraging in the Kealbrogreen stream in the vicinity of the site during construction. However, the Kealbrogreen stream would not provide significant foraging opportunities for otter and no evidence of otter holts were recorded within the proposed site. Further, otters are generally nocturnal, with a peak of activity occurring around dawn and dusk, therefore the main activity period for otter is outside standard construction working hours.

In view of these factors, and in consideration of the relatively small size and scale of the proposed works in relation to the abundance of available habitat for otter downstream of the site within the Laune River and Castlemaine Harbour, ex-situ visual and noise disturbance impacts would not be expected to have a significant adverse effect on this species.

Other QI Habitats and Species

As detailed in Table 3-3, Castlemaine Harbour SAC is designated primarily for the presence of coastal and estuarine habitats. Due to the dilution provided in the estuarine environment of the River Laune downstream of the site and naturally fluctuating levels of silt, impacts on coastal and estuarine habitats are only likely to arise from extremely severe levels of siltation. In view of the nature, size, scale and location of the proposed works, extreme levels of siltation within the River Laune are not expected to arise.

Likewise given the nature, scale and location of the works, the robust nature of qualifying habitats located downstream of the proposed site (e.g. Estuaries [1330] and Mudflats and sandflats not covered by seawater

at low tide [1140], see Table 3-3) and the dilution provided in the estuarine/marine environment, no impacts on Annex I habitats due to elevated silt levels during construction will occur.

There will be no direct or indirect effects that alter hydromorphology (hydrology, water levels) and no change in area of the riverine estuary as a result of the project. No measurable changes to estuarine benthic communities are expected to occur. No significant effects on Estuaries [1330] and Mudflats and sandflats not covered by seawater at low tide [1140] are expected to occur during the construction phase.

The nearest area of the Priority Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] connected to the proposed site is located at Killorglin c.11.4km downstream of the proposed site. In view of the nature, size, scale and location of the proposed works, it is not likely that deleterious substances arising from the works will reach this parcel of Alluvial forest. Further, pollution is not noted as an important threat or pressure to Alluvial forests ([N2K IE0000343 dataforms \(europa.eu\)](#)). In view of these factors, significant impacts on Alluvial forests are not expected.

There is no connectivity between the proposed development and the QI species Petalwort, which has been recorded on dune slacks at Inch and Rosbehy.

4.2.2 Castlemaine Harbour SPA and Killarney National Park SPA

In view of the nature, size and location of the proposed works, a potential temporary to short-term localised reduction in water quality (as described above) is not likely to result in significant impacts on the foraging resources of the SCI for Castlemaine Harbour SPA. There is no hydrological connectivity between the proposed development and Killarney National Park SPA.

Disturbance/ displacement impacts on the SCI within Castlemaine Harbour SPA and Killarney National Park SPA would require the development site and these SPA sites to be in close proximity to allow for visual or noise disturbance impacts. The proposed works are located c.6.1km east of Castlemaine Harbour SPA and 7.9km north of Killarney National Park SPA. The proposed site is not visible from either Castlemaine Harbour SPA or Killarney National Park SPA. As such, there is no potential for disturbance to SCI species within Castlemaine Harbour SPA or Killarney National Park SPA as a result of the proposed works.

The SCI species for Castlemaine Harbour SPA are primarily coastal/ estuarine species that utilise sub-tidal, intertidal and supratidal wetland habitats. The proposed site is set back from Castlemaine Harbour SPA and its associated coastal habitats by a distance of c.6.1km at nearest. Of the SCI species for Castlemaine Harbour SPA, Red-throated Diver, Cormorant, Mallard, Wigeon, Scaup, Common Scoter, Ringed Plover, Pintail, Sanderling, Bar-tailed Godwit, Redshank, Greenshank, Oystercatcher and Turnstone are primarily coastal species or are water dependant, including the use of large river systems by some species. The proposed site predominantly comprises improved grassland, with areas of neutral and wet grassland in low-lying areas adjacent to two small streams. These habitats are not suitable to support the largely water-dependant species listed above. Light-bellied Brent Goose primarily feeds on *Zostera* but alternative food sources include other algae species, saltmarsh plants and grassland when ⁸ is depleted. Given these foraging preferences and the distance of the proposed site from the SPA boundary, the proposed site would not be suitable to provide a regular sustained foraging resource for the Light-bellied Brent Goose population of Castlemaine Harbour SPA.

Chough are regularly found on the sand dunes at Inch where they feed and socialise. Chough are primarily a coastal species but are known to nest and forage at inland sites. The NBDC does not hold any records of Chough from the OS 10km Grid Square within which the site is located (V89). No nesting Chough were recorded at the proposed site during the ecological surveys undertaken between July 2024 and June 2025.

⁸ NPWS (2011) Castlemaine Harbour SPA Conservation Objectives Supporting Document (Version 2). National Parks and Wildlife Service

Given the distance between the proposed site and the SPA boundary (c.6.1km at nearest) and the presence of high-value coastal foraging habitat within and adjacent to the SPA boundary, the proposed site is unlikely to provide a regular sustained foraging resource for SCI populations of Chough for Castlemaine Harbour SPA.

Killarney National Park SPA is designated for the presence of SCI species Greenland White-fronted Goose and Merlin. Greenland White-fronted Goose will forage on improved and wet grassland; however the proposed site is set back from Killarney National Park SPA by c.7.9km, which is at the edge of the core foraging range for this species (5-8km, SNH, 2016). In view of the distance of the proposed site from this SPA (c.7.9km) and the relatively high level of disturbance within the agricultural grassland at the proposed site due to grazing and other agricultural practices, the proposed site would be sub-optimal as a regular foraging resource for Greenland White-fronted Goose and potential impacts would be limited to temporary and not-significant disturbance during the construction, if present. The proposed site is outside of the core foraging range for the SCI population of Merlin for Killarney National Park SPA (5km).

In view of the above detailed factors, the proposed development will not result in significant adverse effects on SCI species for Castlemaine Harbour SPA or Killarney National Park SPA as a result of loss of foraging habitat or ex-situ disturbance impacts.

Glint and Glare

Observations at solar farms of stranded, injured or deceased birds that are associated with water have led to the hypothesis of the "lake effect", which states that these birds are attracted to solar panels as they mistakenly perceive them to be water bodies (Kagan *et al.*, 2014). This bird behaviour has also been observed in relation to other man-made objects, for example asphalt roads. It has been argued that bird mortality associated with solar farms is lower than other anthropogenic sources of bird mortality, however, further studies are needed to better understand the risk of solar farms to birds (Jarcuska *et al.*, 2024). It is proposed that the solar panels at the proposed development will have an anti-reflective coating and therefore will not be mistaken for a waterbody by waterbirds flying overhead (i.e. "the lake effect").

Polarised Light

Dark and shiny artificial surfaces, including solar panels, have been found to act as "ecological traps" to some aquatic insects. Asphalt roads, windows, agricultural sheeting and car surfaces have all been shown to attract aquatic insects (Bernáth *et al.*, 2008; Kriska *et al.*, 1998, 2006; Malik *et al.*, 2008). It has been hypothesised that local insect populations can be impacted by large areas of polarising light (Bernáth *et al.*, 2008). Solar panels with no antireflective coating can be a source of polarising light pollution. Sunlight, an electromagnetic wave, is unpolarised. However, when the waves of sunlight oscillate on a single plane (such as a still water surface), the reflected sunlight is horizontally polarised. This polarised light evolved as a cue to over 300 species of aquatic invertebrates to indicate the presence of lakes and rivers (Horváth *et al.*, 2010). These polarotactic species, belong to the following orders Coleoptera, Collembola, Diptera, Ephemeroptera, Hemiptera, Hymenoptera, Lepidoptera, Mecoptera, Megaloptera, Neuroptera, Odonata, Plecoptera, and Trichoptera (Fritz *et al.*, 2020). Polarotactic insects have evolved to mate and oviposit (deposit eggs) above water bodies, however the ecological trap of artificial surfaces can cause these insects to mate and oviposit over unsuitable surfaces, leading to reproductive failure and increased predation (Horváth & Kriska, 2008).

Research examining the attraction of aquatic insects to solar panels has been undertaken in experimental settings, rather than commercial large-scale applications, therefore further research is required. It is important to note that ecological variability causes large variations in potential impacts to invertebrate populations, for example, it has not yet been determined if the attractiveness of polarising light from solar panels differs between species present in slow/still water or fast-moving water (Taylor *et al.*, 2019). It is also important to note that factors attracting insects to solar farms can vary depending on species, solar farm

design and the surrounding environment, for example, solar farms that incorporate biodiversity enhancement may create additional food sources and habitats for insects.

The potential consequences of polarising light pollution from solar farms may affect not only polarotactic insects but also their predators, including birds. Insects form a crucial part of the food web and ecological consequences could result from their swarming to solar farms that produce polarized light, or as a result of their increased mortality and reduced reproduction (Horváth et al., 2014).

As noted previously, Castlemaine Harbour SPA is located in closest proximity to the site (c. 6.1km at its closest point). While research is lacking, it is thought that most of the aquatic insects with aerial life-stages are poor fliers. When they emerge from the water, they rest on nearby riparian vegetation for a short terrestrial phase in which they complete egg-laying and die (O'Grady, 2006); these groups of insects have life-cycles that are primarily localised to the waterbody and the river corridor or lakeshore vegetation. Flying stages of aquatic insects tend to rise only a short distance from the water surface, where dark silhouettes of trees and bushes on the riverbank against the sky form markers which can keep emerging swarms together. Given the separation distance of the proposed solar panels from Castlemaine Harbour SPA and the characteristics of flying stages of aquatic insects as summarised above, the risk of significant adverse impacts on aquatic insects associated with Castlemaine Harbour SPA, and in turn, their predators including SCI species for Castlemaine Harbour SPA will be avoided.

Given the separation distance between the proposed development and Castlemaine Harbour SPA and Killarney National Park SPA (c. 6.1km and c. 7.9km respectively, see Table 3-3) and the characteristics of flying stages of aquatic insects as summarised above, the proposed solar farm would not be expected to affect the aquatic insect populations associated with these SPAs.

In view of the factors detailed above and the nature of the proposed development, no potential for significant effects on SCI species for Castlemaine Harbour SPA and Killarney National Park SPA during the construction or operation phase of the proposed development has been identified.

4.2.3 Cumulative Impacts with Other Plans and Projects in the Area

As part of the screening for an AA, in addition to the proposed works, other relevant projects and plans in the region must also be considered at this stage and assessed in the context of potential for in-combination effects. These plans and projects are outlined and assessed in Table 4-1 below.

It is concluded that there will be no negative in-combination effects between the proposed development and plans or projects in the area.

Table 4-1: Other Projects and Plans that could result in potential cumulative impacts

Plan / Programme/Policy	Key Objectives/Policies/Proposals	Potential for In-combination Effects and Mitigation
Kerry County Development Plan 2022-2028	Kerry County Development Plan includes the following Objectives of relevance to this report: KCDP 11-1: Ensure that the requirements of relevant EU and national legislation, are complied with by the Council in undertaking its functions, including the requirements of the EU Birds and Habitats Directives. KCDP 11-2: Maintain the nature conservation value and integrity of Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). This shall include any	Policies and objectives of the Kerry County Development Plan 2022-2028 ensure that local planning applications comply with proper planning and sustainability and with the requirements of relevant EU Directives and environmental considerations, there is no potential for adverse in-combination effects on European Sites.

	other sites that may be designated at national level during the lifetime of the plan in co-operation with relevant state agencies. KCDP 11-16: Ensure invasive species are managed in compliance with the provisions of the EC (Birds and Habitats) Regulations (SI 477 of 2011), as amended, particularly Sections 49, 50 and the Third Schedule. Best practices, as produced and updated by relevant authorities, are to be adhered to in the management of invasive species particularly on sites proposed for development.	RECEIVED: 22/09/2025
Water Action Management Plan 2024	The Water Action Plan includes targeted measures for all water bodies, with the objective of either protecting water bodies at good or high status or restoring water bodies to at least good status. Where further specific measures are needed in addition to those set in this plan, integrated catchment planning approaches will be used to identify and decide on further specific measures for each water body. This will be reported in 46 Catchment Management Work Plans. These will be used to locate measures within each catchment. The list of water bodies and their associated status, significant pressures/issues and targeted measures, which are to be included in the Catchment Management Work Plans, will include targets for the third-cycle, along with Key Performance Indicators to monitor progress and outcomes.	The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination effects with the proposed development.
Uisce Éireann Capital Investment Plan 2020-2024 and Strategic Funding Plan 2025-2029	Proposals to upgrade and secure water services and water treatment services countrywide.	Likely net positive impact due to water conservation and more effective treatment of water.
WWTP discharges	Milltown	Discharges from municipal WWTPs are required to meet water quality standards. Irish Water Capital Investment Plan 2020-2024 and Strategic Funding Plan 2025-2029 to upgrade water treatment services countrywide. The long-term in-combination impact is predicted to be negligible.
IPPC Programme	Temmler Ireland Limited (P0813), located c.7km to the west of the site	Discharges from these facilities are governed by strict limits to ensure compliance with quality standards. The long-term in-combination impact is predicted to be negligible.

Solar Farm (KCC Planning Ref: 171305)	10 years permission for a solar farm within a site area of 10.19 hectares comprising: (a) approximately 32,000 sqm of photovoltaic panels on ground mounted frames, (b) a new vehicular entrance onto R563, (c) 1 no. single storey substation, (d) 2 no. single storey inverter stations, (e) 1 no. switchgear station, (f) 1 no. battery storage station, (g) security fencing, (h) satellite mast, (i) CCTV, (j) underground cable ducts, (k) a temporary site compound area and ancillary facilities and (l) all associated ancillary landscape and development works at a site at Knockreagh, Milltown, Killarney, Co. Kerry.	The AASR prepared for the development found that no significant effects arising from the development are likely to occur in relation to Natura 2000 sites. The development site is not part of any designated Natura 2000 site and does not require any resources from them. There is hydrological connectivity between the proposed site and Castlemaine Harbour SAC and Castlemaine Harbour SPA, however no likely significant effects were envisaged. This site is in a separate water catchment to the Laurel Ridge Solar Farm proposal. It is set in the Maine_050 RWB. The Laurel Ridge GCR does run for 1.1km within the upper Maine_050 RWB, but with no watercourse or drain interactions. There is no potential for likely significant cumulative effects on aquatic ecological receptors. No potential for likely significant in-combination effects has been identified.
Maine Solar Farm (KCC Planning Ref: 1783)	Permission for ten years for the development of a solar pv farm consisting of up to 26,550 sq.m. of solar panels on ground mounted steel frames, 4 no. inverter cabins, 1 no. single storey substation / control building, access tracks, boundary fencing, CCTV stands, 3 no. new site entrances, underground services, temporary construction compound and all associated ancillary development works	The AASR completed for the development concluded that no significant impacts to Natura 2000 sites were likely to ensue from the proposed solar farm. The site is 3.5km downstream of the proposed Laurel Ridge Solar Farm on the Kealbrogeen Stream. If construction phases coincided some cumulative waterborne pollutant losses could occur to the Kealbrogeen, but this would be extremely unlikely give the separation distance and the level of on-site attenuation offered by the Laurel Ridge lands. There are no significant cumulative effects on aquatic ecological receptors predicted. No potential for likely significant in-combination effects has been identified.
Housing Development (KCC Planning Ref: 19553)	1) Permission to construct access road and services and 2) Outline Permission to construct 3 no. dwelling houses c/w treatment units and polishing filters, all in accordance with plans and particulars submitted at Listry, Co. Kerry.	No Appropriate Assessment reporting for the development was found during a search of the planning database. However, the site is in a separate water catchment to the Laurel Ridge Solar

		Farm proposal (It is set in the Gweestin, 040 RWB.). No significant cumulative effects on aquatic ecological receptors are predicted. No potential for likely significant in-combination effects on European sites has been identified.
Battery Arrays (KCC Planning Ref: 21/739)	Installation of battery arrays, located within container units (20 number units, each 30m2 by c.2.6m tall), a control building (c.160m2 by c.6.4m tall) and transformer (c.5m tall). The development will include for ancillary infrastructure including step-up transformers, security fencing, lighting, CCTV, internal access roads and drainage.	The NIS for the development prepared by Malone O'Regan found that there is potential hydrological connectivity between the proposed site and Castlemaine Harbour SAC and Castlemaine Harbour SPA. The NIS concluded that the Proposed Development, including the appropriate mitigation measures will not result in any adverse impacts to Natura 2000 sites. No potential for likely significant in-combination effects has been identified.
Retention permission (ABP Ref: 308030)	Retention permission for existing excavation works and construction of a new calf rearing house.	The ABP planning inspectors report concluded that: On the issue of appropriate assessment screening under the Habitats Directive (92\43\EEC) having regard to the nature and scale of the proposed development and nature of the receiving environment, the possible impacts arising from the project relate to possible impacts arising from farm waste. As the proposal relates to an existing farm enterprise with provision for adequate effluent storage and compliance with SI No 605/2017 – European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017 I consider that it is reasonable to conclude that there is no potential for significant effects and that therefore Appropriate Assessment is not required. It is not considered that the proposed development would be likely to have a significant effect individually or in combination with other plans or projects on a European Site. No potential for likely significant in-combination effects has been identified.

Housing Development (ABP Ref: 315563)	Planning permission for 3 houses and associated site works	The ABP planning inspectors report concluded that: Having regard to the modest nature and scale of development and absence of connectivity to European sites, it is concluded that no Appropriate Assessment issues arise as the proposed development would not be likely to have a significant effect individually or in combination with other plans or projects on a European site. No potential for likely significant in-combination effects has been identified.
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4.3 Screening Assessment

Table 4-2 identifies the potential direct, indirect and secondary impacts of the proposed development on European Sites within a 15 km radius.

Table 4-2: Potential Significant Effects on European Sites from the Proposed Development

Site Name and Code	Direct Impacts	Indirect / Secondary Impacts	Resource Requirements	Emissions (Disposal to land, Water or Air)	Excavation Requirements
Castlemaine Harbour SAC (000343)	No impact on QI	Potential impacts on aquatic QI species as a result of degradation of water quality	No impact on QI	Potential impacts on aquatic QI species as a result of degradation of water quality	No impact on QI
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI
Lough Yganavan and Lough Nambrackdarrig SAC (000370)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI
Slieve Mish Mountains SAC (002185)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI
Ballyseedy Wood SAC (002112)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI
Castlemaine Harbour SPA (004029)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI

Killarney National Park SPA (004038)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI
Tralee Bay Complex SPA (004188)	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI

4.4 Likely Changes to the European Site(s)

The likely changes that could arise from the proposed development, have been examined in the context of a number of factors that could have a significant effect on the relevant European Sites (Table 4-3).

Table 4-3: Likely Changes to European Sites

Site Name and Code	Reduction of Habitat Area	Disturbance to Key Species	Habitat or Species fragmentation	Reduction in Species Density	Changes in Key Indicators of Conservation Value (Water Quality, etc.)	Climate Change
Castlemaine Harbour SAC (000343)	None	None	None	None	Potential impacts on aquatic QI species as a result of degradation of water quality	None
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	None	None	None	None	None	None
Lough Yganavan and Lough Nambrackdarrig SAC (000370)	None	None	None	None	None	None
Slieve Mish Mountains SAC (002185)	None	None	None	None	None	None
Ballyseedy Wood SAC (002112)	None	None	None	None	None	None
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	None	None	None	None	None	None
Castlemaine Harbour SPA (004029)	None	None	None	None	None	None
Killarney National Park SPA (004038)	None	None	None	None	None	None
Tralee Bay Complex SPA (004188)	None	None	None	None	None	None

4.4.1 Elements of the Project where the Impacts are Likely to be Significant

Applying the precautionary principle, there is potential for significant adverse effects on QI species Atlantic salmon, sea lamprey and river lamprey for Castlemaine Harbour SAC as a result of degradation of water quality during construction of the proposed development.

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5 Conclusion

This AA screening report was completed with due regard to relevant European Commission guidance, national guidance and case law.

The potential impacts of the proposed development have been considered in the context of the European sites potentially affected, their qualifying interests or special conservation interests, and their conservation objectives.

Through an assessment of the source-pathway-receptor model, which considered the zone of influence of effects from the proposed development and the potential in-combination effects with other plans or projects, the following are the main conclusions:

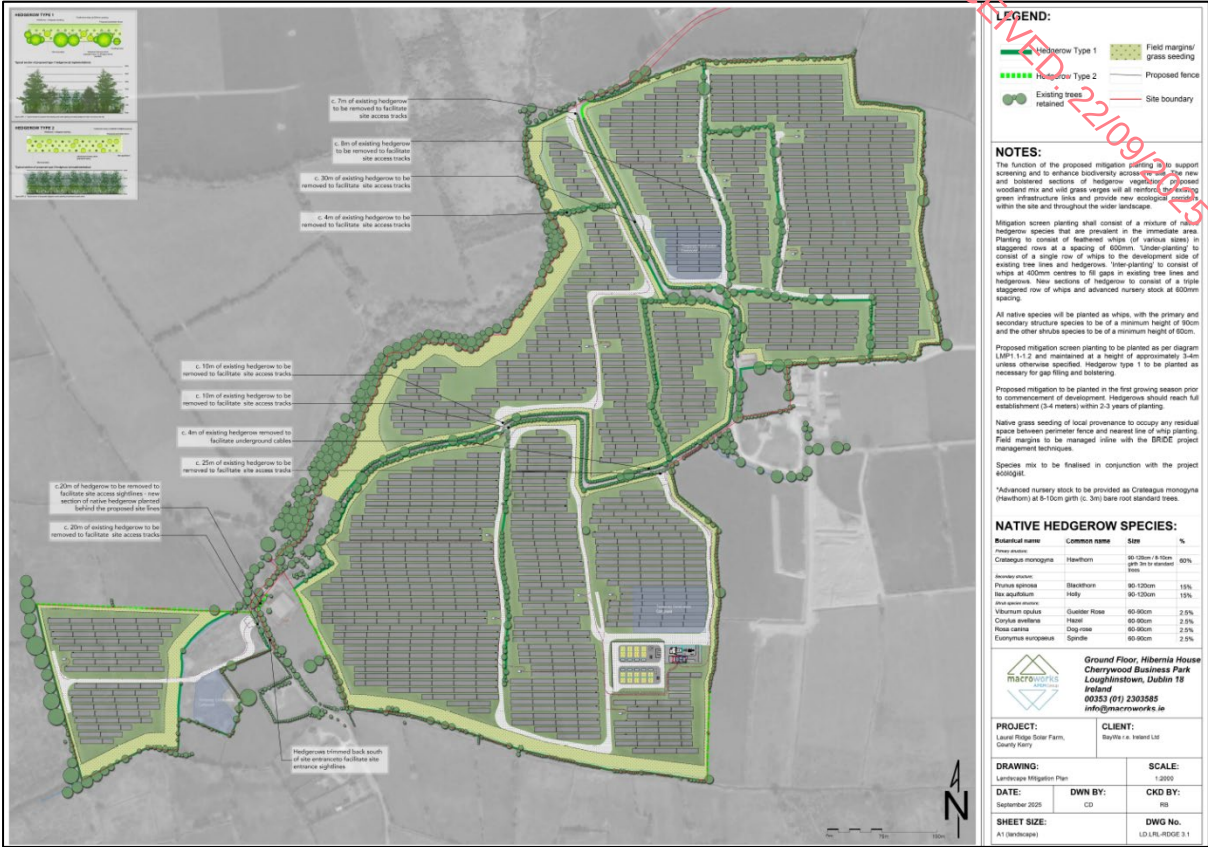
- In view of the geographical location of the proposed project, there is no potential for direct effects on European sites.
- Potential conduits to the River Laune and Castlemaine Harbour SAC are present via the Kealbrogheen stream and the Lissavane West stream. Applying the precautionary principle, there is potential for likely significant effects on QI species Atlantic salmon and sea and river lamprey as a result of degradation of water quality.
- The Kealbrogheen stream in the vicinity of the proposed development does not comprise habitat that could support Annex II species sea and river lamprey of the Castlemaine Harbour SAC and is very sub-optimal for salmon.
- The Lissavane West stream does not support ex-situ populations of aquatic/semi aquatic QI for Castlemaine Harbour SAC.

In the absence of mitigation, and applying the precautionary principle, the potential for likely significant effects on the aquatic QI species Sea Lamprey [1095], River Lamprey [1099] and Salmon [1106] for Castlemaine Harbour SAC as a result of degradation of water quality cannot be excluded. Therefore, a Stage 2 Appropriate Assessment is considered necessary for Castlemaine Harbour SAC.

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Appendix A: Proposed Solar Farm Layout and Landscaping



Appendix B: Aquatic Ecological Impact Assessment

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Aquatic Ecological Impact Assessment

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Laurel Ridge Solar Farm Milltown, Co. Kerry, Ireland

September 2025

PREPARED BY: Lauren Williams MCIEEM | Freshwater Ecologist | 13 Barra an tSean Baile
| Goat St. | Dingle | Co. Kerry | E: laurenwilliams.ecology@gmail.com | P: 087 202 8258

CLIENT: BayWa r. e. | 4th Floor | 1 South Mall | Cork | Ireland

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1 INTRODUCTION

This report contains the Ecological Impact Assessment (EclA) covering the aquatic ecology elements in relation to an application by Laurel Ridge Solar Farm Ltd for a solar farm, 38kV substation and underground cabling grid connection, and energy storage compound with a total area of circa 57 hectares in the townlands of Ballyoughtragh South, Commons, Farranmanagh, Knocknaman and Lisheennashingane, Milltown, County Kerry. The lands are currently under agricultural use.

Laurel Ridge Solar Farm (the 'proposed development') will consist of solar photovoltaic panels on ground mounted frames and all associated ancillary development works. This report refers to two solar farm field parcels: a larger 'eastern parcel' (comprising Fields 1-10 and 12) and a smaller 'western parcel' (Field 11). Solar arrays will be connected to the internal 38kV substation by means of internal 33kV underground interconnector cables (hereafter referred to as 33kV Interconnectors).

The 38kV UGC Grid Connection Route (GCR) forms part of the current application. It is 3.87km in length, travelling from the proposed Laurel Ridge Solar Farm 38kV substation to the existing Oughtragh 110kV substation. The GCR is within the solar farm lands for the first 288m between the proposed 38kV substation and the L11003 public road. From there it follows the L11003, then the L80030 and L8003 local roads to the Oughtragh 110kV substation.

2 METHODOLOGY AND SOURCES OF INFORMATION

2.1 Legislation and Guidance

The ecological impact assessment was prepared having due regard to relevant legislation and guidance documents as follows:

EU Legislation

- European Union Directive 2011/92/EU (the 'EIA Directive') as amended by Directive 2014/52/EU.
- EU Habitats Directive - Council Directive 92/43/EEC (1992).
- EU Water Framework Directive (2000/60/EC) (WFD)

National Legislation

- The Wildlife Acts 1976 and 2000 (as amended) which provide for the protection and conservation of wild fauna and flora, specifically from injury, disturbance, and damage to breeding and resting sites.
- Part XAB of the Planning and Development Act, 2000 (S.I. 30/2000) as amended and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended that transpose the EU Habitats Directive into Irish law.
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) which give legal effect in Ireland to the WFD.
- European Communities Environmental Objectives (Surface Waters) Regulations (S.I. No. 272 of 2009), as amended (S.I. 77 of 2019 and S. I. 50 of 2025).

National Plans

- The 4th National Biodiversity Action Plan 2023 - 2030 (NPWS, 2024), which sets the national biodiversity agenda for Ireland 2023-2030.
- Water Action Plan 2024: A River Basin Management Plan for Ireland (DHLGH, 2024) which sets out actions necessary to protect and restore water quality in Ireland.

Guidance

- EPA (2022) Guidelines on the Information to be contained in Environmental Impact Statements.
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine by the Chartered Institute of Ecology and Environmental Management.
- NRA (2003, 2009) Guidelines for assessment of ecological impacts of national road schemes, Revisions 1 and 2.
- IFI (2016) Guidelines on protection of fisheries during construction works in and adjacent to waters. Inland Fisheries Ireland.

2.2 Study Approach

Watercourses potentially affected by the proposed solar array and grid connection routes were characterised by a combination of desk and field survey. Field survey methods were consistent with standard and published protocols. (2005). Desk-based review of existing information informed the aquatic baseline assessment. Each watercourse was examined at several locations in relation to the Proposed Development and the grid connection route to the existing 110kV Oughtragh Substation.

The downstream Zone of Influence (Zoi) was considered using expert judgement, considering existing watercourse morphology, size and flow types in terms of potential for downstream export of pollutants. Given there is hydrological connectivity to the River Laune, which is part of the Castlemaine Harbour SAC (Site Code 000343), the Zoi applied was 5.1km downstream of the Proposed Development, i.e., to the River Laune confluence / SAC boundary.

2.3 Desk Study

A thorough desk-based search of available information was undertaken to assess potential presence/absence of protected aquatic species/habitats and identify key aquatic values and/or sensitivities. Online information, plus published and unpublished literature, from the following sources was utilised:

- Environmental Protection Agency (EPA) maps and data
- Water Framework Directive (WFD) maps and data (<https://www.catchments.ie/>)
- NPWS maps and data (<https://www.npws.ie/maps-and-data>)
- Geohive historical mapping (<https://www.geohive.ie/>)
- Geological Survey of Ireland (GSI) mapviewer
- National Biodiversity Data Centre (NBDC) maps and data
- Inland Fisheries Ireland (IFI) and WFD fish survey data

2.4 Field Studies

2.4.1 Survey Locations

Fieldwork was conducted on 17 May 2024, 24 September 2024 and 23 August 2025, focusing on potentially affected watercourses, their proposed crossing points (where applicable) and the downstream Zoi. The aim of field studies was to fully characterise baseline conditions of instream habitats and identify key aquatic receptors. Focus was placed on fisheries and any protected aquatic species value of instream habitats. Assessment of ecological value was backed up by desk studies and, where necessary, the published scientific literature. Watercourses were photographed and site coordinates were taken using handheld GPS. **Table 2-1** lists ITM (X, Y) co-ordinates of survey site locations. **Figure 2-1** shows field survey locations in relation to the project Red Line Boundary (RLB). A further four sites (LR10-LR13) were investigated on the Kealbrogheen Stream between the proposed development and the confluence with the River Laune (SAC boundary) on 23 August 2025. The aim was to identify potential Annex II species habitats and any obvious fish passage barriers, the latter in relation to bridge / culvert crossings on public roads. Survey locations downstream of the proposed development are shown on **Figure 2-2**.

Table 2-1 Laurel Ridge Solar Farm – Aquatic Ecology Survey Locations

EPA Waterbody name and code	EPA Watercourse Name	Site Code	Easting (ITM)	Northing (ITM)
Kealbrogeen Stream (Laune)_010 IE_SW_22K040500	Kealbrogeen	LR1	485871	599409
	Unnamed trib. of Kealbrogeen	LR2	486274	599288
	Kealbrogeen	LR3	485939	598965
	Kealbrogeen	LR4	485626	598396
	Lissavane West	LR5	485706	598168
	Kealbrogeen	LR6	485464	598204
	Kealbrogeen	LR7	485186	597999
	Lissavane West	LR8	486181	598074
	*Un-named Drain	LR9	486048	598158
	Kealbrogeen	LR10	485035	597925
	Kealbrogeen	LR11	484120	596327
	Kealbrogeen	LR12	483480	595993
	Kealbrogeen	LR13	483062	595520

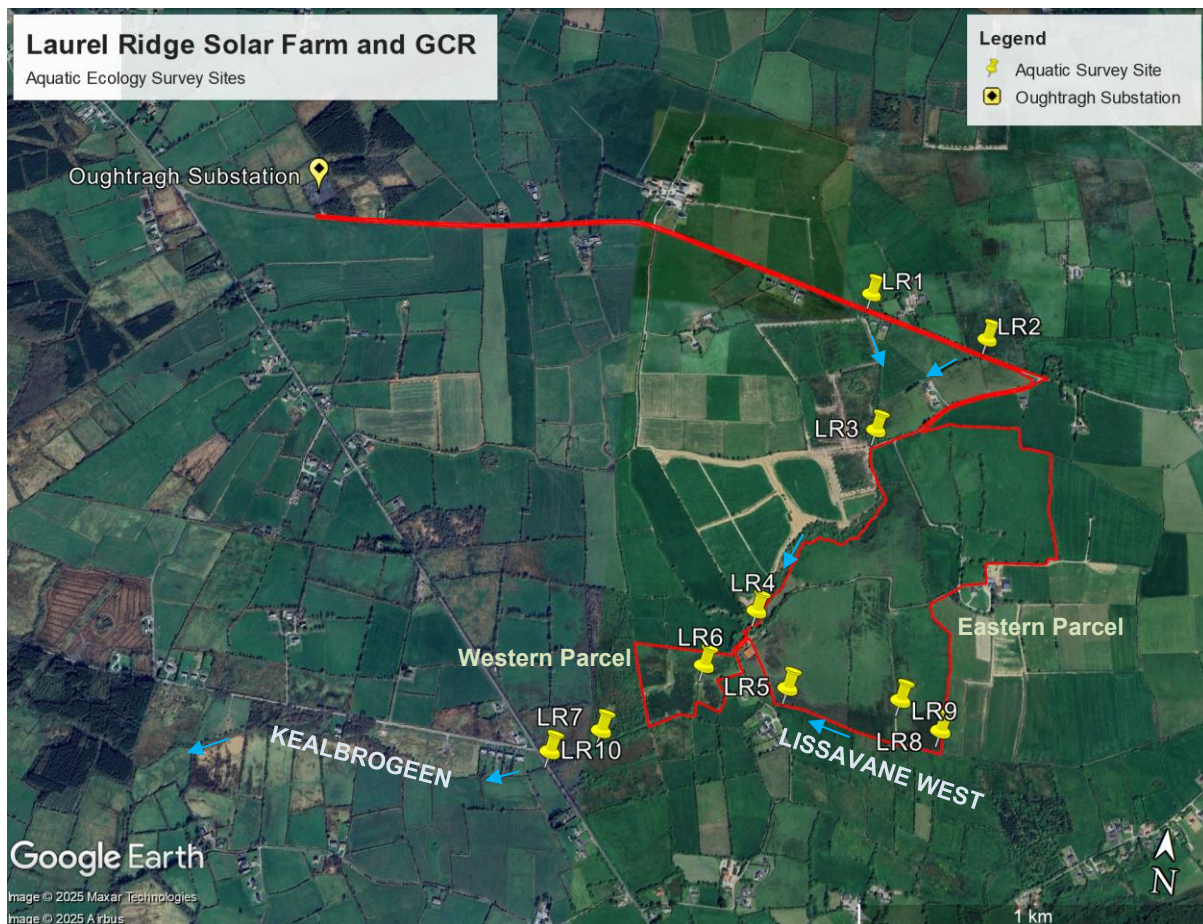


Figure 2-1 Aquatic Ecology survey sites Laurel Ridge Solar Farm



Figure 2-2 Aquatic Ecology survey sites – Kealbrogheen Stream to River Laune

2.4.2 Field Survey Methods

Biological Water Quality

In Ireland, biological water quality is assessed using the Q-value metric. This system is based on field sampling and observations, which evaluates habitat quality and macroinvertebrate diversity and abundance to interpret ecological status as set out in **Table 2-2**. Water Framework Directive (2000/60/EC) (WFD) ecological status is assigned, based on the Q-value rating which is the biological quality element that determines water body status under the WFD. The objective of the WFD is to protect, enhance and restore all surface waters to at least good status by 2027. All surface waters must be maintained or restored to, at least, 'good' ecological status (Q4) and 'high' status waters must not suffer deterioration.

Watercourses were sampled during field studies (17 May 2024) in accordance with EPA protocols to determine Q-value and water quality implications. This involved taking a 2-minute, travelling kick-sample in a fast flowing (riffle) area of each watercourse using a long-handled sampling net (250 mm width, mesh size 0.25mm). Stone washing was employed to ensure "clinging" species, e.g. leeches and gastropods, were adequately collected. Relative abundance and sensitivity of aquatic organisms to pollution were then assessed at the bankside using the Q-rating system.

The EPA operate a national system of river monitoring which provides Q-value data for classification of ecological status on a three-yearly cycle. Available EPA data for the study area was reviewed. Q-values assist in characterising water and habitat quality for the purposes of EclA as water quality is a primary determinant of habitat quality for aquatic organisms.

Table 2-2 Biological Water Quality and Status - Q-value system

Biotic Index	EQR	Quality Status	WFD Ecological Status
Q5	1.0	Unpolluted	High
Q4-5	0.9	Unpolluted	High
Q4	0.8	Unpolluted	Good
Q3-4	0.7	Slightly Polluted	Moderate
Q3	0.6	Moderately Polluted	Poor
Q2-3	0.5	Moderately Polluted	Poor
Q2	0.4	Seriously Polluted	Bad
Q1-2	0.3	Seriously Polluted	Bad

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Fisheries Habitat Assessment

A field-based fisheries habitat assessment was undertaken, recording and evaluating the principle in-channel and bank-side habitats (e.g., substrates, flow types, instream vegetation, sedimentation), and the watercourse suitability as potential spawning, nursery, holding and residential sites for fish (salmonids, lampreys and European eel). The survey was based on expert judgement as to the suitability of channel morphology in relation to fisheries habitat. In the case of salmonid habitat, the Salmonid Life Cycle Unit Score (LCU) method was used to qualify habitat (O'Connor & Kennedy 2002, Loughs Agency 2008). This involved assigning a score equating to "Excellent", "Good", "Fair", "Poor" or "None" for each life cycle unit (Spawning, Nursery, Holding) as shown in **Table 2-3**. These scores were totalled to provide overall salmonid habitat score and descriptor, where applicable, as part of the characterisation of aquatic habitat and fisheries value.

Table 2-3 Salmonid Life Cycle Unit Score and Expert Judgement Qualification

Habitat quality	Life Cycle Unit Habitat score	Total score (3 x LCU)	Expert Judgement Qualification
Excellent	1	3 to 5	Watercourse is ideal habitat for the species owing to high quality and diversity of habitats (flow types, substrate types, bed profiles, riparian habitat) that support relevant salmonid life stages
Good	2	6 to 8	Likely that the watercourse supports the species owing to good quality of habitat conditions
Fair	3	9 to 11	Possible that the stream section could support the species but it there is sub-optimal diversity of flow, bed profile, substrate diversity and/or instream water quality and physical conditions
Poor	4	12	Possible, but unlikely, that the stream could support the species owing to impaired habitat conditions such as drainage, lack of flow, bed profile and substrate diversity and/or instream water quality and physical conditions
None	~	~	No possibility that the watercourse could support the species in question in the relevant life stage owing to completely unsuitable habitat and conditions

General Habitat Descriptions

Survey sites were visually assessed recording bankside and in-channel habitats and their suitability for aquatic fauna, including substrate and flow types, depth and width, shading, surrounding land-use and general morphological character. The latter were assessed, generally based on principles of the

River Hydromorphology Assessment Technique (RHAT) (NIEA, 2014) whereby “departure from naturalness” is evaluated in terms of habitat quality for aquatic fauna.

2.5 Ecological Valuation of Watercourses

The criteria used for assessment of ecological value of watercourses are adapted from ¹NRA Ecological Impact Guidelines (NRA, 2003, 2009) involving careful consideration of fisheries value, water quality and contextual information for the resource at a geographic level. The evaluation criteria used to classify sites is shown in **Table 2-4**. This is based on NRA (2003) guidelines, with slight modifications based on NRA (2009) to set out criteria that classify aquatic habitat value within the study area. The 2003 NRA guidelines reference aquatic habitats and fisheries clearly, while the 2009 guidelines have a more terrestrial focus. Criteria with direct relevance to aquatic habitats and fisheries have been retained in this table. EPA biological monitoring data and field-based study results were assessed in the context of national trends, guidelines, regulations and criteria of both the EU Habitats Directive (92/43/EEC) and Water Framework Directive (WFD) (2000/60/EC), as appropriate.

Table 2-4 Ecological evaluation criteria (NRA 2003, 2009)

Relevant Criteria	Category
International Importance: - Sites designated (or qualifying for designation) as an SAC. - Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988). - Major salmonid (salmon, trout, or char) lake fisheries.	A
National Importance: - Sites or waters designated or proposed as an NHA or Statutory Nature Reserve or National Park. - Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU habitats directive. - Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts; and/or; species listed on a Red Data list. - Major trout fishery rivers. - Waterbodies with major amenity fisheries value. - Commercially important coarse fisheries.	B
County Importance: - Small water bodies with known salmonid populations or with good potential salmonid habitat, - Undesignated sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive. - Large water bodies with some coarse fisheries value. - Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.	C
Local Importance (Higher Value): - Small water bodies with some coarse fisheries value or some potential salmonid habitat. - Any waterbody with unpolluted water (Q-value rating 4-5, Q5)	D
Local Importance (Lower value): Water bodies with no current fisheries value and no significant potential fisheries value.	E

¹ NRA = National Roads Authority, now Transport Infrastructure Ireland (TII)

2.6 Impact Assessment

Potential direct, indirect and cumulative impact significance associated with the proposal were assessed in accordance with criteria set out in EPA Guidelines (EPA, 2022). Guidance was also sought from CIEEM (2018) and NRA (2009). Pre-mitigation and residual ecological impacts were assessed using the source-pathway-receptor (S-P-R) framework and classified and described according to the terminology of EPA (2022) with respect to significance and duration criteria set out in as set out in **Table 2-5** and **Table 2-6**. To assist with assigning impact significance, the matrix in **Appendix 1** was also used, which determines effects in relation to the ecological quality category of the watercourse in question. Special consideration was given to the prediction of how proposed measures may impact on any identified protected aquatic species and their habitats.

Table 2-5 Ecological Impact Significance Criteria (EPA, 2022)

Impact Significance	Criteria
Neutral	No impact
Imperceptible	An impact capable of measurement but without noticeable consequences
Not significant	An impact which causes noticeable changes in the character of environment but without significant consequences
Slight impacts	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate impacts	An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends
Significant impacts	An impact which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment
Very Significant	An impact which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound impacts	An impact which obliterates sensitive characteristics

Table 2-6 Ecological Impact Duration Criteria (EPA, 2022)

Impact Duration	Criteria
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years
Medium-term Effects	Effects lasting seven to fifteen years
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years
Reversible Effects	Effects from which spontaneous recovery is possible within a reasonable timescale or which may be counteracted by mitigation.
Irreversible Effects	Effects from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it.

2.7 Statement of Competence

Lauren Williams BSc PGDip MCIEEM, is a Senior Freshwater Ecologist with 25 years professional consultancy experience. Lauren holds a BSc in Zoology (University of Otago, New Zealand), a Certificate in Environmental Law and a Post Graduate Diploma in Environmental Monitoring Assessment and Engineering with Distinction from Trinity College Dublin. She is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). Laurens specialties are ecological impact assessment, water quality assessment, environmental monitoring and aquatic species/habitat survey including protected aquatic species and fisheries habitat assessment. Lauren has conducted baseline surveys and Environmental Impact Assessment reports for a wide range of large infrastructural developments across Ireland, including appearing as aquatic ecology expert witness at oral hearings. Her work has also involved large, catchment-based water quality monitoring projects and sampling for EPA national river monitoring programmes throughout Ireland.

3 EXISTING ENVIRONMENT

3.1 Designated Conservation Areas

There are no designated Natura 2000 sites directly affected by the proposed development. The lands, however, drain via the Kealbrogheen Stream to meet the River Laune 5.1km downstream. The River Laune is part of the Castlemaine Harbour SAC (000343) at the confluence. Aquatic Qualifying Interest (QI) species and habitats of the SAC are:

- Atlantic salmon (*Salmo salar*)
- Sea lamprey (*Petromyzon marinus*)
- River lamprey (*Lampetra fluviatilis*)
- Estuaries [Habitat 1130]
- Mudflats and sandflats not covered by seawater at low tide [Habitat 1140]

The River Laune at the Kealbrogheen confluence is entirely freshwater, located 5.2km upstream of QI Habitat 1130 [Estuaries] and 11.2km upstream of QI Habitat 1140 [Mudflats and sandflats] as per mapping in the marine habitat supporting documents for site-specific Conservation Objectives (NPWS, 2011a). Habitat 1140 [Estuaries] and 1140 [Mudflats and Sandflats] are a total of 10.3km and 16.3km, respectively, downstream of the proposed development. Neither of these Annex I habitats are at risk of likely significant effects owing to the large separation distance and relatively modest scale of the proposed solar farm in the catchment context. Annex II fish species (salmon and lampreys) are scoped into the assessment. The current report also underpins the Natura Impact Statement (NIS) that accompanies this application.

3.2 Desk Study

3.2.1 Overview

The Kealbrogheen Stream near the proposed development commences as a small 1st order stream, which is joined by the 1st order Lissavane West tributary to form a 2nd order watercourse through the western land parcel. The Kealbrogheen then flows another 5.1km to meet the River Laune, a large 6th order channel that flows westward through Killorglin to the Castlemaine Harbour and Dingle Bay.

The solar farm land parcels drain mainly to Lissavane West stream, and partly to the Kealbrogheen stream (see topographical survey map, **Figure 3-2**, below). The GCR crosses the Kealbrogheen stream (Site LR1) and its small tributary (Site LR2) in their very upstream reaches where they are already culverted beneath the local road (L8003). The solar farm site is underlain by Carboniferous sandstone and shale (GSI mapviewer).

3.2.2 EPA Biological Water Quality

The EPA do not monitor the small streams draining the proposed solar farm development site. The nearest EPA river monitoring stations are on the River Laune. **Table 3-1** shows recently available (2016-2021) river monitoring results from relevant EPA water bodies on the River Laune, upstream and downstream of the Kealbrogheen stream confluence.

Table 3-1 Relevant EPA Q-value data (2016-2022)

EPA Code	Water body name	EPA River Station Name	2016	2019	2022	Ecological Status WFD (2016-2021)
RS22L010300	River Laune	Ballymalis Castle	Q4	Q4	Q4	Good
RS22L010400	River Laune	1.5 km d/s Gweestin R confl.	Q4	Q4	Q4	Good

The Laune has been Q4, meriting 'good' ecological status at river stations 22L010300 (1.9km upstream) and 22L010400 (350m downstream) between 2016 and 2022. This is compliant with WFD

objectives to remain at 'good' status or better. Q-values were assessed as part of field studies for this project (see Section 3.3 and **Appendix 2** for results). The Kealbrogheen was sampled in May 2024 (Site LR3, LR7) and August 2025 (Sites LR4, LR12) meriting Q4, ²representative of 'good' status.

3.2.3 Existing Fisheries Data

Inland Fisheries Ireland (IFI) conducted catchment wide electrofishing (CWEF) surveys in the Laune, most recently in 2017 (IFI, 2019). The Kealbrogheen Stream was not sampled. The Laune catchment had a mean catch of 21.41 salmon fry/5min, which is above the 17 salmon fry threshold which underpins the management of the Laune fishery. It is noted that most 2nd order streams (as is the Kealbrogheen) sampled in the catchment wide survey had trout fry, but not salmon fry. The main channel of the River Laune downstream of the Kealbrogheen confluence is mainly a holding and migration route for salmonids with some reaches of nursery habitat in faster water and limited patchy spawning habitat.

The theoretical ³Conservation Limit (CL) for salmon in the "41SW Laune and Cottoners" by the ⁵SSCS is currently 2,071 returning fish per annum. Data shows that the River Laune exceeded this CL by 2699 fish in 2024. MSW fish on the Laune also exceeded the CL (815) by 239 in 2024, thus the river has an exploitable surplus for angling purposes (TEGOS, 2025).

Castlemaine Harbour is a mixed-stock harvest fisheries, one of only four potential commercial salmon fisheries currently operating in Irish estuaries (given that salmon are nationally in decline and most fisheries are closed to commercial netting). The fishery is only able to be harvested commercially if all three rivers feeding into it (Maine, Laune and Caragh) are above their CL for salmon. Scientific salmon stock evidence shows the harbour fishery has had an exploitable salmon surplus since 2011 (TEGOS, 2025).

3.2.4 Water Framework Directive

The proposed Laurel Ridge Solar Farm is located entirely within the EPA delineated River Water Body (RWB): Kealbrogheen Stream (Laune)_010 (IE_SW_22K040500). Watercourses of the Kealbrogheen Stream (Laune)_010 RWB that are the subject of this assessment are shown in **Figure 3-1**. The GCR is also located mainly in Kealbrogheen Stream (Laune)_010 RWB but has a small footprint in the Maine_050 (IE_SW_22M010800) RWB, i.e., 1.1 km along the L8003 local road to the Oughtragh 110kV substation at the dry, upper boundary of the RWB with no watercourse crossings and no direct drainage connectivity from the GCR and the nearest watercourse in the that catchment (Rathpoge East). Drainage from the L8003 road is broadly westward on barely sloping land intercepted by vegetated over the edge drains and the R563 road. Current EPA assigned river water body (RWB) status (2016-2021) for the relevant receiving waterbodies is listed in **Table 3-2**.

The Laune_040 RWB is assigned 'good' status by the EPA for the 2016-2021 reporting period, and is 'Not at Risk', meaning there is no evidence indicating a trend towards status decline. Both the Kealbrogheen Stream (Laune)_010 and Maine_050 RWBs are currently assigned 'moderate' status based on "modelling" (i.e., not sampled by the EPA) and have assigned risk categories of 'Review'. Where a water body is placed under *Review*, it may show either an improving or a deteriorating trend, but more evidence is needed before it can be classified as either *At Risk* or *Not at Risk* of achieving its WFD objective. On-site Q-value sampling (**Appendix 2**) shows the Kealbrogheen to be Q4, indicative of 'good' ecological status. That does not agree with EPA modelled status, however, the EPA rating is the official WFD water body status.

² Q-values reported outside of the EPAs formal river monitoring programme are "representative" of ecological status as the EPA is the only authority for assigning formal WFD status.

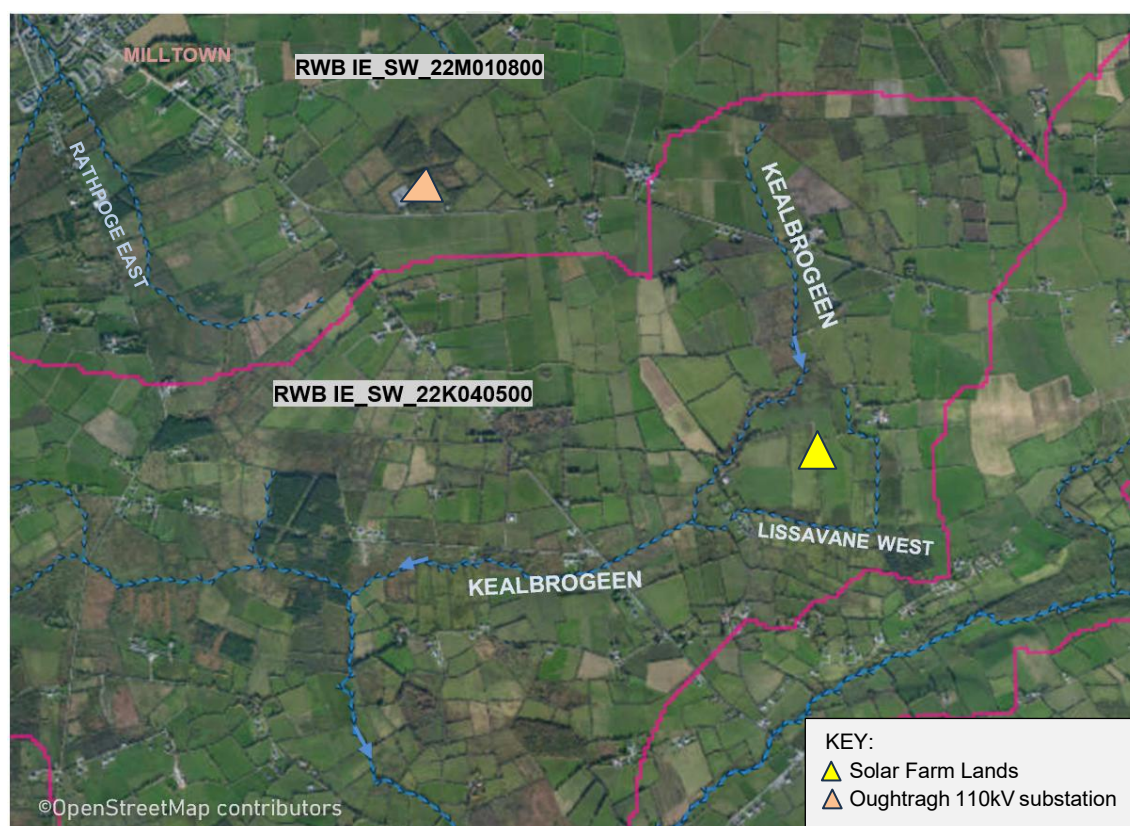
³ Scientifically derived sustainable stock level, i.e., the number of returning salmon that would be required to maintain the carrying capacity of the system based on its accessible area of fluvial habitat.

⁴ 1SW = one sea winter fish ('grilse'); MSW = Multi sea winter fish.

⁵ Standing Scientific Committee on Salmon

Table 3-2 EPA Waterbody Status, Risk and Pressures

EPA Waterbody name and code	EPA Watercourse Name	Laurel Ridge Solar Farm Sites	EPA assigned Waterbody Status (2016-2021)	EPA Identified Risk / Issue / Pressures
Kealbrogeen Stream (Laune)_010 IE_SW_22K040500	Kealbrogeen	LR1, LR3, LR4, LR6, LR7	Moderate (modelled)	Under Review (no listed pressures)
	Lissavane West	LR5, LR8		
	Unnamed drain	LR2		
Maine_050 IE_SW_22M010800	Rathpoge East	N/A	Moderate (modelled)	Under Review (no listed pressures)
Laune_040 IE_SW_22L010400	River Laune	N/A	Good (monitored)	Not at risk (no listed pressures)

**Figure 3-1** WFD River Water Bodies (RWBs) and watercourses draining the proposed development

3.3 Field Survey Results

Aquatic habitat descriptions should be read in conjunction with macroinvertebrate sampling and Q-value results shown in **Appendix 2**. Sites are assigned 'representative' ecological status based on field sampling as they are not formal status classifications reported to Europe. Q-value ratings were assigned using published EPA methods and protocols (Toner *et al*, 2005). Survey site locations are shown in **Figure 2-1** and **Figure 2-2**, above.

3.3.1 Grid Connection Route Sites

Site LR1 [ITM 485871, 599409]: Very minor drained watercourse with very low flow over silty substrates (wet width 0.5m; mean depth 5cm). The stream is piped under the local road L8003 where the GCR will be installed by undercrossing of the existing culvert with no instream works. Refer to culvert crossing C01 in Site Layout Plans (TLI, 2025b). A sluggish glide supports *Callitriche* spp. downstream (Plate 1A), while the channel is heavily drained and overgrown with vegetation on the upstream side of the road (Plate 1B). Not suitable for kick-sampling and Q-value. Stickleback and eel may be present downstream of the road culvert. The stream is ephemeral at this location, virtually drying out in summer.



Plate 1A: Site LR1 downstream of local road (17 May 2024)



Plate 1B: Site LR1 upstream of local road (17 May 2024)

Site LR2 [ITM 486274, 599288]: Minor, drained, field boundary watercourse with silty substrates on upstream side of piped L8003 road culvert (wet width 0.6m; mean depth 5cm) (Plate 1A). The GCR will be installed by undercrossing of the existing culvert with no instream works. Refer to culvert crossing C02 in Site Layout Plans (TLI, 2025b). There is a vertical drop on the downstream side of the road into a deeply drained channel with almost vertical clay banks. The stream has clearly been dredged in the recent past but has recovered substates of embedded cobble and gravel (Plate 2B). Despite this, the habitat is suboptimal for trout and brook lamprey, but these species can't be ruled out downstream of the local road. Eel and stickleback are likely both upstream and downstream, but the road culvert forms a passage barrier to salmonids and brook lamprey. Not suitable for kick-sampling and Q-value. The stream reduces to very low volume during summer.



Plate 2A: Site LR2 upstream of local road (17 May 2024)



Plate 2B: Site LR2 downstream of local road (17 May 2024)

3.3.2 Solar Farm Sites

Site LR3 [ITM 485939, 598965]: Kealbrogheen Stream main channel ~500m downstream of Sites LR1 and LR2. The stream is more “natural” in this location, forming the wooded, gully stream that flows along the western boundary of the proposed development site. Channel width was 1.0m with 5cm riffles and step-pools of about 10cm (Plate 3A). A pipe culvert forms a farm track crossing at this location (Plate 3B) at the upstream end of the field. This does not form any part of the proposed development. The culvert is likely to be at least a partial fish passage barrier, but resident trout cannot be ruled out upstream of the culvert as habitat is suitable. From Site LR3, continuing downstream, the Kealbrogheen is a small, but good quality trout stream with spawning and nursery habitat. There is little opportunity for brook lamprey (*Lampetra planeri*) between Site LR3 and LR4 as fine sediment deposition is lacking, but brook lamprey may spawn in gravels along the reach with juveniles dropping downstream further (nearer to LR7) where there are marginal silt deposits for burrowing. A kick sample merited Q3-4, “slightly polluted” and indicative of ‘moderate’ ecological status (**Appendix 2**).



Plate 3A: Site LR3 view upstream from culvert (17 May 2024)



Plate 3B: Site LR3 culvert viewed downstream (17 May 2024)

Site LR4 [ITM 485626, 598396]: Kealbrogheen Stream main channel ~650m downstream of Site LR3 is a 2nd order stony bottomed watercourse. The gradient levels out at this point, forming virtually a continuous riffle-run over substrates of cobble (10%), gravel/pebble (85%) and coarse sand (5%). The true right bank is wooded with mature ash, elm, hawthorn, willow, sycamore and a dense understorey of ferns and ivy.



Plate 4A: Site LR4, view upstream (17 May 2024)



Plate 4B: Site LR4 – overview of wooded, gully stream from within the proposed solar farm site (17 May 2024)

Channel wet width was 1.2m with a bank width of 1.6m, mean depth 8cm (riffle) and 10-15cm (pool). The stream is set in a steep sided gully along the western boundary of the proposed development lands, with continuous riparian woodland tree cover on the west bank. On the eastern bank, agricultural fields roll down to the stream with a line of gorse, willow and bramble enclosing the

watercourse (Plate 4B). The habitat is very suitable for trout spawning and is nursery (Trout LCU score = 7) and is habitat for brook lamprey spawning. A small amount of the pollution tolerant filamentous green algae (*Vaucheria*) was present. A macroinvertebrate kick sample on 23 August 2025 merited Q4, “unpolluted”, indicative of ‘good’ status (**Appendix 2**).

Site LR5 [ITM (485706, 598168)]: Lissavane West is a minor 1st order tributary of the Kealbrogeen Stream. The channel has been drained historically to form the southern field boundary. It formed a sluggish glide over mud and silt substrates in May 2024 with an abundance of aquatic emergent macrophytes, mainly *Sparganium erectum*, *Iris pseudocorus*, and *Helosciadium nodiflorum* (Plate 5A), plus pollution tolerant filamentous green algae (*Cladophora*) covered in filamentous brown diatom. This channel was mainly dry with occasional patches of standing water on 23 August 2025. The stream forms the outer edge of a wet meadow / wetland at the southern side of the field (Plate 5B). The true left bank is a raised ditch covered in bramble, nettle and rushes. The field is heavily poached by cattle with a narrow stream margin cordoned off by electric fence. The habitat, being ephemeral could not support eel or stickleback and holds no salmonid value at all. It was not conducive to kick-sampling or Q-value assessment.



Plate 5A: Site LR5, view upstream (17 May 2024)



Plate 5B: Site LR5 – overview of wet meadow on southern field boundary near the stream.

Site LR6 [ITM 485464, 598204]: Main channel of Kealbrogeen Stream located ~300m downstream of Site LR4. The stream had been dredged in this reach (as of May 2024), evident by patches of bare clay bank and removal of bankside vegetation (Plate 6A). Gorse lines the channel in places along this reach, but it is generally open and disturbed by grazing and localised channel maintenance. Instream substates had somewhat recovered after dredging, with riffle-run flow over cobble (5%) pebble/gravel (90%) and coarse sand (5%). Wet width was 1.0-1.5m in a narrowly incised channel. A short pipe culvert (Plate 6B) has been installed and is correctly installed to ensure fish passage, i.e., set below the prevailing bed-level. This culvert will be utilised as part of the Proposed Development to access the western land parcel. A 33kV Interconnector will be installed by undercrossing of the existing culvert with no instream works. Refer to culvert crossing CMV01 in Site Layout Plans (TLI, 2025b). The habitat at Site LR6 comprises good trout and brook lamprey spawning gravels and good trout nursery, though generally lacking in riparian cover. The small size / depth character is less suitable for salmon, but if salmon can pass the barrier (road culvert) at Site LR12 (see below), juveniles cannot be ruled out as occurring in small numbers in early spring, perhaps dropping downstream as flows decrease into summer. It would be more likely that salmon select spawning sites in the more stable 3rd order reaches commencing approximately 1.7 km downstream of the proposed development.



Plate 6A: Site LR6, view downstream from existing pipe culvert (17 May 2024)



Plate 6B: Farm access culvert at Site LR6 with bare LHS bank upstream. Proposed cable undercrossing (17 May 2024)

Site LR7 [ITM 485186, 597999]: Main channel of Kealbrogheen Stream located ~430m downstream of Site LR6 and ~180m downstream of the Proposed Development boundary. The stream is at a reasonably low gradient and forms a riffle-run-glide over substrates of pebble/gravel (90%) and coarse sand (10%). It was obviously deepened historically, with a high bank on the true right bank but has recovered very natural hydromorphology. The embankment is covered in bramble and ferns, with liverwort close to the channel. The true left bank forms a natural floodplain, with scattered willow, grasses, ferns, tall herb and rushes. Channel wet width was 1.5m with a bank width of up to 2.0m, mean depth 8cm (riffle) and 15cm (glide). Very good salmonid spawning and nursery habitat (Trout LCU score = 7; 'good'), set within continuous riparian woodland cover (Plate 7A). A total of five (5 no.) juvenile trout (<5cm, i.e., young-of-the-year) were captured in a 2 min kick-sample. This was a high density for such a small stream, signifying high quality spawning habitat and good recruitment in the past winter (Plate 7B). The small stream size / depth character is not ideal for Atlantic salmon spawning and nursery and there is no localised holding habitat (salmon LCU = 11 to 12, 'fair' to 'poor'), but the species cannot be ruled out as occurring in small numbers, if they can pass the barrier (road culvert) at Site LR12 (see below). It would be more likely that salmon select spawning sites in the more stable 3rd order reaches commencing approximately 1.7 km downstream of the proposed development. The invertebrate kick sample merited Q4, "unpolluted" and indicative of 'good' ecological status (**Appendix 2**).



Plate 7A: Site LR7, view upstream (17 May 2024)



Plate 7B: Site LR7 – juvenile trout (<5cm).

Site LR8 [ITM 486181, 598074]: Site LR8 is upstream of Site LR5 on the Lissavane West watercourse: a very small, first order tributary of the Kealbrogheen Stream. The channel has been drained historically to form the southern field boundary. At Site LR8 the channel dries out in places, with patches of standing water over deep clay and mud substrates with emergent macrophytes, mainly *Glyceria fluitans*, *S. erectum* and *H. nodiflorum* (Plates 8A and 8B). The stream forms a linear

wetland at this point, that attenuates and deposits sediment, with substrates of mud and clay throughout.



Plate 8A: Site LR8, view downstream (24 Sept. 2024)



Plate 8B: Site LR8, view downstream at channel narrowing (24 Sept. 2024)

Site LR9 [ITM 486048, 598158]

Site LR9 is a field boundary drain that connects to the Lissavane West watercourse on the eastern perimeter of the proposed internal 38kV sub-station site. It had been dredged and was completely dry in September 2024 with substrates of bare clay (Plate 9A). Gorse was beginning to colonise the base of the drain. It has no fisheries or aquatic ecological significance.



Plate 9A: Site LR9, view downstream – dry drain (24 Sept. 2024)



Plate 9B: View over rush-covered field from proposed substation site towards field boundary stream (24 Sept. 2024)

3.3.3 Sites Downstream on Kealbrogreen Stream

Site LR10 [ITM 485035, 597925]: Kealbrogreen Stream, Site LR10 was spot checked at the R563 road culvert. It was a low gradient glide, 1.5m in width and 10cm depth with substrates of silt and mud with some embedded cobble and gravel (Plate 10). Aquatic habitat was not suitable for salmon spawning or nursery, i.e., too small and sluggish in nature with unsuitable substrates. Trout, eel and stickleback are likely to be present. The R563 culvert is not a fish passage barrier.

Site LR11 [ITM 484120, 596327]: Kealbrogreen Stream, Site LR11 was spot checked at the local road culvert, 3.4 km downstream of the proposed solar farm. The stream had gained volume (3rd order): 2.5-3.5m width and 20cm glide/run habitat over small boulder, cobble and gravel (Plate 11). Water was slightly turbid. Aquatic habitat had potential for salmon spawning and nursery in this location, and

lamprey could also spawn, with patches of marginal silt further downstream for lamprey ammocoetes. (Salmon LCU score = 9; 'fair'). Trout, eel and stickleback are likely to be present. The culvert is not a fish passage barrier.



Plate 10: Site LR10, view downstream – dry drain (23 Aug 2025)



Plate 11: Site LR11, view upstream through local road culvert (23 Aug 2025)

Site LR12 [ITM 483480, 595993]: Kealbrogheen Stream, Site LR12 was surveyed at the local road culvert and a Q-value sample was taken 25m upstream of the culvert. The quad-barrel pipe culvert (Plate 12A) is a partial fish passage barrier, likely becoming drowned out on occasion and allowing fish to pass. Aquatic habitat upstream is suitable for trout, salmon and lamprey spawning and nursery (Plate 12B) (Salmon LCU score = 9; 'fair'). The stream (3rd order) was 3.0-3.6m width; 15 cm riffle/run over cobble and gravel (Plate 12B). Trout, eel, stone loach and stickleback are likely to be present. The macroinvertebrate kick sample had a high abundance of sensitive Heptagenid mayfly larvae (*Ecdyonurus* spp.), meriting Q4, "unpolluted" and indicative of 'good' ecological status (**Appendix 2**).



Plate 12A: Site LR11, view looking upstream showing quad-barrel culvert with flat concrete apron (23 Aug 2025)



Plate 12B: Site LR12, Q-value site (23 Aug 2025)

Site LR13 [ITM 483062, 595520]: Kealbrogheen Stream, Site LR13 was spot checked at the N72 road bridge. The crossing was clear span and is not a fish passage barrier. The stream had been deepened and channelised upstream and downstream of the road and formed a long sluggish glide upstream of the N72, which is unsuitable for salmon spawning and nursery, but provides some holding habitat (Salmon LCU score = 10; 'fair').

3.4 Notes on Hydrological Connectivity

As relevant to the impact assessment the following is noted in terms of hydrological connectivity:

- Sites **LR1** and **LR2** are on separate branches in the upper reaches of Kealbrogreen Stream, relating to the GCR only.
- Sites **LR3, LR4, LR6** and **LR7** are on Kealbrogreen Stream main channel, traversing the proposed development lands.
- Sites **LR5** and **LR8** are on Lissavane West Stream, a minor tributary of the Kealbrogreen Stream.
- Site **LR9** is on a field drain connected to Lissavane West Stream.
- Sites **LR10** to **LR13** are on the Kealbrogreen Stream between the solar farm site and the River Laune confluence (SAC boundary). The lower reaches of the Kealbrogreen Stream, from Site LR11 downstream comprise habitats that are suitable for salmon and potentially river and sea lamprey.
- The proposed 38kV substation and energy storage facility (and its associated temporary construction compound) is in the eastern land parcel, draining southwards to Lissavane West (refer to Sites LR8 and LR5), which joins the Kealbrogreen Stream approximately 75m downstream of Site LR6.
- There are two construction compounds in the drainage area of Kealbrogreen Stream: one set back 115m from the true left bank at Site LR3 and one set back 10m (minimum) on the true left bank adjacent to Site LR6.
- One additional construction compound is located on 'high-dry' land in the drainage catchment of Lissavane West (refer to Sites LR8 and LR5), but with no active watercourse connectivity.
- The majority of the proposed solar farm development lands are gently rolling-to-flat, making them amenable to best construction methods in sediment run-off control. The only exception is the field bordering the Kealbrogreen watercourse at the western boundary of the eastern parcel, which has a slightly steeper gradient down towards the gully stream, as illustrated in **Figure 3-2** (topographical survey map), which shows the direction of surface water run-off based on topography.
- The direction of drainage from most of the large eastern parcel (representing ~92% of the solar farm area) is towards the Lissavane West stream, a watercourse that is 'drain-like' and depositing, filled with aquatic macrophytes and subject to drying out in places during summer months. Only 2% of the eastern parcel drains towards the more sensitive Kealbrogreen Stream (**Figure 3-2**).
- There are several minor field boundary drains (inactive during summer) between the proposed eastern development parcel and the EPA delineated Lissavane West Stream.
- The western parcel represents ~8% of the total solar farm land area, and drains over wet, rush covered, agricultural lands towards the Kealbrogreen Stream.
- There are no instream works proposed for any watercourse crossings. The watercourse crossings at **LR1, LR2** and **LR6** are under crossings of existing culverts. This is achieved by trenching up to the existing culvert and passing beneath it with no channel disturbance. There are other land drain crossings as part of the 38kV GCR, 33kV Inteconnectors and internal access tracks, but these are not "watercourses" *per se*; they are ephemeral land drains that dry out, with no fisheries significance.

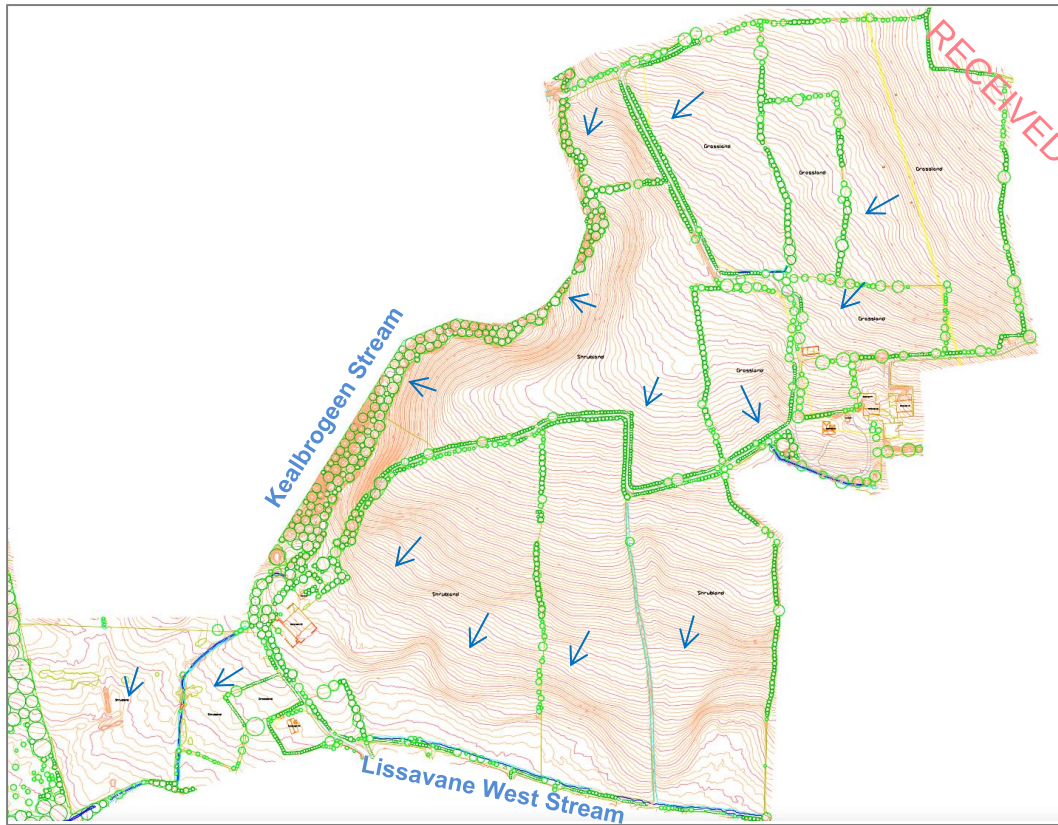


Figure 3-2 Topographical Survey Map – Laurel Ridge Solar Farm (arrows show drainage direction)



Figure 3-3 Laurel Ridge Solar Farm Layout Plan

3.5 Summary of Aquatic Receptor Sensitivity

Table 3-4 provides a summary of ecological value of watercourses potentially affected by the development and sets out the species and habitats of ecological interest that occur or are likely to occur in the Zone of Influence of the proposed development.

Table 3-4 Summary of Aquatic Ecological Value and Importance

Sub-catchment	Summary	Ecological Valuation
Kealbrogreen Stream	Small and channelized in the upper reaches where the GCR will pass under the existing culvert (LR1). Good trout spawning and nursery habitat with reasonably natural hydromorphology from LR3 to LR4, along the western boundary of the Proposed development, where it is enclosed in a woodland gully. The lower gradient reach from LR4 to LR7, running through the western parcel and continuing downstream of the site boundary comprised good trout spawning and nursery, with evidently high density of juvenile trout locally, attesting to habitat quality. The stream is suitable for brook lamprey spawning, with some limited brook lamprey nursery habitat (silt deposit) further downstream of the development lands (LR7 to LR10) but no lamprey ammocoetes were found. Owing to small size / depth character the stream is not suitable for salmon between LR1 and LR4. It is sub-optimal for salmon in the reaches adjacent to the western parcel but the species cannot be ruled out as occurring in small numbers from LR6 downstream, assuming the partial barrier further downstream in the catchment (LR12) is passable by fish occasionally. The Kealbrogreen stream, in the vicinity of the Proposed development, does not comprise habitat that could support Annex II species sea and river lamprey of the Castlemaine Harbour SAC, located 5.1km downstream, and is sub-optimal for salmon. There is greater potential for salmon spawning / nursery once the stream becomes 3rd order, from 1.7km downstream of the proposed solar farm site, although habitat is not ideal for the species owing to historical and contemporary drainage and a partial fish passage barrier in the lower reaches.	D – Local Importance (Higher Value)
Lissavane West	Low volume, heavily drained, but subsequently overgrown 'drain-like' channel along the southern boundary of the eastern parcel. No salmonid habitat or potential. Eel and stickleback may be present towards the deeper glides in the reach around LR5, but the channel almost completely dries out, particularly in the upper reaches around LR8 during summer months, meaning even eel and stickleback may not persist over summer.	E – Local Importance (Lower Value)

4 POTENTIAL IMPACTS

4.1 Relevant characteristics of the proposal

For reference the solar farm site layout is presented in Error! Reference source not found., above. The overall construction timeframe for the project, including the GCR cabling, is 12 months. The proposed development will consist of a solar farm comprising of c.230,000 m² of solar photovoltaic panels on ground mounted frames, associated string inverters mounted to rear of panels and 14 no. single storey electrical transformer stations. The Energy Storage System (ESS) compound will consist of 36 no. containerised energy storage modules and associated plant and equipment, 9 no. transformers and 2 no. auxiliary transformers, 2 no. spare parts containers and 1 no. office unit. The application includes for 1 no. 38kV substation and associated electrical compound, including single storey control building, line bay, transformer and accompanying apparatus.

The project will also consist of underground electrical ducting and cabling within the development site (33kV Interconnectors) and within the L11003, L8003 and L80030 (GCR) public roads, temporary construction compounds, security fencing, CCTV, access tracks, landscaping, drainage and all ancillary development works and apparatus necessary to facilitate the proposed development. Construction and operational access will be via 6 no. entrances from the L11003 and L80030, with one of these entrances used for the temporary construction phase only. The proposed operational lifespan of the solar farm will be 40 years.

The Construction and Environmental Management Plan (CEMP) (HWP, 2025) was consulted for this assessment as was the Construction Method Statement (CMS) for the electrical infrastructure (TLI, 2025a). The CEMP describes the proposed solar farm installations, work schedule and environmental protection measures. The CMS (TLI, 2025a) covers the electrical installations, including 38kV substation, ESS compound, interconnector and GCR cabling. Protective measures were built into the CMS and CEMP, informed by aquatic ecological constraints reporting by this author. The overall project design was informed (iteratively) by aquatic ecological sensitivities and includes design measures (e.g., 10m set back from watercourses / drains) that avoid or limit the potential sources of water borne construction related pollutants (sediment, concrete, hydrocarbons) and helps prevent export of pollutants into drains and/or watercourses from construction areas.

4.1.1 Solar Arrays, 33kV Interconnectors and Access Tracks

The civil works for the panels involve a simple ground-mounted system within the gently sloping site topography, avoiding undue ground disturbance. There are no major excavations required for panel installation. A total of 4,100 linear metres of track across the land parcels will be installed. Finished internal access tracks will be 3.5m wide and of compacted gravel, equating to 1.435ha of track area within the c.57ha solar farm site. The design specifies a buffer zone of no less than 10m between solar farm elements and any drains or watercourses to reduce potential for pollutant losses during the construction and operation phases.

There are no instream works involved in the proposed development. There is only one location within the solar farm where 33kV Interconnector cabling will be installed at a flowing watercourse and this has an existing pipe culvert which will be under crossed by trenching up to the culvert on either side and passing underneath with no bed disturbance:

- 1 no. under crossing of Kealbrogeen Stream at Site LR6 (see **Figure 2-1**) under the existing Ø 1.5m pipe culvert. Refer to culvert crossing CMV01 (TLI, 2025b).

4.1.2 38kV Substation and Energy Storage Compound

The proposed 38kV substation and ESS compound are included in the application for the solar farm. Of relevance to the aquatic ecology assessment, these elements comprise:

- 1 no. on-site electrical substation and ancillary buildings with a footprint of ~1111m².
- 1 no. on-site ESS compound with a footprint of ~5020 m².

- No foul water discharges to surface waters, i.e., site messroom, washroom and toilet waste will be retained on site and tanked out periodically using a licenced waste management contractor.
- The proposed 38kV substation and ESS compound are set 100m back from the Lissavane West stream on gently sloping topography where surface drainage pathways are intercepted by low-lying wet, rush covered agricultural land before reaching the ephemeral Lissavane West watercourse.

The substation and ESS will take approximately 6 months to construct, commencing 7 weeks prior to the main solar farm construction period. The main soil stripping works for these larger elements therefore occur in advance of the solar array installation in the Lissavane West water catchment (eastern parcel). These elements are located on the higher, drier land with no active drains or watercourses within 100m of their perimeter. The ephemeral (but largely dry) land drain represented by Site LR9 (Section 3.3.2, above) runs directly downhill from the southwestern corner of the ESS compound to meet the ephemeral Lissavane West watercourse.

4.1.3 Grid Connection Route

The underground 38kV GCR cable will run 3.87km from the proposed internal 38kV substation, through private land for 288m and then along public and local roads (L11003, L80030, L8003) to connect to the existing Oughtragh 110kV substation. Best construction practice measures are built into the CMS (TLI, 2025a) and CEMP (HWP, 2025) to prevent waterborne export of sediment and other pollutants into watercourses from the substation and GCR construction areas. There are no instream works involved in the proposed GCR. There are 2 no. under crossings of minor, flowing watercourses at Site LR1 (upper Kealbrogheen Stream) and Site LR2 (upper tributary of Kealbrogheen). These flowing watercourses each have an existing pipe culvert under the L3008 road which will be under crossed by trenching up to the culvert on either side and passing underneath with no bed disturbance. Refer to culvert crossings C01 and C02, respectively (TLI, 2025b). There are 3 no. very minor (ephemeral, mainly dry) land drains also undercrossed by cabling on the GCR at existing small pipe culverts (refer to C03, C04 and C05 in TLI, 2025b).

4.1.4 Construction Phasing

Table 4-1 sets out phasing of the proposed construction works. This is used to inform the impact assessment in terms of scale and duration of potential effects.

Table 4-1 Construction Phasing by Month

Month	1	2	3	4	5	6	7	8	9	10	11	12
Site Compound Setup												
Enabling Works												
Substation & ESS Compound												
Civil Works												
Electrical Works												
Pre-commissioning												
ESB Commissioning												
Grid Connection Works												
Ducting & Cabling												
PV Site												
Solar Farm Site Set Up & Civil Works												
Frames and Modules												
Electrical Commissioning												
Close Out												

4.2 Potential Effects of Laurel Ridge Solar Farm

4.2.1 Construction Phase Effects

Impacts resulting from civil engineering works near watercourses are primarily related to three sources of potential water borne pollutant loss: suspended sediment, concrete and hydrocarbons.

Potential Effect and Impact Significance in relation to Suspended Sediment Loss

The principal source of potentially negative effects on aquatic receptors arises from the escape of excessive amounts of suspended sediment during the construction phase. Sediment export can occur as a result of earthworks and erosion of soil stockpiles and excavated areas relating to, e.g., access tracks, site compounds and underground cabling (trenching). Machinery traversing lands during PV panel piling, mounting and installation, may generate suspended solids, depending on the ground conditions. Low load bearing machines will be used to traverse ground, and only minimal soil disturbance is expected for this element of construction, however, whilst the majority of the land is 'high and dry' with inherently low risk of erosion, there is very wet ground bordering the ephemeral Lissavane West stream which will require management in the construction phase.

Installation of new access tracks involves linear construction within green fields on lands that are, in general, gently rolling to flat. This inherently reduces risk of potential uncontrolled runoff of pollutants and increases effectiveness of best practice run-off controls (e.g., temporary check dams, silt fencing), especially compared to broad-scale excavations or full field ploughing, the latter of which is ordinarily practiced in such an agricultural setting. Permeable (compacted gravel) access tracks will have over-the-edge drainage to vegetated ground, with existing onsite drainage features (ephemeral field perimeter drains) and infiltration patterns remaining unchanged.

Escaped solids (if this did occur in excess, which is unlikely) can settle in watercourses; smothering of plants and macroinvertebrates, causing fish to abandon the area at least in the short-term. At worst, such sedimentation could occur over localised trout spawning beds of the Kealbrogeen Stream. This could (depending on the amount and the timing) result in reduced recruitment of young fish from affected reaches because of localised egg and fry mortalities. Elevated concentrations of suspended solids and resulting turbidity within the water column can also potentially damage the gills, physiology and behaviour of fish (e.g., respiration, migration) and/or benthic macroinvertebrates (e.g., respiration, drift responses). Brook lampreys also depend on clean gravels for spawning, and although very little lamprey nursery habitat was identified in the upper Kealbrogeen Stream, brook lamprey could be spawning locally with juveniles dropping downstream to areas of silt deposition for their nursery stage.

It is noted that Lissavane West tributary of the Kealbrogeen receives most of the drainage from the proposed development. It is ephemeral (dry in August 2025) with no fisheries significance and any escaped solids would likely settle out within a short distance of their source especially given the instream aquatic plant density and low gradient nature of the channel. This channel is depositing by nature and forms a long linear "wetland" along the southern boundary of the eastern parcel.

The indicative work timeline set out in **Table 4-1** (above) and in Appendix C of the CEMP shows a 12-month construction period. Temporary site compound, 38kV substation and ESS compound enabling works in the eastern parcel occur in Months 1 to 3 and include the main soil stripping for these elements. Solar farm civil works construction commences at the end of Month 3 and last for approximately 3 months. This means there is a gap of 1-2 months between the two main periods of associated soil stripping. By the time solar farm access tracks are excavated (Months 4-6) and panels are installed in Months 7 to 11, the substation site will be well advanced in the civil works period and any stripped soil will have been re-used (settled and reseeded) or safely stockpiled with silt control measures in place for later reinstatement. Ducting and cabling, including the 33kV Interconnectors and 38kV GCR, commence in Month 4, running through to Month 10 (6 months in total). The cabling is a linear process and occurs distant to watercourses, apart from the under crossings (no instream works) at Site LR6 (western solar farm parcel) and Sites LR1 / LR2 (GCR).

The bulk of soil stripping for the temporary works compound, substation and ESS compound sites are set back $\geq 100\text{m}$ from the watercourse in the Lissavane West water catchment. Drainage is mainly

over vegetated ground with a portion of drainage to the (ephemeral) LR9 arterial land drain. The receiving watercourse is the Lissavane West (also ephemeral), which is naturally depositing in nature, forming a linear wetland-type habitat that dries out in summer months. The low-lying band of wet ground adjacent to the Lissavane West, including the depositing watercourse itself will inherently intercept and attenuate any suspended solids run-off before it reached the fisheries habitats of the Kealbrogheen located 650m downstream of the LR9 land drain confluence. The amount of solids reaching aquatic receptors of the Kealbrogheen would likely be imperceptible given the level of natural attenuation on the pathway between the main source areas of soil stripping (38kV substation, ESS compound and temporary construction compound).

However, the 'wet' nature of the field adjacent to the Lissavane West also means that tracking of heavy machinery during installation of the solar arrays and access tracks could cause deep rutting and potential for additional suspended solids wash out, which will require mitigation to prevent that occurring. The 'wet field' area is marked in **Figure 4-1**. It is covered in soft rush and *Iris pseudacorus*, merging to the ephemeral watercourse with patches of branched burr reed (*Sparganium erectum*) and reedmace (*Typha latifolia*) within residual patches of standing water (see Plate 5A and 5B, above).

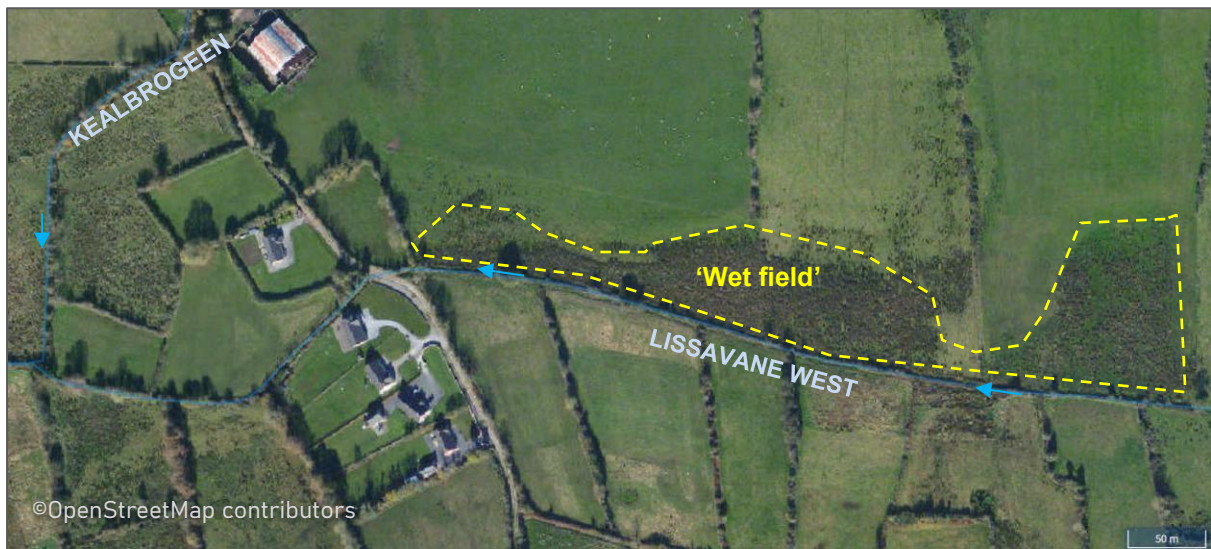


Figure 4-1 Vulnerable area of 'wet field' along the Lissavane West watercourse boundary



Figure 4-2 Vulnerable area of sloping, riparian meadow along Kealbrogeen Stream

The Lissavane West will inherently attenuate suspended solids losses (if they did arise) from most of the construction area that drains in its direction (i.e., 92% of the eastern parcel). There is, however, a steeper margin of sloping ground bordering the Kealbrogeen Stream at the western boundary (**Figure 4-2**) that is vulnerable to suspended solids loss, e.g., if there was heavy tracking in that area. It is noted though, that construction works and solar farm infrastructure (solar arrays) are set back a minimum of 10m from the watercourse along this boundary and the proposed access track is, at nearest, 65m set back from the Kealbrogeen Stream on the higher, drier and lower gradient land of the development field bordering the stream (Refer to Site Layout Plans, TLI (2025b)). Overall, the potential sources of solids loss during construction in this field bordering the Kealbrogeen Stream are buffered owing to incorporation into the design of setbacks that separate proposed infrastructure from the watercourse and the gully land form.

Construction works in the western parcel are on flat land and pose an inherently lower risk of construction related erosion and sediment wash out to the Kealbrogeen as the scale of the development is relatively small and there is a high degree of inherent onsite attenuation. Mitigation will, however, be required to prevent pollutant losses from the proposed temporary construction compound in the western parcel, which is set back 10m from the watercourse.

In conclusion, the greater proportion of soil stripping occurs in the Lissavane West water sub catchment (temporary works compound, substation, ESS compound, access tracks, panel arrays, Interconnectors) which has a high level of inherent attenuation owing the land form and naturally depositing nature of the receiving, ephemeral watercourse. The lesser proportion of construction works occur in the direct water drainage sub catchment of the Kealbrogeen itself.

Placed in context, the proposed soil stripping activity is of a low magnitude, set back from watercourses and is mainly linear (i.e., access tracks, cabling), which is of a much lesser scale compared to e.g., entire field ploughing, which routinely occurs in the absence of dedicated controls in these types of agricultural settings.

Given the phasing and the level of best practice environmental control measures proposed during construction, the risk of uncontrolled sediment loss is considered low. However, in line with requirements of the Habitats Directive whereby mitigations cannot be considered, if appropriate

construction strategy and environmental controls were not employed, there is conservatively potential for **localised, short-term moderate-to-significant negative reversible** effects on water quality (temporarily elevated turbidity), and fisheries habitats (short-term sedimentation effects) of the Kealbrogreen Stream.

Potential Effect and Impact Significance in relation to Cement Loss

Relatively small amounts of liquid cement usage will be required during the solar farm construction phase, e.g., transformer plinths. There will be no on-site batching of concrete and no-washing out of concrete batch delivery trucks on-site. Interconnector and GCR joint bays utilise precast concrete units. Owing to its highly alkaline and corrosive nature, cement is potentially toxic to instream fauna and can cause fish and invertebrate kills downstream if it did reach watercourses. However, the likelihood of this occurring is very low and inherently limited using best construction practice around concrete usage. Concrete usage during the solar farm construction period will have **no likely significant negative effects** on aquatic receptors as there are limited sources of concrete contamination and very distant (and attenuated) pathways to sensitive aquatic habitats.

Potential Effect and Impact Significance in relation to Hydrocarbon Loss

Hydrocarbon spills and leakages can result in oil slicks and tainting of fish, or (if large enough) fish and invertebrate kills. They can be very detrimental to salmonid eggs and young fry in spawning areas. Hydrocarbons can reach drains and watercourses because of spills and leakage from poorly secured or non-bunded fuel storage areas; spills during re-fuelling; leaks from on-site vehicles, plant and equipment.

It is considered that the main area of risk for hydrocarbon contamination is in relation to the temporary construction compound in the western parcel (near Site LR6), noting, that there is a 10m undisturbed buffer zone between the compound and the watercourse built into the proposal.

Temporary compounds in the eastern parcel are distant from watercourses (>100m) that possess fisheries significance, and it is very unlikely owing to the long pathways (comprising ephemeral, vegetated drains), that sources of hydrocarbon contamination would reach sensitive aquatic receptors.

Whilst likelihood of hydrocarbon loss occurring from a well-managed construction site is low, i.e., employing best construction practice in terms of fuel storage and management, if there was no mitigation and an accidental leak or spillage occurred, the effects could be (at worst) **localised, short term, significant negative**, affecting aquatic receptors (fish and macroinvertebrates) primarily at the Kealbrogreen Stream (Site LR6) and downstream.

Potential Effect and Impact Significance in relation to Stream Crossing (Site LR6)

Whilst there are no instream works involved, under crossings require trenching up to the existing culvert or drain, with risk of contaminants entering, primarily suspended solids. In the absence of dedicated environmental controls elevated levels of suspended solids may escape downstream, potentially affecting fisheries and macroinvertebrate habitat, at least locally. Given that there are no instream works involved, and considering the small scale and temporary nature of the proposed under crossing works, the impact on downstream aquatic receptors is likely to be at worst, **temporary, reversible, imperceptible to slight negative** locally at LR6 (33kV Interconnector) owing to brief turbidity and/or temporary sedimentation, the latter of which will wash out during a subsequent rain event in this spate driven system.

Potential Effect and Impact Significance in relation to Drain Crossings (Site LR9)

There are 4 no. drain under crossings required for the internal 33kV Interconnector route. These occur on the ephemeral field perimeter drain represented by Site LR9. The drain is predominantly dry judging by the amount of gorse and grass regrowing on its freshly deepened bed (Refer to Plate 9A, Section 3.3.2, above). The drain was never active during three separate site visits in 2024 and 2025, and it has no fisheries significance. It is orientated downhill forming a potential conduit to the ephemeral Lissavane West stream which has no fisheries significance and was virtually dry in August

2025. The under crossings of cable beneath this drain will have no impact on aquatic ecological sensitivities and no significant effects on the Lissavane West (owing to its lack of sensitivity). There will be a neutral effect on the Kealbrogreen Stream, further downstream, as there is unlikely to be any perceptible increase in suspended solids that far downstream given the natural attenuation provided by the drain itself and the low-gradient, plant choked nature of Lissavane West stream. If the cable is laid when the drain is dry which is the most likely scenario, there will be a **neutral** effect on downstream water quality and aquatic receptors. The sloping nature of the drain means that it would not retain any standing water. If there was some small volume of water in the drain the undercrossings could be achieved by a temporary dam and pump over water management which may cause temporary, slight turbidity in the drain and Lissvane West downstream with no consequential effects on sensitivities of the Kealbrogreen further downstream and hence **not significant**.

Potential Effects of Invasive Alien Plant Species (IAPS)

Construction works, especially those involving earthmoving within the site and importation of materials, carry potential for introduction and/or transfer of invasive alien plant species. These can have significant negative effects on riparian corridors if transferred either within the site or brought onsite. It is noted there will be no importation or movement of topsoil, with any reinstatement works carried out using soil stripped from access tracks and the substation / ESS sites. Section 7.9 of the CEMP contains the approach to the Invasive Species Management Plan (ISMP) to prevent any transference of IAPS into or within the development lands. There is not expected to be any significant negative effects on riparian corridors and instream fauna.

Potential Construction Phase Effects on European Sites

Castlemaine Harbour SAC is 5.1km downstream via the Kealbrogreen Stream. At that separation distance, whilst unlikely to occur, **temporary to short term significant negative** effects cannot be ruled out (in the absence of site-specific mitigation around sediment loss control). Such effects could be related to impact on salmon and lamprey spawning / nursery habitat, primarily of the lower Kealbrogreen Stream (e.g., Sites LR11, LR12) where there is habitat diversity suitable to salmon, bearing in mind that the sources of sediment loss from the construction site itself are not considered to be high risk. However, as a precaution and given the S-P-R linkages the effect of potential sediment loss impact on ex-situ salmon and lamprey habitat of the Kealbrogreen Stream have been considered as the lower Kealbrogreen contributes (in a small way in a catchment context) to Conservation Objectives for these Annex II QI fish species of the SAC.

4.2.2 Operation Phase Effects

Hydrology and Water Quality

The proposed solar arrays are on generally flat-to-gently-rolling topography and will continue to be drained by existing on-site (in-active) field drains which flow, mainly towards the ephemeral Lissvane West watercourse and a proportion to the Kealbrogreen Stream. The discharge rates shall be the equivalent of greenfield conditions, with no alteration to natural flow patterns and hence no significant change to the hydrological regime of the lands in question. It is envisaged that either mowing or low intensity sheep grazing will be the principal means of managing grass growth levels on the site during operation, meaning the site will continue to be vegetated. This is consistent with best practice measures contained within the UK BRE Planning Guidelines for the development of ground mounted solar PV systems. Because of the proposed management, run-off rates will not differ significantly from existing green-field rates and the potential for erosion linked to concentrated run-off from panels is therefore considered low (Cook & McCuen, 2013).

There will be no additional soil disturbance during the 40-year operation phase, meaning a negligible release of sediment to the watercourses associated with the proposed development. The sediment export rates will likely be similar or less compared to the current situation because there will be no ploughing/reseeding of fields (as would otherwise be common agricultural practice over a 40-year time scale). The development includes a 10m set-back at a minimum from all watercourses and drains. These buffers, which are currently grassed or covered in a wet meadow mix of Iris and soft rush, will be enhanced through management as tussocky grassland with perennial grasses and wildflowers. The proposal also includes introduction of 553 linear metres of new hedgerow planting, as well as the bolstering of an additional 7,077 linear metres, some of which is in riparian zones. Once

established, these setbacks and plantings will enhance filtering function and on-site nutrient and sediment attenuation, helping to protect receiving watercourses. Panels will be cleaned with pure water (no chemical additives).

Given there are no significant sources of contaminants from the operational panel array, nor their maintenance, and no further soil disturbance, there is virtually no risk of contaminated run-off having any significant impact on watercourses during operation. Overall, the effect over the 40-year lifespan of the project is potentially a **long-term positive** on water quality and aquatic receptors as there will be a likely reduction in intensity of agricultural activity on the land parcels and consequent net reduction over 40-years in commonly associated agriculture emissions to surface waters.

Potential Operational Phase Effects on European Sites

Once the solar farm is constructed and land reinstated, there are no operational phase sources (emissions) of impact on aquatic ecology locally and no potential for effects on the SAC located 5.1km downstream.

4.3 Potential Effects of Grid Connection Route

4.3.1 Construction Phase Effects

Trenching for the GCR cable will travel across private land for the first 288m before joining the L11003 road, travelling ~648m to meet the L80030 local road, travelling ~478m to meet the L8003 road, turning westwards to travel ~2.37km to the existing Oughtragh substation. There are two very minor, ephemeral land drain crossings on the L80030 road - refer to C03 and C04 on Site Layout Plans (TLI, 2025b). Both drains were completely dry during 3 no. site visits between May 2024 and August 2025, are very small channels and have no fisheries significance. There are 2 no. under crossings of existing pipe culverts at Sites LR1 and LR2 along the L8003 road.

Trenching can give rise to potential for sediment export locally. Lean mix will line the first 600mm of trenches along the route, which, by its nature, is contained and has a low risk of potential escape to nearby drains. It is noted that only short lengths of trench will be open at any one time (100m maximum), with backfill and reinstatement occurring immediately. Plant and machinery involved in the trenching are small and mobile and will not be refuelled within 50m of a watercourse or drain. These activities can be adequately managed using best construction practise in line with the CEMP. The limited source areas at any one time, separation distance and the gently sloping topography along the GCR route are such that the potential for excessive wash out of sediment is low. However, the crossings and approaches of the upper Kealbrogheen Stream (LR1) and its tributary (LR2) will require care to avoid entrainment of suspended solids to the more sensitive trout habitats located downstream. In the absence of mitigation, the localised effect would be **temporary slight negative** at LR1 and **temporary moderate negative** at LR2, in terms of potential downstream effects of suspended solids on aquatic habitat of the Kealbrogheen Stream, affecting trout and macroinvertebrates.

4.3.2 Operational Phase Effects

Once installed and land reinstated, underground cables have no operational impacts on aquatic ecology. Any required maintenance of cables could be expected to involve intervention at joint bays, with no watercourse interaction and no deleterious substances released. There are no significant aquatic ecological operational impacts predicted with regard to the GCR.

4.4 Decommissioning Phase Effects

Refer to the Decommissioning Statement in Appendix B of the CEMP accompanying this application. At the end of the 40-year lifespan of the solar farm the solar arrays, transformers and Interconnector cabling will be removed. The 38kV substation and underground GCR will become the property of ESB Networks once the project is energised and will remain in-situ following the decommissioning of the solar farm. This infrastructure will have a future long-term use as part of the national electricity transmission system.

Within the solar farm, the arrays and their mounting will be removed; underground 33kV interconnector cables and ducting will also be removed as part of the decommissioning. Trenches to remove ducting are sources of suspended solids washout to drains and watercourses, but once complete will be reinstated and reseeded immediately. Access tracks will be required to remain for the decommissioning period and will then be top soiled over and reseeded. Alternatively, if the landowner wishes to retain track as they have a beneficial farming purpose, these may be retained. Hardcore plinths will be broken up and removed from site for appropriate recycling. The land will then be filled and re-seeded for full reinstatement.

Potential impacts associated with the decommissioning are similar to those identified for the solar farm construction phase, but the anticipated level of soil disturbance is considerably less compared to the construction phase owing to: (1) retention of the substation (not soil disturbance involved); (2) the fact that access tracks are already in place meaning the majority of ducting can be removed alongside these before reinstatement; (3) ducting will remain in place along the c.3.87km GCR from the 38kV substation to Oughtragh 110kV substation. Environmental protection measures for decommissioning would be the same as during construction, with measures relating to surface water management that increase on-site attenuation and prevent excessive sediment loss from the land parcels via field drains. The effects on aquatic receptors, if any, will be **temporary, slight negative reversible** locally and not significant.

4.5 Do Nothing Scenario

If the project does not go ahead there will be no potential construction, operation or decommissioning phase effects on water quality and aquatic ecology related to sediment and/or hydrocarbon / concrete loss during the solar farm development. Agricultural activities will continue, with its current emissions and effects relating to nutrient and sediment wash out to surface water.

4.6 Potential Cumulative Effects

4.6.1 Within Project Cumulative Effects

The 38kV substation, energy storage facility and GCR are in the eastern parcel with drainage mainly towards the Lissavane West watercourse, and a small proportion towards the Kealbrogheen Stream.

The direction of drainage from most of the large eastern parcel (representing ~92% of the solar farm area including the substation, ESS compound and most of the access tracks) is towards the Lissavane West stream, a watercourse that is 'drain-like' and depositing, filled with aquatic macrophytes and subject to drying out in places during summer months. Only 2% of the eastern parcel drains towards the more sensitive Kealbrogheen Stream. In addition, the western parcel represents just ~8% of the total solar farm area and is located on flat land straddling the Kealbrogheen Stream. There will be a 10m set back to infrastructure on either side of the stream. Overall, with best construction practice and mitigations as set out in Section 5.1 of this report, the potential for significant impact on the more sensitive Kealbrogheen Stream is very low.

In line with the Habitats Directive however, whereby site-specific mitigations cannot be considered in the assessment of effects, if specific mitigation measures were not used to avoid and prevent sediment wash out during the solar farm and GCR construction, there may be **cumulative short-term, moderate negative reversible** effects on water quality (turbidity) with some localized sedimentation in the Lissavane West (**not significant**) and/or the Kealbrogheen (**locally significant negative**). Very conservatively, there may be impacts on salmon and sea/river lamprey spawning and nursery habitat further downstream (>1.7km) which could affect site specific Conservation Objectives for these Annex II QI species of the Castlemaine Harbour SAC, although this is very unlikely to occur owing to the separation distance involved and the high level of localised, natural attenuation of the proposed development site (i.e., Lissavane West stream which acts as a "linear wetland").

4.6.2 Wider Cumulative Effects

With respect to projects identified by review of Kerry County Council and An Comisiún Pleanála (ACP) for the cumulative assessment, **Table 4-2** examines the potential for cumulative effects on

aquatic ecological receptors. There are no significant cumulative effects predicted with other projects scoped in to the assessment.

Table 4-2 Cumulative Effects with Identified developments

Ref. Number and Status	Description	Cumulative Effect on Aquatic Ecology
17/1305 (KCC) Granted with conditions - 23/02/2018 1.8km from Subject Site	10 years permission for a solar farm within a site area of 10.19 hectares comprising: (a) approximately 32,000 sqm of photovoltaic panels on ground mounted frames, (b) a new vehicular entrance onto R563, (c) 1 no. single storey substation, (d) 2 no. single storey inverter stations, (e) 1 no. switchgear station, (f) 1 no. battery storage station, (g) security fencing, (h) satellite mast, (i) CCTV, (j) underground cable ducts, (k) a temporary site compound area and ancillary facilities and (l) all associated ancillary landscape and development works at a site at Knockreagh, Milltown, Killarney, Co. Kerry	Not Significant: The site is in a separate water catchment to the Laurel Ridge Solar Farm proposal. It is set in the Maine_050 RWB. The Laurel Ridge GCR does run for 1.1km within the upper Maine_050 RWB, but with no watercourse or drain interactions. There is no potential for likely significant cumulative effects on aquatic ecological receptors.
17/83 (KCC) Granted with conditions - 28/09/2017 3.5km downstream Subject Site	Permission for ten years for the development of a solar pv farm consisting of up to 26,550 sq.m. of solar panels on ground mounted steel frames, 4 no. inverter cabins, 1 no. single storey substation / control building, access tracks, boundary fencing, CCTV stands, 3 no. new site entrances, underground services, temporary construction compound and all associated ancillary development works	Not Significant: The site is 3.5km downstream of the proposed Laurel Ridge Solar Farm on the Kealbrogheen Stream. If construction phases coincided some cumulative waterborne pollutant losses could occur to the Kealbrogheen, but this would be extremely unlikely give the separation distance and the level of on-site attenuation offered by the Laurel Ridge lands, along with mitigation and best construction practice in the area of sediment loss control. There are no significant cumulative effects on aquatic ecological receptors predicted.
19/553 (KCC) Granted with conditions - 11/11/2019 1.1km from Subject Site	1) Permission to construct access road and services and 2) Outline Permission to construct 3 no. dwelling houses c/w treatment units and polishing filters, all in accordance with plans and particulars submitted at Listry, Co. Kerry.	Not Significant: The site is in a separate water catchment to the Laurel Ridge Solar Farm proposal. It is set in the Gweestin_040 RWB. No significant cumulative effects predicted with proposed Laurel Ridge Solar Farm or GCR.
21/739 (KCC) Granted with conditions - 28/03/2022 1.7km from Subject Site	Installation of battery arrays, located within container units (20 number units, each 30m2 by c.2.6m tall), a control building (c.160m2 by c.6.4m tall) and transformer (c.5m tall). The development will include for ancillary infrastructure including step-up transformers, security fencing, lighting, CCTV, internal access roads and drainage.	Not Significant: The site is in a separate water catchment to the Laurel Ridge Solar Farm proposal. It is set in the Maine_050 RWB. The Laurel Ridge GCR does run for 1.1km within the upper Maine_050 RWB, but with no watercourse or drain interactions. There is no potential for likely significant cumulative effects on aquatic ecological receptors.
308030 (ACP) Granted with revised conditions - 25.01.2021 1.8km from Subject Site	Retention permission for existing excavation works and construction of a new calf rearing house.	Not Significant: The site is in a separate water catchment to the Laurel Ridge Solar Farm proposal. It is a relatively small development set in the upper Gweestin_040 RWB. No significant cumulative effects predicted with proposed Laurel Ridge Solar Farm or GCR.
315563 (ACP) Granted with revised conditions - 15.04.2024 1.2km from Subject Site	Planning permission for 3 houses and associated site works	Not Significant: The site is in a separate water catchment to the Laurel Ridge Solar Farm proposal. It is a relatively small development set in the mid region of Gweestin_040 RWB. No significant cumulative effects predicted with proposed Laurel Ridge Solar Farm or GCR.

Other principal catchment activities with potential cumulative effects on aquatic receptors include ongoing agricultural activities (nutrient and sediment runoff) and rural housing with associated infrastructure (e.g., septic tanks, domestic wastewater). These aspects are a continuously evolving background and have no additional in-combination effects with respect to the potential temporary-to-short term effects predicted during construction of the proposed solar farm, substation and grid connection route.

During the operational phase, there is potential for an overall positive impact on aquatic ecology owing to a net reduction in regular agricultural activities on the solar array lands which can affect water quality. For example, across the c.57ha solar farm site there will be no broad scale ploughing/reseeding of fields; no herbicides to be used in the solar farm management, plus the introduction of swathes of unfertilized species rich grassland buffers.

5 MITIGATION

5.1 Laurel Ridge Solar Farm

The CEMP (HWP, 2025) and CMS (TLI, 2025a) set out best practise methods and specific measures in relation to the solar farm, interconnectors, 38kV substation, ESS compound and GCR covering the construction, operation and decommissioning phases. Contractors will be obliged to adopt the CEMP and the CMS as their own and adhere to its contents, updated to include any requirements conditioned in a planning permission. A Site Environmental Manager (SEM) acting as Ecological Clerk of Works (ECoW) will be appointed to oversee the implementation of the outlined mitigation strategy during the construction, operational and eventual decommissioning stage of the project.

IFI will be notified well in advance of the construction commencement in relation to the 2 no. under crossings of the Kealbrogheen (Sites LR6 and LR1) and its small tributary stream (Site LR2). These under crossings are not subject to timing restrictions as they do not involve instream works, but IFI will be made aware of the works to be commenced and will be provided with a copy of the construction method statement.

Measures to be used to protect aquatic ecology and fisheries during the construction works adhere to the following guidelines and TII standards:

- Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016).
- Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2008)
- CIRIA C648 (Murnane et al. 2006) Control of water pollution from linear construction projects. Technical guidance.
- The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020).

Sections 5.1.1, 5.1.2, 5.1.3 and 5.1.4, below, detail construction, operation, decommissioning phase and cumulative impact mitigation in relation to aquatic receptors.

5.1.1 Construction Phase Mitigation

Objective	Measure	Details of Mitigation
Water quality and Aquatic habitat protection	Temporary Works Drainage Management	During excavation and construction of access tracks and associated over the edge drainage: on tracks that run directly downhill towards watercourses and field boundary drains, there must be a series of temporary gravel check-dams, as necessary, installed along the parallel drainage flow path to attenuate and slow run-off velocities during the construction phase. These must remain in place until such time as the track surfaces have bedded in and over-the-edge drainage pathways have revegetated. Temporary check dams may be removed following revegetation of these drainage pathways. During soil excavation associated with temporary site compound area construction there must be temporary silt fencing installed on the downslope leading to any minor field drain. Any existing preferential over-land flow paths or inactive field drains between e.g., access tracks, temporary compound areas, must be

Objective	Measure	Details of Mitigation
		bunded or have temporary check dams installed prior to works commencing to prevent escapement of suspended solids to downstream drains / streams. The ephemeral drain represented by Site LR9 will generally be dry, however, during the main period of soil stripping for the temporary works compound, substation and ESS compound it will have a series of check dams installed (staked down geotextile wrapped hay bales) to slow run-off and facilitate onsite attenuation of sediment.
Water quality and Aquatic habitat protection – culvert under crossings	IFI Consultation	There are no instream works required, but IFI must be contacted and consulted prior to culvert under crossing works commencing at Site LR6 (33kV Interconnector), LR1 and LR2 (GCR). A copy of the CMS relating to the construction methods must be provided.
Water quality and Aquatic habitat protection – culvert under crossings	Timing of Under Crossing Works	The culvert under crossings (LR6, LR1, LR2) are not likely to be subject to timing restrictions that apply to the closed fisheries season, so long as suitable mitigation measures are in place to prevent sediment wash out. However, the timing of these works will be agreed with IFI well in advance of their commencement.
Water quality and Aquatic habitat protection – culvert under crossings	Best Practice during Culvert Under Crossing Works	There must be no discharge of suspended solids or any other deleterious matter to watercourses during the under crossing work. Any silt contaminated water from the works area must be treated prior to discharge. The contractor shall employ best practice sediment control methods to ensure sediment and other pollutants are not entrained to the watercourse. There must be no direct discharge (e.g., pumping) of silt/sediment laden water from the works to the active watercourse at any time. Any preferential over-land flow paths or drains between the trenched under crossings must be bunded or have temporary check dams installed prior to works commencing to prevent any escaped solids from reaching the watercourses.
Water quality and Aquatic habitat protection – drain under crossings	Best Practice during Drain Under Crossing Works	The on-site land drains dry out regularly, especially from late spring to early autumn. Drain undercrossing construction shall be timed (where possible) to coincide with them being dry. In the unlikely event that drain crossings occur when there is water in them, a simple dam and pump over water management system shall be used to ensure a dry working area and prevent suspended solids washout. Additional bunds can be inserted downstream of the dam/pump over system to settle any escaped solids locally in the drain.
Water quality and Aquatic habitat protection	Best Practice during Construction – ‘Wet field’ management at Lissavane West watercourse	The 10m exclusion zone along the Lissavane West watercourse shall be marked (roped off) in advance of construction works in that vicinity. This will clearly mark out the exclusion zone for vehicles and machinery during construction and retain an undisturbed buffer. Any installation of solar arrays in the wet-zone (as per Figure 4-1, above) shall be carried out either in the dry summer months (when the land has dried out) or with the use of bog mats to accommodate tracking machinery. The access track will require excavation down to ground of sufficient competence before laying geotextile, stone and gravel material to form the track surface. This will be carried out either in the dry summer months (when the land has dried out) or with the use of bog mats to accommodate tracking machinery required.
Water quality and Aquatic habitat protection	Best Practice during Construction – riparian management,	The 10m exclusion zone along the Kealbrogheen Stream at the western boundary of the eastern parcel (as per Figure 4-2 , above) shall be marked (roped off) during the entire construction period. This will clearly mark out this area as an exclusion zone for vehicles and machinery during construction and retain an undisturbed buffer.

Objective	Measure	Details of Mitigation
	Kealbrogeen Stream	
Prevention of spread of pathogens and invasive species	Biosecurity Measures	Transfer of invasive plant species between sites within catchments and to other catchments must be prevented. An invasive species management plan will include the requirement for a pre-construction invasive alien plant survey, (e.g., Himalayan balsam, Japanese Knotweed) at the watercourse crossing (LR6) and along any cable trenching routes. The final Construction Method Statement shall set out methods for management and prevention of invasive species transfer.
Prevention and control of sediment loss	Best Management Practice – Cable Trenching	All trenching works shall be undertaken using a cut and fill procedure to ensure that only short sections of the trench ($\leq 100\text{m}$) are open at any time as set out in the CEMP. Any run-off water which gathers in an excavated trench must be collected and treated appropriately using Best Practice methods (e.g., silt bags, settlement systems) before being discharged. There will be no discharge of silt contaminated pump-out water to on-site drains or watercourses. Spoil heaps are unlikely to accumulate because trenches will be immediately back filled following ducting installation. Any freshly excavated spoil must be retained in an area over 10m away from any drain or watercourse until such time as the trench is refilled. The spoil heap must be located on either a well vegetated area surrounded by silt fencing or with the use of containment measures (geotextile mat or bag) and covered to reduce potential for sediment export. A ready supply of these materials must be always onsite to deal with such eventualities. Where ancillary onsite drains are crossed with underground ducting, the release of sediment over baseline conditions will be prevented by the use of silt traps, check dams and/or bunds (including the use of staked down geotextile wrapped haybales) in dry or stagnant drains. These will be put in place on either side of the dry drain crossing location in advance of construction works.
Prevention and control of sediment loss	Water management - Interconnector drain crossing	Drain crossings (4 no.) on the LR9 field drain will be carried out using open trenching and timed to occur when the drain is dry, which it is for the majority of the year. However, in the unlikely event there was water in the drain, a dam and pump over system will be employed to create a dry working area for cable installation. There is no timing restriction for instream works in this ephemeral drain as it has no aquatic ecological or fisheries value.
Prevention and control of sediment loss	Best Management Practice – Soil storage	Soil stripped in the construction of access tracks, temporary compound areas, substation and ESS compound may be stored temporarily for reuse in reinstatement. Such material will be stored not less than 10m from any on-site drain and must be tamped down, reseeded with grass and allowed to revegetate for the duration of the construction phase. The stockpiles will be surrounded by well staked silt fencing.
Prevention and control of sediment loss	Best Management Practice – Soil spreading	Stripped soil that is used for site infill, will be tamped down and immediately rolled and reseeded with an appropriate grass seed mix to establish vegetative cover and reduce potential solids washout. Any localised agricultural drains should have temporary bunds (e.g., earthen or stake + geotextile) installed to prevent waterborne sediment run-off until such time as the surrounding areas have revegetated.
Avoid Hydrocarbon Loss	Best Management Practice - Hydrocarbons	No storage of hydrocarbons or any polluting chemicals can occur within 50m of watercourses or surface water features. Any diesel or fuel oils stored on site will be banded to 110% of the capacity of the storage tank. Design and installation of fuel tanks to be in accordance with best practice guidelines and oil storage guidelines. Drip trays and spill kits must be kept available on site.

Objective	Measure	Details of Mitigation
		Temporary parking and refuelling areas must be designated within the construction compound. These areas will be at least 50m away from watercourses and drains.
Overseeing of environmental controls	Monitoring during Construction	A suitably qualified Environmental Clerk of Works (ECoW) will be employed to oversee the construction phase, including any advance works period, to ensure compliance with methods, mitigation measures and monitoring set out in the CMS / CEMP and Section 5 of this document. The ECoW will be present during key parts of the construction phase, i.e., culvert under crossings, to protect water quality and avoid potential impacts on aquatic receptors. See Section 6 for details of the ECoW role and responsibilities.

5.1.2 Operational Phase Mitigation

Objective	Measure	Details of Mitigation
Water quality and Aquatic habitat protection	Buffer zone management	To ensure the continued functioning of buffer zones alongside on-site drains and streams, the riparian vegetation should be protected by exclusion of continual grazing, although some periods of grazing will be allowed to manage the sward (with any tree planting protected from grazing). The biodiversity enhancement proposals for the site detail the maintenance of uncropped tussocky grassland along these stream / drain buffers. Refer to the Biodiversity Management Plan and Landscaping Plan submitted as part of this application. The appropriate way to manage these as buffer zones is to exclude uncontrolled grazing. The zones can be occasionally grazed and/or mowed to encourage a rich and diverse sward which enhances the filtering and attenuation function. Scattered plantings of suitable native tree species, (e.g., alder, hawthorn, willow) shall be established along the Kealbrogeen Stream in the western parcel, i.e., where it is currently open with disturbed vegetation dominated by gorse. Refer to the Biodiversity Management Plan and Landscaping Plan submitted as part of this application. These shall be set back from the watercourse in groups so as not to create a tunnelling effect. The watercourse through this reach will be appropriately fenced (not excluding wildlife, e.g., otter) to prevent stock access which is currently degrading the reach. An alternative drinking supply for animals shall be provided so the stream is not continually accessed by stock during the operational phase, as it currently is.
Water quality and Aquatic habitat protection	Drainage Maintenance	Access tracks will be embedded in with over-the-edge drainage to vegetated ground. The access tracks and any parallel, vegetated flow paths will be subject to routine maintenance and repair, as required, to ensure no obvious erosion and sediment washout is occurring. Over the course of the operation phase, observations shall be made during regular site visits. If there are any obvious erosion hot-spots on preferential flow paths from access tracks, then necessary surface repairs will be carried out as soon as practicable, with additional check-dams installed (and allowed to revegetate) into the preferential drainage flow path, where required to increase attenuation and slow run-off velocity locally.

5.1.3 Decommissioning Phase Mitigation

Objective	Measure	Details of Mitigation
Water quality and Aquatic habitat protection	Waterborne pollutant runoff measures as set out in Section 5.1.1 (above)	Environmental protection measures for decommissioning would be the same as during construction, with measures relating to surface water management that increase on-site attenuation and prevent excessive sediment loss and other pollutant losses from the land parcels via surface flow or field drains.
Overseeing of environmental controls	Monitoring during Decommissioning	It would be envisaged that a suitably qualified Environmental Clerk of Works (ECoW) will be employed to oversee the decommissioning works (in accordance with the approved decommissioning plan) to ensure compliance with methods and mitigations that match those used in the construction phase that will avoid and prevent water quality pollution and aquatic habitat impacts.

5.1.4 Cumulative Impact Mitigation

Objective	Measure	Details of Mitigation
Minimise in-combination effects of sediment loss	Phasing of works	The overall project phasing as set out in the CEMP along with rigorous implementation and maintenance of construction phase best practise and specific mitigation measures set out in the CEMP (HWP, 2025), the CMS (TLI, 2025a) and this document will reduce potential for cumulative impact arising from the construction of Laurel Ridge Solar Farm and Grid Connection Route.
Overseeing of environmental controls	Monitoring during Construction	A suitably qualified Environmental Clerk of Works (ECoW) will be employed to oversee the construction phase, including any advance works period, to ensure compliance with methods, mitigation measures and monitoring set out in the CEMP and Section 5 of this document. The ECoW will be present during key parts of the construction phase, i.e., culvert under crossings (LR6, LR1, LR2) to protect water quality and avoid potential impacts on aquatic receptors. See Section 6 for details of the ECoW role and responsibilities.

5.2 Laurel Ridge Grid Connection Route

The GCR is distant from watercourses apart from three locations where there is interaction with: 2 minor upper channels of the Kealbrogeen (Site LR1, LR2) and 1 no. very minor ephemeral drain.

Contractors will be obliged to adopt the CEMP (HWP, 2025) and CMS (TLI, 2025a) as their own and adhere to its contents, updated to include any requirements conditioned in the planning permission.

Sections 5.2.1 and 5.2.3 detail construction phase and cumulative impact mitigation in relation to aquatic receptors for the GCR.

5.2.1 Construction Phase Mitigation

Objective	Measure	Details of Mitigation
Control of sediment loss	Best Management Practice –	All trenching works shall be undertaken using a cut and fill procedure to ensure that only short sections of the trench are open at any time (maximum 100m at any one time).

Objective	Measure	Details of Mitigation
	Sediment (GCR Cable Trenching)	Any water which gathers in the trench must be collected and treated appropriately on or off site before being disposed of in accordance with conditions set out by the relevant authorities. It will not be discharged directly to any drain or watercourse. Spoil heaps are unlikely to accumulate because trenches will be immediately back filled following ducting installation. Freshly excavated spoil must be retained in an area over 5m away from any drain or watercourse until such time as the trench is refilled. The spoil heap must be located on either a well vegetated area surrounded by silt fencing or with the use of containment measures (geotextile mat or bag) and covered to reduce potential for sediment export. A ready supply of these materials must be always onsite to deal with these eventualities. Where ancillary drains are crossed with underground ducting, the release of sediment over baseline conditions will be prevented by the use of silt traps, check dams and/or bunds. These will be put in place in advance of construction works.
Control of sediment loss	Best Management Practice – Sediment (Cable Trenching)	Such material will be spread at not less than 10m from any on-site drain and must be reseeded with an appropriate grass seed mix and rolled immediately to establish vegetative cover and reduce potential solids washout. Any surplus spoil must be removed from the site and disposed of in accordance with conditions set out by relevant authorities.
Avoid Hydrocarbon Loss	Best Management Practice - Hydrocarbons	Temporary parking and refuelling areas must be designated within a designated area along the grid connection construction route. These areas will be at least 50m away from watercourses and drains. Design and installation of fuel tanks to be in accordance with best practice guidelines and oil storage guidelines. Drip trays and spill kits must be kept available on site. No storage of hydrocarbons or any polluting chemicals can occur within 50m of watercourses or surface water features. Any diesel or fuel oils stored on site will be banded to 110% of the capacity of the storage tank.

5.2.2 Operational Phase Mitigation

None required.

5.2.3 Cumulative Impact Mitigation

Objective	Measure	Details of Mitigation
Minimize in-combination effects of sediment loss	Phasing of works	Phasing of construction works will occur as set out in Appendix C of the CEMP. This sets out a clear separation of the main periods of soil stripping in relation to aspects of the solar farm (including the substation and ESS compound) and the GCR cabling. The rigorous implementation and maintenance of construction phase best practise and specific mitigation measures set out in the CMS, CEMP and this document will reduce potential for cumulative impact arising from potential simultaneous construction of Laurel Ridge Solar Farm and Grid Connection works.
Overseeing of environmental controls	Monitoring during Construction	A suitably qualified Environmental Clerk of Works (ECoW) will be employed to oversee the substation and GCR construction phase, including any advance works period, to ensure compliance with methods, mitigation measures and monitoring set out in the CEMP and Section 5 of this document. The ECoW will be present during

Objective	Measure	Details of Mitigation
		key parts of the construction phase, i.e., culvert under crossing, to protect water quality and avoid potential impacts on aquatic receptors. See Section 6 for details of the ECoW role and responsibilities.

6 MONITORING

6.1 Roles and Responsibilities

The main contractor will engage a Site Environmental Manager (Environmental Engineer, Environmental Scientist, or equivalent) with experience in construction to fulfil the role of Environmental Clerk of Works (ECoW) to ensure that methodologies and mitigation are followed throughout construction to avoid negatively impacting on the receiving aquatic environment.

The ECoW will be based on site, overseeing the implementation of pollution mitigation measures, compliance with any environmental planning conditions, monitoring and reporting on environmental aspects of the development. Regulation and ongoing maintenance of the mitigation measures will be the responsibility of the contractor, as directed by regular observations made by the ECoW to ensure water quality protection measures are being adhered to. Should the ECoW observe that erosion and sediment control measures are not functioning properly, they shall have the authority to stop works until such measures have been implemented properly in accordance with the CEMP and the CMS.

6.2 Visual Monitoring

Daily water quality checks (twice daily during wet weather conditions) at watercourses downstream of active works sites including:

- A visual check of turbidity levels for obvious signs of sediment loss from the construction site;
- Upstream / downstream measurements during and after rainfall events (i.e., when the site is hydrologically active) using a calibrated hand-held turbidity probe. This applies to the Kealbrogheen Stream at Site LR3 (upstream) and between Sites LR6 and LR7 (downstream of the Lissavane West stream confluence). If there is a difference in turbidity readings that can be attributed to the construction site activity, additional on-site silt control measures shall be implemented.
- A visual check for evidence of oil slicks.
- Daily inspections of all silt fencing and other silt control measures for integrity and efficacy.
- Monitoring the condition of roads around the temporary work compound, construction areas and local roads, with additional erosion prevention measures and road washing to be implemented where necessary.
- Checking weather forecasts to ensure suitable programming of earthworks activities and suspending earthworks during heavy rain.
- Twice daily visual checks of culvert under crossing construction areas will be conducted by the ECoW to ensure all standard sediment control and emergency spillage / frack-out measures are in place.
- The ECoW shall ensure all sediment control and water quality protection measures are in place until such time as the structures have been installed and surrounding vegetation has re-established.

6.3 Biological Water Quality Monitoring

Pre-construction Q-value sampling and analysis will be conducted on the Kealbrogheen Stream at Sites LR3, LR4 and LR7 in the summer/autumn prior to the construction phase and will be carried out in the same season: (1) during construction, and (2) the year post-construction. The results shall be provided to Kerry County Council to pass on to the Local Authority Waters Programme (LAWPRO).

7 RESIDUAL EFFECTS

7.1 Laurel Ridge Solar Farm and GCR

With construction best practice and mitigation measures implemented and monitored in accordance with the CEMP, the CMS and Section 5 of this report, the construction phase impact on the Kealbrogreen Stream, which is the main receptor of sensitivity will be limited to temporary, localised, slightly negative (disturbance), but the effect on aquatic receptors will be **not significant**. It is noted that the likelihood of this occurring is very low given the inherent, natural level of attenuation provided by the ephemeral Lissavane west stream which would receive most potential construction site run-off.

During the operational phase, the change of land use away from the existing level of agricultural use to a lower intensity land use with associated continuous vegetative cover and management of drain and stream riparian areas as wild tussocky grassland buffer zones will mean that, compared to the baseline situation, operational effects will be **imperceptible** and potentially **slightly positive** in terms of improved water quality and hence downstream aquatic habitat improvement for fish and macroinvertebrates. There will be no deterioration of WFD ecological status, nor prevention of attainment of official 'good' status in the future, and the project is therefore compliant with WFD objectives.

7.2 European Sites

With construction best practice and mitigation measures implemented as set out in the with the CEMP, the CMS and Section 5 of this report, there may be temporary, localised, slightly negative disturbance associated with low levels of sediment wash out in the upper reaches of the Kealbrogreen catchment, with **no likely significant** construction phase effects water quality or fisheries value. There are no significant sources of negative impact on water quality or aquatic habitat during the operation phase of the solar farm. If anything, there may be a slight improvement in water quality of the Kealbrogreen related to slight reduction in agricultural activity on the development lands over the 40-year lifespan of the project.

There will be **no likely significant** operational phase effects on QI species or habitats and no adverse effects on the River Laune or the overall integrity of the Castlemaine Harbour SAC, located 5.1km downstream via the Kealbrogreen Stream.

8 REFERENCES

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APPENDIX 1 Impact Magnitude Criteria

Ecological Impact Assessment criteria for impact magnitude (derived from NRA, 2009)

Impact Magnitude	Internationally important (A sites)	Nationally important (B sites)	High value, locally important (C sites)	Moderate value, locally important (D sites)	Low value, locally important (E sites)
Profound negative	Any permanent impacts	Permanent impacts on a large part of a site			
Significant negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate Negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a small part of a site	Permanent impact on a site if part of a designated site
Slight Negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Imperceptible Negative			Temporary impacts on a small part of the site	Temporary impacts on a small part of the site	Permanent impacts on a small part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	No impacts
Slight Positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site

APPENDIX 2 Q-value Macroinvertebrate Taxa

SITE		Site LR3	Site LR4	Site LR7	Site LR12
Stream		Kealbrogeen	Kealbrogeen	Kealbrogeen	Kealbrogeen
Sample Date		17/05/2024	23/08/2025	17/05/2024	23/08/2025
Width (m)		1.00	1.20	1.60	3.50
Depth (cm)		9cm	8cm	10cm	15cm
Flow type		Riffle/run	Riffle/run	Riffle/run	Riffle/run
Substrate		Cobble, pebble, gravel	Cobble, pebble, gravel	Pebble, gravel, coarse sand	Cobble, gravel, fine silt (+)
Easting ITM		485939	485626	485186	483480
Northing ITM		598965	598396	597999	595993
Taxa	EPA Quality				
MAYFLIES (Ephemeroptera)					
<i>Ecdyonurus</i>	A		45	3	40
<i>Rhithrogenia</i>	A	8	8	1	7
<i>Seratella ignita</i>	C			25	2
Baetidae	C	100+	40	50	50
STONEFLIES (Plecoptera)					
<i>Siphonoperla</i>	A		2		
<i>Isoperla grammatica</i>	A			13	
<i>Protonemoura</i> spp.	A	1	2	3	
<i>Amphinemoura</i> spp.	A	18			
<i>Leuctra</i> spp.	B		5		18
CADDISFLIES (Trichoptera)					
<i>Sericostoma personatum</i>	B	3		5	
Goeridae	B		2		
Limnephilidae	C	2			3
Philopotomidae	C		12		
Polycentropidae	C		2		
Hydropsychidae	C	30	21	2	5
Rhyacophilidae	C	15	3		3
TRUE FLIES (Diptera)					
Chironomidae	C	25	5		
Simuliidae	C	65	15		15
<i>Dicranota</i> spp.			2		2
BEETLES (Coleoptera)					
Elmidae	C	10			25
F/W SHRIMPS (Crustacea)					
<i>Gammarus</i> sp.	C	5	6	12	65
<i>Asellus aquaticus</i>	E				9
LEECHES (Hirudinea)					
<i>Trocheta</i> sp.	E	7	1		
WORMS (Annelida) Tubificidae	E	5			7
Q Value		Q4	Q4	Q4	Q4
Potential Status		Good	Good	Good	Good

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