

Environmental Report – Volume 1

Proposed 110kV Substation and Underground Grid Connection at Grangeford, Co. Carlow

**On behalf of
Prt Solar Limited**





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Environmental Report – Volume 1

Proposed 110kV Substation and Underground Grid Connection at Grangeford, Co. Carlow Prt Solar Limited

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Appendix A: SID Consultation Decision

Appendix B: Proposed Site Layout, Sightlines and Site Context

Appendix C: Biodiversity Management Plan

Appendix D: Landscape Plan

Appendix E: Noise Appendices

Appendix F: Photomontages

Appendix G: Geophysical Survey

Appendix H: Construction Traffic Management Plan

EXECUTIVE SUMMARY

Malone O'Regan Environmental ('MOR Environmental') were commissioned by Prt Solar Limited ('the Applicant') to prepare an Environmental Report ('ER') in respect of both the construction and operational phases of a proposed 110kV substation and associated 110kV underground cable ('UGC') connecting the proposed substation ('110kV Substation') to the existing ESB 220kV Kellistown Substation and all associated works ('Proposed Development').

The proposed 110kV Substation will be located on a Site that is circa ('ca.') 1.7 hectares ('ha') in size and located in the townlands of Grangeford Old and Friarstown, Co. Carlow (OS ITM Reference 076106 336077) as outlined in Figure 1-1 ('the Site'). The proposed 110kV UGC will be circa ('ca.') 8 kilometres ('km') in length, primarily along public roads and will traverse through the townlands of Kellistown East, Kellistown West, Ballycurragh Rathoe, Inchisland, Rathnashannagh, Glenoge, Moanalow, Grangeford, Grangeford Old and Friarstown to connect the proposed 110kV Substation to the existing Kellistown 220kV substation.

The Applicant entered into pre-application consultation with An Bord Pleanála ('ABP') on the 13th August 2024, as provided for in Section 182E of the Planning and Development Act, 2000, as amended. ABP formally confirmed on the 6th February 2025 that the Proposed Development was strategic infrastructure in accordance with Section 182A of the Planning and Development Act, 2000, as amended (see Appendix A).

An Environmental Impact Assessment ('EIA') Screening was undertaken, which concluded that the Proposed Development does not warrant an EIAR. Regardless, robust environmental assessments have been undertaken in support of this SID application, the findings of which are presented in this ER. For the purposes of this report, the one 110kV substation, underground grid connection and permitted Solar PV, the battery storage units and all associated infrastructure works, will be evaluated to assess the cumulative impacts of the overall development.

The key conclusions of the ER are that the Proposed Development will not result in any likely or significant environmental impacts based on the following:

- The proposed design has taken full cognisance of all requirements of the Carlow County Development Plan 2022-2027;
- Permission currently exists for a PV development onsite (Planning Permission Ref No. 23/60297). The proposed 110kV substation would be developed in lieu of a permitted 38kV substation granted by Carlow County Council and a connecting 110kV underground transmission line at Grangeford, Co. Carlow;
- The principle of developing a substation has already been established given that a solar development has already been permitted across a lot of the Site, albeit this proposal will supersede the permitted 38kV Substation only;
- The Permitted Development will not be able to function as a standalone development as these will be reliant on connections to the Proposed Development in order to connect to the grid;
- The Proposed Development will be located on a Site that is currently of low ecological value due to the type of habitats present at the Site;
- The Appropriate Assessment screening undertaken concluded that activities associated with the Proposed Development either alone, or in combination with other projects or land uses, will not have any direct or indirect adverse impacts on the conservation objectives of any Natura 2000 Sites;

- The Ecological Impact Assessment undertaken concluded that the Proposed Development will not result in any impacts to biodiversity and protected flora and fauna either directly or indirectly, given all of the appropriate mitigation measures being implemented;
- A Preliminary Site-Specific Flood Risk assessment confirmed the absence of any notable flood risks on the Site or in the immediate vicinity of the Site, therefore the Proposed Development will not result in any increased flood risk;
- The Proposed Development will not require any alternations to the existing drainage network and no specific drainage infrastructure will be required;
- The Site is located in an area classed as having 'Low' landscape sensitivity. It is not considered that at a local level, this landscape is highly sensitive or highly susceptible to change. There will be no impacts, direct, indirect, or residual on receptors in regard to visual amenity of the area;
- No protected archaeological sites will be impacted either directly or indirectly as a result of the Proposed Development;
- Sufficient setbacks will be implemented from all sensitive receptors - adjacent dwellings, transport route receptors (road) and onsite tree / hedge lines and therefore no adverse effects either during the Construction or the Operational Phase will occur;
- During the construction period, the potential exists for temporary noise nuisance. However, due to the distance of the proposed construction works from the NSRs identified and the general methods that will be involved in constructing the Proposed Development, these will not exceed standard construction noise limits at nearby NSRs;
- During the grid route connection, there is a potential for short-term exceedances of typical construction noise limits; however, it is considered that with general mitigation, noise levels would have a negligible effect;
- There will be no noise nuisance impacts during the operation of the Proposed Development;
- Detailed noise modelling concluded that there will be no cumulative noise impacts arising from the Permitted Development and the Proposed Developments at any nearby receptors either during day or night-time periods.
- A Preliminary Construction Environmental Management ('pCEMP') has been submitted in support of the planning application. This pCEMP will be used by the appointed contractor to prepare an updated and comprehensive CEMP prior to the commencement of any on-site works. It is proposed that this plan will be agreed with the Council in advance and will be fully implemented during the construction of the Proposed Development;
- The Proposed Development will be accessed via the permitted development (PR 23/60297) and existing commercial entrance for Nolan Farming off the R725. Safe sightlines have been achieved;
- The Construction Traffic Management Plan undertaken will be fully implemented during the construction of the Proposed Development, to minimise any impacts on the existing road network during this temporary period;
- The Proposed Development will have a design life of approximately 40 years at which time it will be fully decommissioned, and lands reinstated;

- The Proposed Development will not give rise to any in combination impacts on ecological, noise, landscape and visual, hydrological, cultural heritage or traffic receptors; and,
- The applicant will fully implement all of the environmental commitments outlined in Section 14.

1 INTRODUCTION

Malone O'Regan Environmental ('MOR Environmental') has been commissioned by Prt Ltd ('the Applicant') to prepare an Environmental Report ('ER') in respect to the construction and operational phases of a proposed 110kV substation ('henceforth referred to as the 110kV Substation') and associated 110kV underground cable ('henceforth referred to as the UGC') connecting the proposed to the existing ESB 220kV Kellistown Substation and all associated works ('henceforth referred to as the Proposed Development'). A detailed description of the Proposed Development is provided in Chapter 5 of this ER.

The Applicant entered into pre-application consultation with An Bord Pleanála ('ABP') on the 13th August 2024, as provided for in Section 182E of the Planning and Development Act, 2000, as amended. ABP formally confirmed on the 6th February 2025 that the Proposed Development was strategic infrastructure in accordance with Section 182A of the Planning and Development Act, 2000, as amended (see Appendix A).

The Proposed Development will form a major new strategic connection node to the national grid within County Carlow. The Proposed Development will transmit power from the permitted Grangeford Solar Farm (Planning Ref: 23/60297; which amended previous permission Reg. Ref: 21/23 and ABP-309987-21) (henceforth referred to as the 'Permitted Solar Development') via an UGC, which will connect into the existing ESB Kellistown 220kV substation located circa ('ca.') 3.4km (direct distance) southwest of the Permitted Solar Development.

The Substation is designed to the latest Eirgrid Standard, comprising a 110kV AIS 2 Bay Station extendable to 4 Bay and 8 Bay configuration. Eirgrid recommends this design as it facilitates future expansion and improving the overall availability of renewable energy on the grid. This design optimises resources in the initial substation development and reduces the downtime and impact on the grid over its lifecycle, thus facilitating future grid connections and improving the effectiveness of the substation. This substation design will improve the availability of customer renewable energy connections on the system and enhance the integration of renewable sources, thus supporting the industry's collective goal of a sustainable energy future.

This report comprises of two volumes, with the main report presented in Volume 1, and supporting appendices presented in Volume 2. The Strategic Infrastructure Development ('SID') application for the Proposed Development will also be supported by:

- Stage 2 – Appropriate Assessment: Natura Impact Statement ('NIS');
- Preliminary Construction Environmental Management Plan ('pCEMP');
- Decommissioning Plan; and,
- Engineering Report.

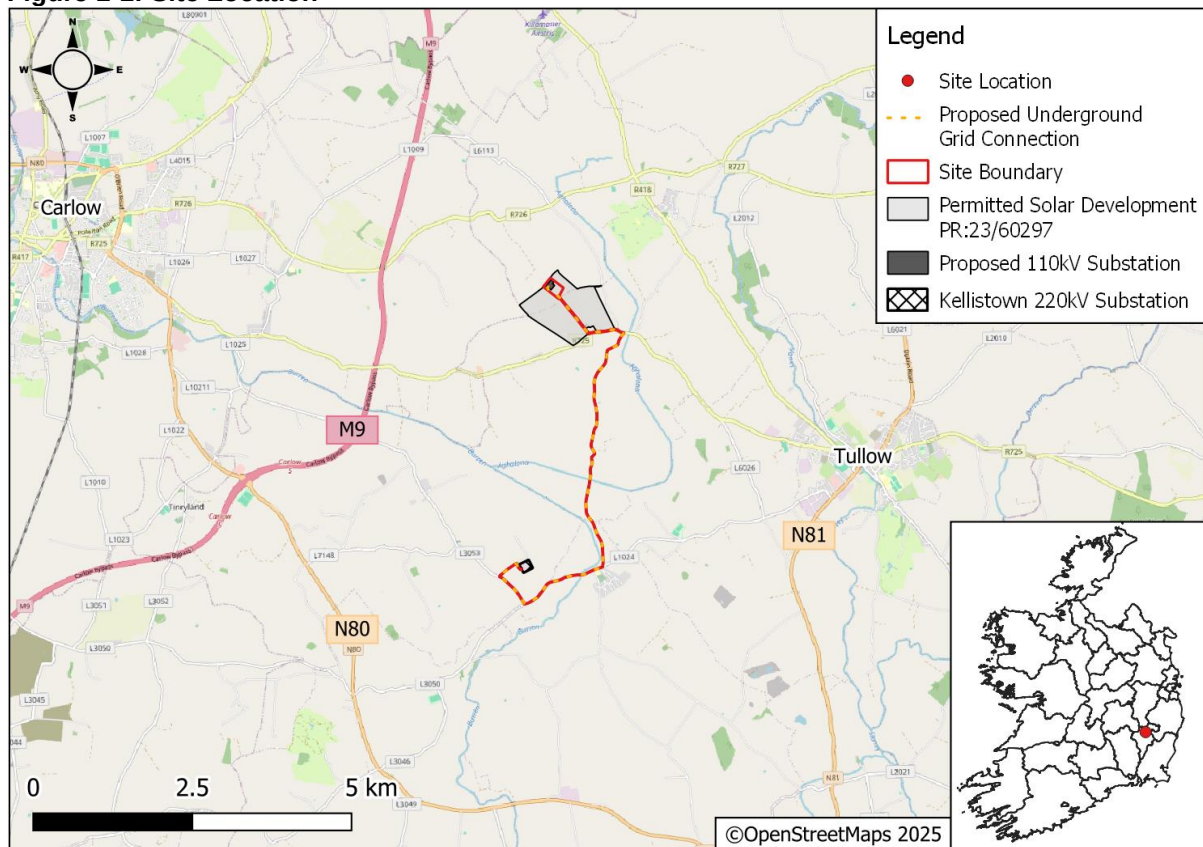
These reports should be read in conjunction with this report. This ER collates the key findings from each individual report to develop the assessment of likely significant effects arising from the Proposed Development and the mitigation strategies to be implemented where relevant.

1.1 Site Location

The proposed 110kV Substation will be located on a Site that is ca. 1.7 hectares ('ha') in size and located in the townlands of Grangeford Old and Friarstown, Co. Carlow (OS ITM Reference 076106 336077) as outlined in Figure 1-1 ('the Site').

The proposed 110kV UGC will be ca. 8km in length, primarily along public roads, and will traverse through the townlands of Friarstown, Grangeford Old, Grangeford, Moanalow, Glenoge, Rathnashannagh, Inchisland Or Moatalusha, Rathtoe, Kellistown East, Ballycurragh and Kellistown West.

Figure 1-1: Site Location



1.2 The Applicant

Prt Solar Limited is an SPV established in 2021 for the purpose of developing, constructing and operating the Proposed Development. The company is wholly owned by Aer Soléir, a pan-European renewable energy developer, which is headquartered in Ireland.

Aer Soléir is a developer, owner and operator of utility-scale onshore wind, solar and battery storage in select markets in Europe. They are backed by Quantum Energy Partners, a leading capital provider to the global sustainable energy and decarbonisation sectors with more than \$21 billion in capital commitments. Aer Soléir is a 30-person team focused on acquisition, development, engineering, and construction, as well as procurement and finance. The team is led by Andy Kinsella (former CEO of Mainstream Renewable Power) and Manus O'Donnell (former CIO of NTR) and supported by senior members with decades of experience in the renewable energy and financial sectors, all of whom have worked for international leaders in the renewable energy industry. Aer Soléir plans to continue to grow throughout Europe, adding to their portfolio of over 2.5GW+, which they have developed since inception in April 2021.

1.3 Background

1.4 Planning Background

1.4.1 Permitted Planning Permissions

The Proposed Development will be critical infrastructure that will be intrinsically linked to both permitted and planned renewable energy projects, comprising both solar and battery energy storage developments. Details of these projects are described below. These renewable energy projects will not be able to function as standalone developments as they will be reliant on connections to the Proposed Development in order to connect to the national grid.

It is anticipated that, subject to obtaining consent for the Proposed Development, the proposed 110kV substation will be developed in lieu of a previously permitted 38kV substation granted by Carlow County Council (Planning Ref: 2360297). Please refer to Drawing P850_PppS.I.D – 110kV Substation submitted as part of Appendix B which illustrates the Proposed Development permission in context with the Permitted Development.

The Proposed Development will connect the Permitted Solar Development to the national grid. It is envisioned that the Proposed Development will be constructed in conjunction with the Permitted Solar Development as part of one development (henceforth known as the 'Overall Development').

Carlow County Council Planning Reg: 21/23 (ABP Ref No. 309987-21) – Granted

10 Year permission for development consisting of the construction of a Solar PV development comprising photovoltaic panels laid out in arrays over a total development site area will be ca. 65.6 ha, the construction of a 38kV substation (ca 114.4m² x 4.75 tall) a transformer unit (ca. 18m² x 4m tall) and associated bund (ca. 55m²), along with ancillary development including; 24 no. Power Hubs (ca. 15.25m² x 2.4m) which incorporate an inverter and a transformer, 1 no. single storey communications building (11.1m² x 2.5m), 1 no. single storey client side sub-station building (15.25m² x 2.9m), 1 no. single storey equipment storage building (7.5m² x 2.7m), 10 no. CCTV cameras mounted on 4m high poles, perimeter security fencing, site access, site egress and all ancillary works.

A Notification to Refuse Permission was issued by Carlow County Council on the 23rd March 2021 due to a limitation on MW's outputs stipulated in their Development Plan at that time. A first party appeal was submitted to An Bord Pleanála on 17th May 2021. Planning was granted by An Bord Pleanála (ABP Ref: 309987-21) on the 26th October 2021.

This planning permission was superseded by Planning Ref: 23/60297 below.

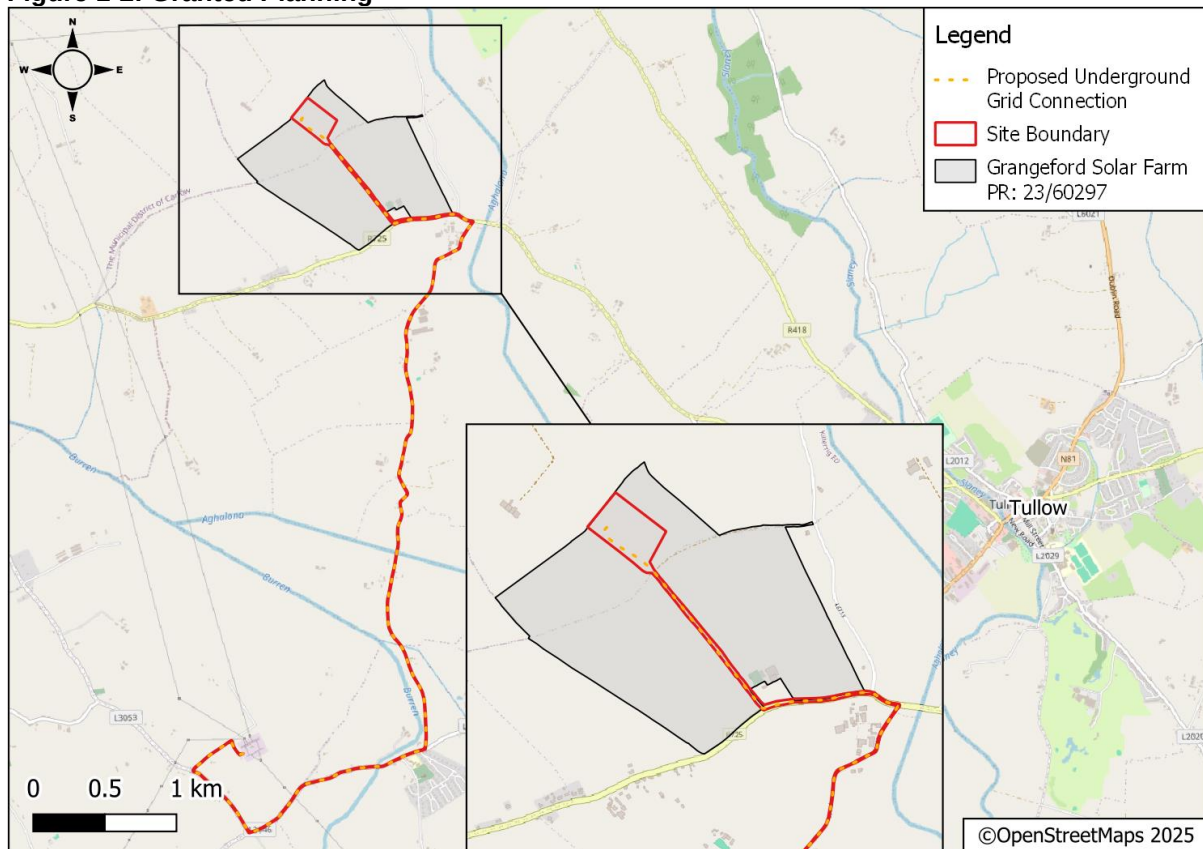
Carlow County Council Planning Reg: 23/60297– Granted

10-year permission. The development will consist of the construction of (i) a Solar PV development comprising photovoltaic panels laid out in arrays over a total development site area of ca. 91.2ha, (ii) the construction of a 38kV substation building ((6.1m (h) x 20.9 (l) and 7.3 (w)) and associated compound area, a transformer unit (ca. 6m x ca. 3.6m) and associated bund, (iii) 352 number Battery Energy Storage System units comprising 22 modules (ca. 21.9m x ca.5.2m) each with 16 number cabinet units within each module and (iv) all ancillary development including 15 number transformer integrated units (ca. 10.5m x ca.2.7m), 12 number inverter units (ca. 6.0m x ca.2.4m), 7 number CCTV cameras mounted on 4m high poles, a 3m high acoustic barrier, with berm and fencing, perimeter security fencing, site access, site egress and all ancillary works and services. The development will have a 40-year operational lifetime.

This planning permission superseded the previously permitted solar development (Planning Ref: 21/23; ABP Ref No. 309987-21). Carlow County Council granted the Permitted Solar Development on the 24th September 2024.

Figure 1-2 illustrates the Permitted Solar Development permission boundary and the Proposed Development boundary.

Figure 1-2: Granted Planning



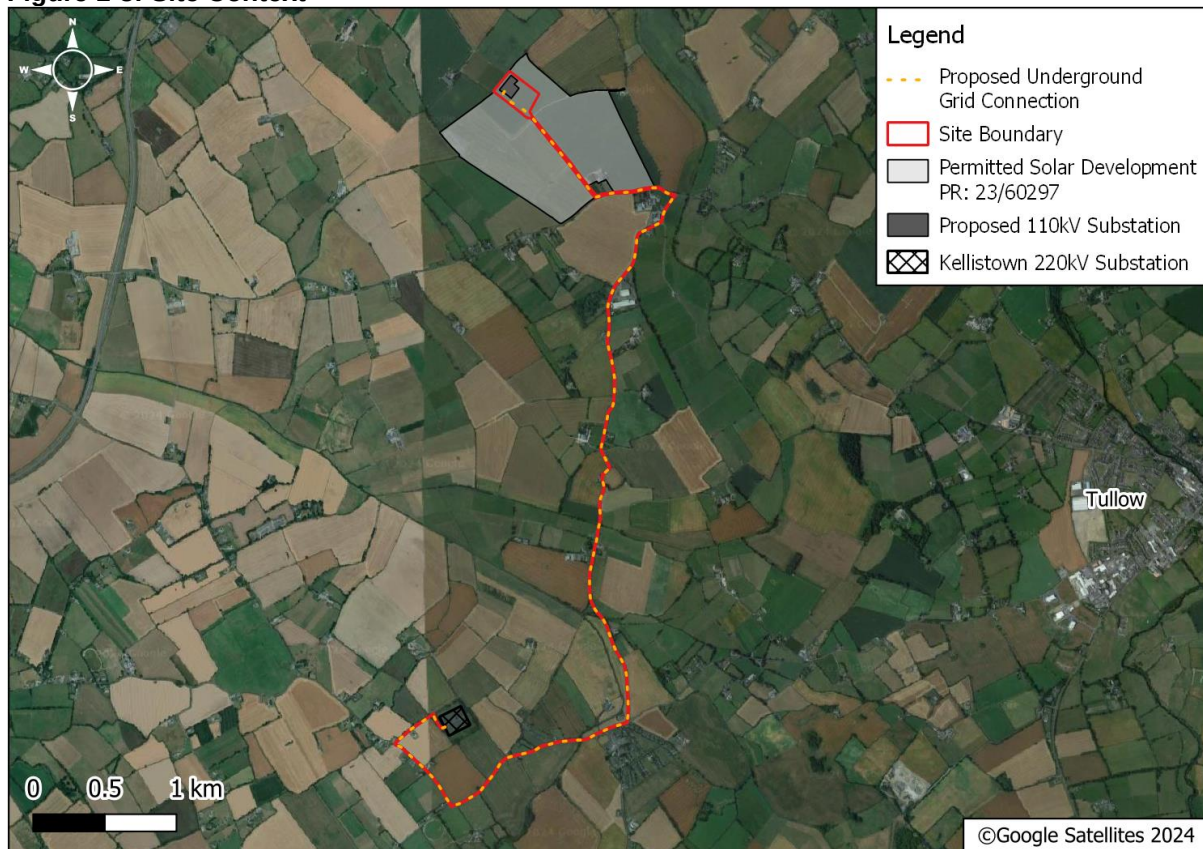
1.5 Site Context and Description

The Site is located within a predominately rural landscape within the townlands of Friarstown Grangeford Old, Grangeford, Moanalow, Glenoge, Rathnashannagh, Inchisland, Rathoe, Ballycurragh, Kellistown West and Kellistown East, Co. Carlow. The Site is surrounded by agricultural grassland, with scattered residential properties and farmyards. The Killerig Golf Club is located ca. 1km northeast of the Site at the closest point. Refer to Figure 1-3.

The Site is 1.7ha in size, located in predominantly agricultural land, which at the time of writing this report is under arable crop with hedgerow / treeline forming the northern perimeter of the Site. The Site is accessed via the R725 and the L6113.

The proposed 110kV UGC will be situated along existing internal access tracks / agricultural land, with the majority located within existing public road infrastructure, both regional and local, before connecting to the existing ESB 220kV Kellistown Substation.

Figure 1-3: Site Context



1.6 Watercourses within the Vicinity of the Site

The Site is situated within the Barrow Water Framework Directive ('WFD') Catchment [Catchment_ID: 14] and the Barrow_SC_090 subcatchment [Subcatchment_ID: 14_13] [1].

There are no open watercourses within the proposed 110kV substation site. However, as per EPA maps there are six hydrological features of note within close proximity to the Site and three watercourses will be crossed via the UGC route, as outlined below and illustrated in Figure 1-4 and Figure 1-5.

1. The Ardnehue River.

The Ardnehue River is located ca. 560m to the west / southwest of the Site at its closest point. This river flows in a south-westerly direction, draining into the Burren 14 River, ca. 3.2km downstream of the Site. The Burren 14 flows in a west / northwesterly direction, eventually discharging into the River Barrow, ca. 11.6km downstream of the Site. The River Barrow forms part of the River Barrow and River Nore SAC.

2. Grangeford Old Stream

According to the EPA maps, the Grangeford Old Stream is located ca. 230m southwest of the Site and joins the Ardnehue River (described above). However, this watercourse **was not identified** as part of the site inspection completed in May 2024.

The absence of this watercourse remains consistent with the findings of the previous site surveys completed in 2021 and 2023 as part of the previously permitted planning applications (21/23; ABP Ref No. 309987-21 and 23/60297). This portion of the Site is noted as being 'benefited land' that was drained as part of the Drainage District and has been infilled.

3. The Baunogenasraid Stream

The Baunogenasraid Stream runs parallel to the proposed UGC for ca. 200m and then flows in a southwesterly direction. The Baunogenasraid Stream discharges into the Burren River ca 2.8km downstream.

4. The Aghalona River

The Aghalona River will be crossed by the proposed UGC via Horizontal Directional Drilling ('HDD') under the existing bridge / culvert. This river flows in a southwesterly direction before discharging into the Burren River ca. 2.5km northwest of the Site.

5. The Roscat River

The Roscat River flows in a westerly direction and discharges into the Burren River ca.165m west of the proposed UGC route. This River will be crossed by the proposed UGC via HDD under the existing bridge along the road infrastructure.

6. The Burren 14 River ('Burren River')

The Burren River flows in a northwesterly direction and discharges into the River Barrow 11.6km downstream of the Site. The proposed UGC will cross the Burren River via HDD under the existing bridge. The River Barrow forms part of the River Barrow and River Nore SAC.

Water Quality Status and Risk

Under the Water Framework Directive ('WFD') 2000/60/EC, the Environmental Protection Agency ('EPA') classifies the status and the risk of not achieving good water quality status for all waterbodies in Ireland [1]. According to the river waterbody WFD 2016-2021 [1], the water quality status and risk for the above-mentioned watercourses is as follows:

- The Ardnehue River has a '*moderate*' water quality status and is considered to be '*not at risk*,'
- The Grangeford Old Stream has a '*good*' water quality status and is classified as '*not at risk*,'
- The Baunogenasraid Stream has a '*good*' water quality status and is classified as '*not at risk*,'
- The Aghalona River has a '*moderate*' water quality status and is classified as '*at risk*,'
- The Roscat River is classified as '*moderate*' and '*under review*'; and,
- The Burren River has a '*moderate*' water quality status and is deemed '*not at risk*' along the section of river into which the Ardnehue and Aghalona rivers drain. Approximately 3.5km downstream, the Burren River is considered to be '*at risk*' of not achieving a '*high*' water quality status even though its water quality remains '*moderate*';

The location of the key surface water features in the vicinity of the Site are illustrated in Figure 1-4 and 1-5 below.

Figure 1-4: Watercourses in the Vicinity of the Proposed Tail Fed Substation

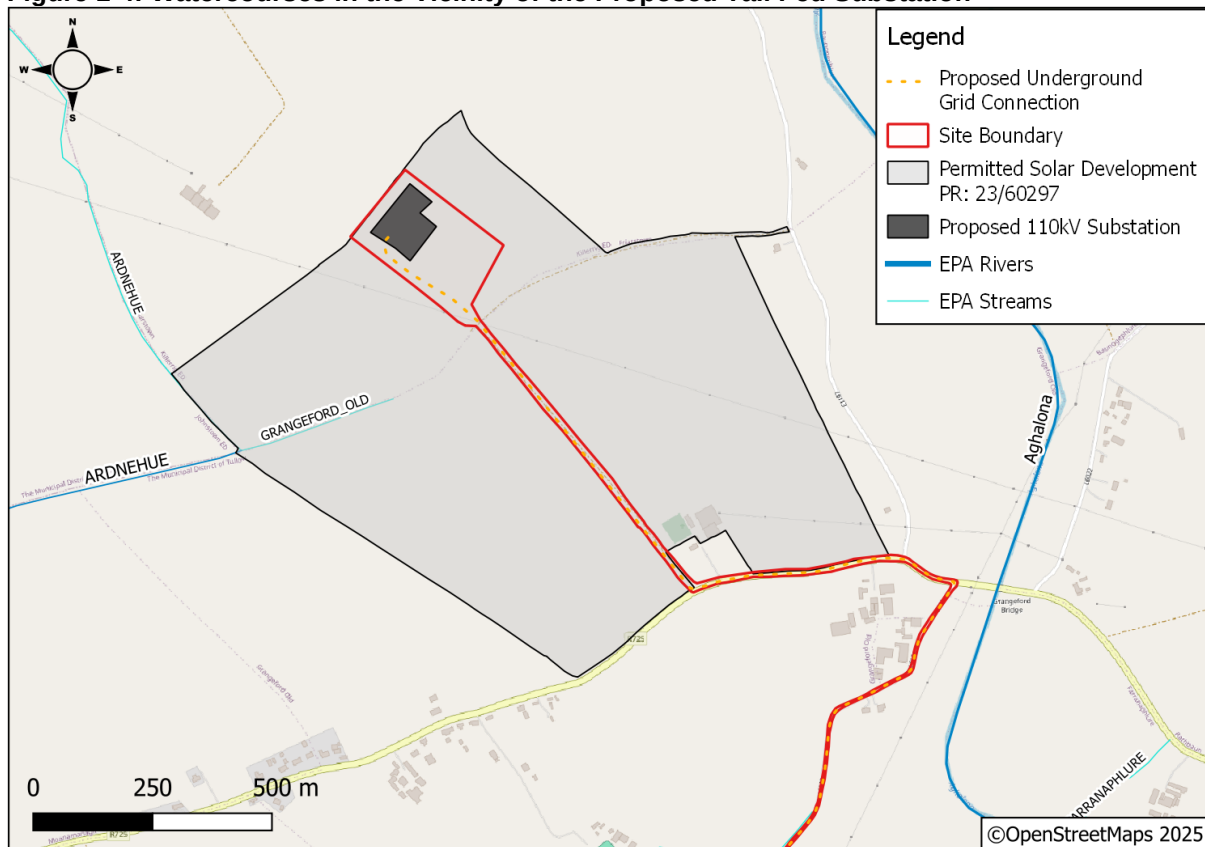


Figure 1-5: Watercourses in the Vicinity to the Proposed Grid Connection



1.6.1 OPW Flood Maps

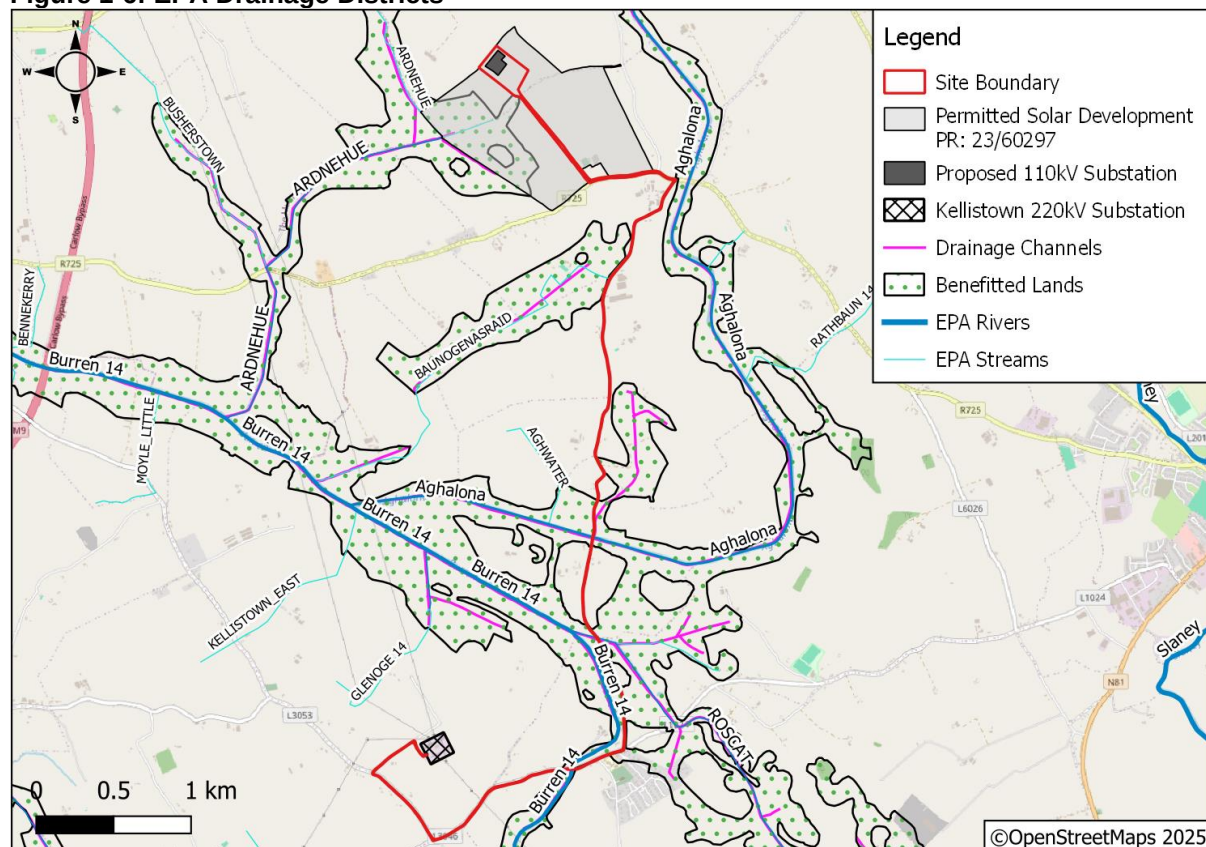
The Office of Public Works ('OPW') Flood Maps identifies Drainage Districts, Arterial Drainage Schemes and Benefited Areas. Arterial Drainage Schemes were works that were carried out under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. The Benefited land identifies land that was drained as part of the Drainage District with the aim to improve land for agriculture and to mitigate flooding.

The Site does not form part of the Benefitted Lands Scheme; see Figure 1-6. However, a section of land within the western portion of the Permitted Solar Development, directly adjacent to the Site Boundary, forms part of the Benefitted Lands Scheme. Additionally, a drainage ditch channel was also identified within the Permitted Solar Development under the Barrow Drainage District Scheme. The drainage ditch channel is located predominantly along the western perimeter of the Permitted Solar Development, ca. 100m at its closest point from the Proposed Development.

1.6.2 Drainage Ditch Network

A number of drainage ditches were noted within the vicinity of the Site, located adjacent to hedgerow / treelines along sections of the Permitted Solar Development perimeter. No drainage ditches were noted traversing the Site. The surveys undertaken at the Site in 2020, 2023 and 2024 confirmed that these ditches were not hydrologically connected to any EPA watercourse. See Figure 1-6. Such drainage regimes are typical features of agricultural lands as they facilitate drainage from the fields during periods of heavy rainfall to reduce flooding.

Figure 1-6: EPA Drainage Districts



1.7 Consultation

1.8 An Bord Pleanála

The Applicant entered into pre-application consultation with the Board, as provided for in Section 182E of the Act.

On 6th February 2025, the Board served notice that it is of the opinion that the Proposed Development falls within the scope of the section 182A of the Planning and Development Act 2000, as amended and the Board has decided that the Proposed Development would be strategic infrastructure (ABP Ref: ABP-319470-24).

Please refer to Appendix A for ABP determination letter.

2 ENVIRONMENTAL IMPACT ASSESSMENT ('EIA') SCREENING CONSIDERATIONS

2.1 Introduction

An EIA screening assessment has been undertaken in accordance with Schedule 5 and Schedule 7 of the Planning and Development Regulations 2001 (as amended) and takes cognisance of Directive 2014/52/EU, as it is currently interpreted, utilising the following guidance:

- Environmental Protection Agency ('EPA'), Guidelines on the Information to be contained in Environmental Impact Assessment Reports ('EIAR') 2022.

EIA stands for the process of Environmental Impact Assessment, which anticipates and predicts the effects on the environment caused by a project. It is integrated into consent processes and helps to ensure that the environmental consequences of a project are understood before a consent decision is reached.

EIA screening involves deciding whether an EIA needs to be undertaken or not, regarding legislative requirements.

This section of the report examines the legislative context relating to EIA and EIA Screening and its applicability to the Proposed Development.

2.2 Methodology

2.2.1 Desk-Based Studies

In undertaking this EIA Screening Assessment, a detailed desk-based study was completed that included a review of the following information:

- Relevant legislation and guidance; and,
- Relevant published information pertaining to the Site and the surrounding area in regard to all of the stipulated EIA Report ('EIAR') topics.

2.2.2 Field-Based Studies

Site surveys were undertaken on 30th May 2023, 17th May 2024 and 29th January 2025 by suitably qualified and experienced MOR Environmental Ecologists to gain a better understanding of the receiving environment and to identify any sensitive environmental receptors.

2.3 Legislative and Regulatory Context

The requirement for EIA has its origins in Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. This Directive has been amended three times and was codified by Directive 2011/92/EU in 2011. Directive 2011/92/EU was then subsequently amended by Directive 2014/52/EU in 2014.

Projects requiring EIA are defined in Article 4 and set out in Annexes I and II of Directive 2014/52/EU. These provisions are, in turn, transposed into domestic Irish legislation through Schedule 5 of the Planning and Development Regulations 2001, as amended.

In determining the requirement for EIA, Schedule 5 differentiates between different types of projects in the context of 'project types':

- Schedule 5 'Part 1' identifies project types that are anticipated to have significant effects on the environment and which require mandatory EIA; and,
- Schedule 5 'Part 2' identifies projects that do not necessarily have significant effects but for which different thresholds or other criteria are applied, and if these are met,

then EIA is required. Projects that are identified in Part 2, but which fall below those thresholds and other criteria, may also require EIA. This is determined by the outcome of a sub-threshold EIA Screening, which is undertaken in accordance with Schedule 7.

If a project is not of a type identified in Schedule 5, there is no statutory requirement for it to be subject to EIA or EIA Screening. This is clearly established in Irish planning legislation and its interpretive case law

2.3.1 Environmental Impact Assessment Screening - Legislative and Regulatory Context

In order to determine whether it is required to undertake an EIA for the Proposed Development, the following legislation was consulted:

- The Planning and Development Regulations, 2001 (as amended) [2]; and,
- EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment ('2014 EIA Directive') [3].

In addition, the following guidance documents were reviewed:

- Interpretation of Definitions of project Categories of Annex I and II of the EIA Directive (European Commission, 2015);
- European Commission (June 2017), Environmental Impact Assessment of Projects. Guidance on Screening [4];
- Department of the Environment, Heritage, and Local Government (August 2003), Environmental Impact Assessment ('EIA') Guidelines for Consent Authorities regarding Sub-threshold Development [5];
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022) [6];
- Department of Housing, Planning, Community and Local Government Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive) - Circular 1/2017', 15th May 2017 [7]; and,
- Department of Housing, Planning and Local Government ('DHPLG') Transposing Regulations (S.I. No. 296 of 2018) Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment [8].

2.4 Consideration of Substation and Grid Connection Development

Section 5 of the Planning and Development Regulations 2001 (as amended) sets out the criteria for assessing whether or not a mandatory EIAR is required for a development. It transposes Annex I and Annex II of the EU EIA directive (85/337/ECC as amended) into Irish law under Parts 1 and 2 of the schedules.

2.4.1 Schedule 5 'Part 1' Projects

There are no activities listed within Schedule 5 'Part 1' of the Planning and Development Regulations 2001 (as amended) that relate to substations or underground grid connections.

The most relevant energy-related project types are set out below with corresponding commentary:

2(a) A thermal power station or other combustion installation with a heat output of 300 megawatts or more.

- 110kV substations or underground cable grid connections do not meet the definition of a thermal power station or combustion installation. Therefore, this project type is not applicable.

2(b) A nuclear power station or other nuclear reactor including the dismantling or decommissioning of such a power station or reactor¹ (except a research installation for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load).

- 110kV substations or underground cable grid connections do not meet the definition of a nuclear power station. Therefore, this project type is not applicable.

(20) Construction of overhead electrical power lines with a voltage of 220 kilovolts or more and a length of more than 15 kilometres.

- The Proposed Development does not include overhead power lines with a voltage of 220kV. Therefore, this project type is not applicable.

There are no other project types identified in Schedule 5 'Part 1' that relate either directly or indirectly to 110kV substation or underground electrical cables. It is clear, therefore, that 110kV substation or underground electrical cables are not a project type with regard to 'Part 1' and does not, therefore, require a mandatory EIA. This has been subject to legal confirmation in *Kavanagh V An Bord Pleanála* [2020] IEHC 259 and *Sweetman V An Bord Pleanála* [2020] IEHC 39.

2.4.2 Schedule 5 'Part 2' Projects

Under Schedule 5 - Part 2, the following project types have been considered to determine applicability to the Proposed Development:

1(a) Projects for the restructuring of rural land holdings, undertaken as part of a wider proposed development, and not as an agricultural activity that must comply with the European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011, where the length of field boundary to be removed is above 4 kilometres, or where re-contouring is above 5 hectares, or where the area of lands to be restructured by removal of field boundaries is above 50 hectares.

- All field boundaries will be retained as part of the Proposed Development, no hedge / treeline will be removed as part of the Proposed Development. The pattern and integrity of the existing field network will be retained. The land will not be re-contoured as part of any aspect of the Proposed Development. Therefore, the Proposed Development does not meet the definition of restructuring for rural land holdings as per the paragraph as amended.

3(a) Industrial installations for the production of electricity, steam and hot water not included in Part 1 of this Schedule with a heat output of 300 megawatts or more.

- 110kV substation or underground cable grid connections do not meet the definition of an industrial installation as per the meaning of the 3(a).

3(b) Industrial installations for carrying gas, steam, and hot water with a potential heat output of 300 megawatts or more, or transmission of electrical energy by overhead cables not included in Part 1 of this Schedule, where the voltage would be 200 kilovolts or more.

- 110kV substations or underground cable grid connections do not meet the definition of an industrial installation as per the meaning of the 3(b).

3(i) Installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts.

- 110kV substations or underground cable grid connections do not meet the definition of a wind farm.

10(a) Industrial estate development projects, where the area would exceed 15 hectares.

- 110kV substation or underground cable grid connections do not meet the definition of an industrial estate.

10(b)(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere.

- 110kV substations or underground cable grid connections do not meet the definition of an urban development as per the meaning of 10(b)(iv).

10(b)(dd) All private roads which would exceed 2000 metres in length.

- The Proposed Development will include access tracks comprising of permeable hardcore which will not fall within a road definition as per the Roads Acts 1993, as amended.

There are no other project types identified in Schedule 5 'Part 2' which relate either directly or indirectly to 110kV substations or underground cable grid connections. It is clear, therefore, that the Proposed Development is not a project type with regard to 'Part 2' and does not, therefore, require EIA.

2.5 Conclusions on Schedule 5 Analysis

If a project is not of a type identified in Schedule 5, then there is no statutory requirement for it to be subject to EIA or EIA Screening. Based on the findings of this EIA screening assessment, the Proposed Development does not fall under the remit of Schedule 5 and accordingly neither a mandatory nor a sub-threshold EIA is warranted.

Therefore, there is no legal requirement to subject the Proposed Development to a sub-threshold EIA Screening. The legislative basis for this is well established in planning legislation and interpretive case law, including (in the specific case of solar farm development) *Kavanagh V An Bord Pleanála* [2020] IEHC 259 and *Sweetman V An Bord Pleanála* [2020] IEHC 39. It is also a well-established precedent with planning authorities and An Bord Pleanála.

Regardless, a precautionary approach was undertaken to assess the Proposed Development in regard to potential environmental impacts. Although Section 7 is not applicable to the Proposed Development, it has been utilised in order to comprehensively undertake this assessment.

2.5.1 Assessment under Schedule 7 (Significance)

Schedule 7 of the Planning and Development Regulations 2001 (as amended 2018) sets out the criteria for assessing whether or not a project will have 'likely' and 'significant' effects on the environment. These criteria include the following:

- 'Characteristics of proposed development';
- 'Location of Proposed Development'; and,
- 'Characteristics of Potential Impacts'.

Taking a very precautionary approach, these criteria were considered for the Proposed Development under the topics recommended in EIA guidance documents. A summary of this assessment is set out in Table 2-1. Section 7 of the Planning and Development Regulation 2001 (as amended, 2015), has been utilised in order to undertake a comprehensive assessment.

Table 2-1: EIA Screening Assessment

Topic	Likely & Significant Effects	Comment
Human Beings	None	As per the permitted development (PR:23/60297), there will be no significant effects on the local population due to the Proposed Development. Any potential effects on humans through visual impact, noise impact, and traffic are discussed in the relevant sections of this report.
Biodiversity / Flora & Fauna	None	An ecological assessment has been undertaken, as presented in Chapter 6. The assessment concluded that the Proposed Development will not result in any significant impact on any protected or notable species and that it is considered that an overall positive impact will occur. A Stage 2 Natura Impact Assessment has been completed for the Proposed Development.
Soils & Geology	None	Localised levelling works will be required for the development of the Site. The detailed design of the substation will determine the extent of the earthworks. It is estimated that the majority of the excavated materials will be reused within the Site or alternatively within the adjoining permitted solar farm for the purpose of constructing screening berms given the overall development will be constructed as a single construction project. Details of soil disposal are provided in Chapter 5.3, Construction Procedures. There will be no significant effects on soils and geology at or in the general area of the Site.
Water	None	A hydrological and hydrogeological assessment, which included a desk-based flood risk screening assessment, was undertaken and is presented in Chapter 7. The assessment concluded that there is no flood risk at the Site and that the Proposed Development is not expected to result in any adverse impacts to the hydrological or hydrogeological regime of the receiving environment.
Noise	None	A comprehensive Noise Assessment was undertaken for the Site and is presented in Chapter 8. The assessment concluded that there are no significant noise sources associated with the Proposed Development. The Applicant is committed to ensuring that any noise is maintained below typical Local Authority, day, and night-time noise nuisance level of a site-specific $L_{Aeq,T}$ of 55dB and 45dB, respectively, during operation nuisance limits at sensitive receptors.
Air Quality	None	No significant emissions to air will occur due to the Proposed Development.

Topic	Likely & Significant Effects	Comment
Climate	None	It is considered that the Proposed Development will have an overall slightly positive impact, as it will improve the efficiency of energy production by providing storage capacity for surplus energy as discussed in Chapter 4.4 Need for the Development.
Landscape & Visual	None	The Proposed Development will not present significant landscape or visual impacts. Refer to Chapter 9 of this report.
Cultural Heritage	None	An archaeological assessment has been undertaken, as presented in Chapter 11. This assessment concluded that the Proposed Development will not result in any significant impact on any protected monuments or features in the wider area.
Material Assets - Traffic	None	Given the temporary nature of the construction period, the existing road infrastructure, and the limited number of vehicle movements during the operational lifetime of the Proposed Development, it was concluded that the potential impact on the local road network will be insignificant. A Construction Traffic Management Plan was prepared and is presented in Chapter 11
Material Assets - Water	None	Water for onsite welfare facilities will be provided by a 1,500 litre rainwater harvesting tank which will be filled from roof runoff. Working with projected usage of the sanitary facilities of 1,950 litres every 13 weeks, the rainwater storage tank will provide for up to 10 weeks without receiving any rainfall. The Proposed Development will not present significant material assets -water.
Material Assets - Wastewater	None	There will be no foul drainage required. During the construction phase, portable toilets will be provided at the temporary Contractors' Compound for the duration of the construction phase only. All waste from the portable toilets will be removed and disposed of off-site by an approved contractor. During the operational phase, the substation building will contain a sink and toilet. As the welfare facilities on-site will be infrequently used, it is proposed that foul water will be diverted into a below-ground holding tank. All wastes collected in this holding tank will be removed by a suitably licensed waste contractor as required. No specific drainage infrastructure will be required for the Proposed Development.
Material Assets - Waste	None	There will be no significant waste produced during the operational phase and minimal waste during the construction phase. Waste generated during the construction and operational phase will be collected, accommodated, and segregated on-site before being removed off-site and recycled or disposed of at a suitably licensed waste or treatment facility as discussed in Chapter 5.

2.5.1.1 Screening Conclusion and Scope of this Environmental Report

Based on the findings of this EIA screening assessment, it was concluded that the Proposed Development will not result in any likely and significant effects on the environment; therefore, an EIAR would not be warranted.

2.5.2 Cumulative Screening Assessment

Despite the fact that a mandatory EIAR was deemed not to be warranted, this ER has considered the cumulative environmental aspects of the Proposed Development alongside the Permitted Development and other developments in the area as much as practicable to ensure both applications will be supported with a robust environmental assessment.

2.6 Environmental Report

In the absence of the requirement for an EIA, the Applicant is still committed to ensuring that a comprehensive and robust environmental assessment of the Proposed Development is undertaken. This Environmental Report ('ER') has been prepared having regard to some of the same guidelines applicable to EIA projects described in Section 2.4. in terms of the general format and specialist assessment methodologies, including:

- Advice Notes for preparing Environmental Impact Statements - Draft [9];
- Environmental Protection Agency ('EPA'), Guidelines on the Information to be contained in Environmental Impact Assessment Reports ('EIAR') 2022 [10];
- European Commission, Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, 1999 [11]; and,
- Circular letter PL 1/2017 - Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive) - Advice on Administrative Provisions in Advance of Transposition [7].

Additional relevant specialist guidance documents were also used in the preparation of the individual assessments. These are detailed in the relevant chapters and associated appendices.

2.6.1 Scope of this ER

The following topics are presented in this ER.

- Proposed Development and Construction Stage Management;
- Biodiversity (Flora and Fauna);
- Water;
- Noise;
- Landscape and Visual;
- Cultural Heritage; and,
- Traffic.

3 METHODOLOGY

3.1 Assessment of the Effects – Evaluation Criteria

The assessment of effects has been undertaken in accordance with best practice. The approach is set out below. The evaluation of significance considers the magnitude of the change and the sensitivity of the resource or receptor. Unless otherwise stated, this approach has been adopted throughout the ER.

The criteria for determining the significance of impacts and the effects are set out in Figure 3-1 and Table 3-1, as abstracted from the EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports [10]. Definitions of impact, as outlined by the EPA, are included below; unless otherwise stated within a specific ER topic, these definitions will apply within this ER.

Table 3-1: Quality of Effects

Type of Effect	Quality of Effect
Positive Effects	A change which improves the quality of the environment.
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative / Adverse Effects	A change which reduces the quality of the environment.

Table 3-2 outlines the definitions for the significance of an effect, which range from imperceptible to profound.

Table 3-2: Describing the Significance of Effects

Classification	Criteria
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant	An effect which, by its character, magnitude, duration, or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration, or intensity significantly alters the majority of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

Table 3-3 describes the terminology used to discuss the Extent and Context of Effects.

Table 3-3: Describing the Extent and Context of Effects

Magnitude	Description
Extent	Describes the size of the area, the number of sites, and the proportion of a population affected by an effect.

Magnitude	Description
Context	Describes whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

Table 3-4 details the descriptions of probability of effects, i.e., how likely an impact is to occur.

Table 3-4: Describing the Probability of Effects

Magnitude	Description
Likely	Effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Table 3-5 outlines the duration of effects. Momentary effects lasting from seconds to minutes will often be less concerning than long term and permanent effects, depending on their severity.

Table 3-5: Describing the Duration and Frequency of Effects

Magnitude	Description
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 that can be undone, for example through remediation or restoration
Frequency of Effects	Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

Table 3-6 defines the types of effects that can potentially occur.

Table 3-6: Describing the Types of Effects

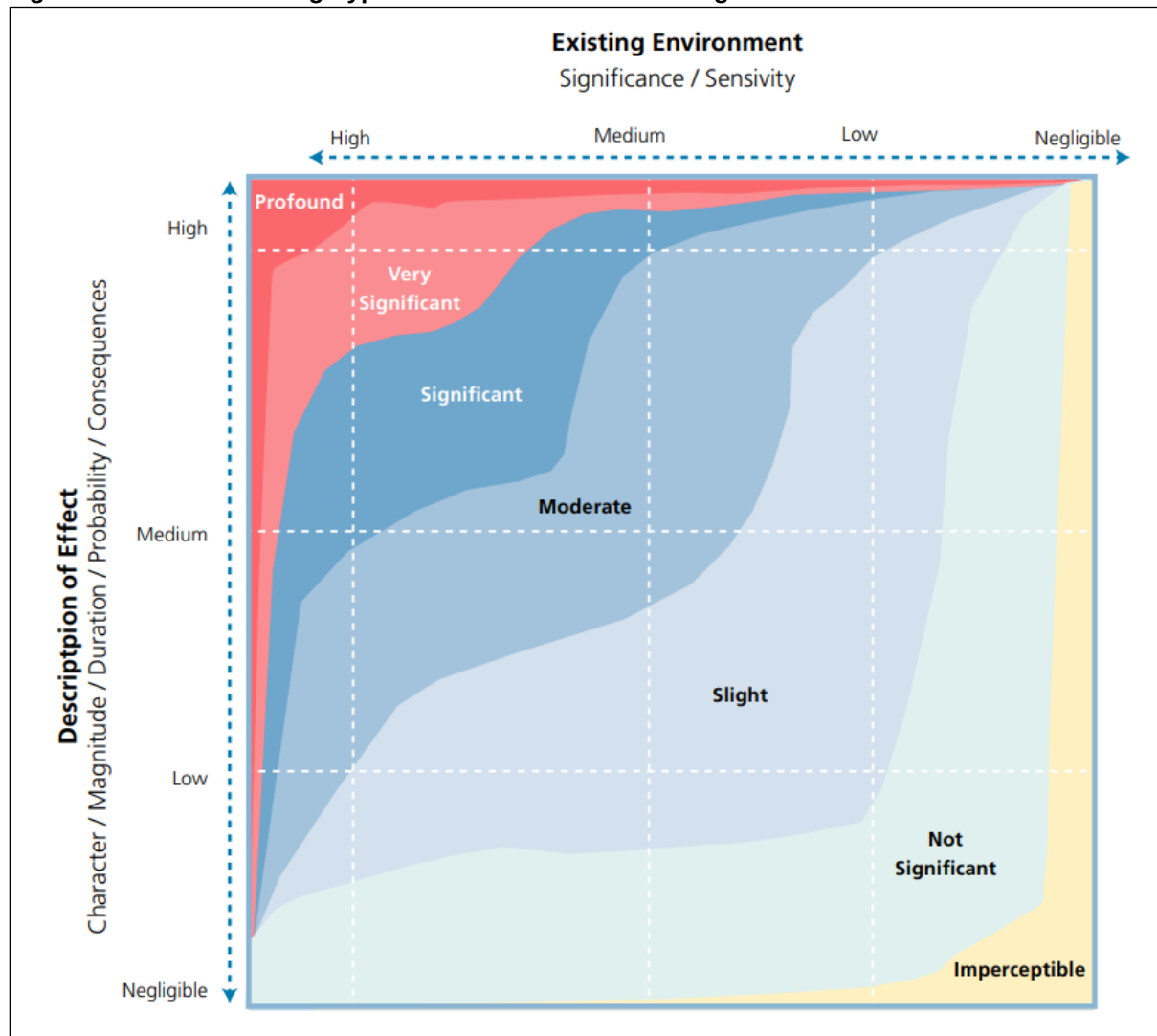
Magnitude	Description
Indirect Effects (a.k.a. Secondary or Off-site Effects)	Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative Effects	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
Do Nothing Effects	The environment as it would be in the future should the subject project not be carried out.
'Worst-case' Effects	The effects arising from a project in the case where mitigation measures substantially fail

Magnitude	Description
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect
Synergistic Effects	Where the resultant effects are of greater significance than the sum of its constituents.

3.1.1 Determining Significance

Figure 3-1 shows how comparing the character of the predicted effect to the sensitivity of the receiving environment can determine the significance of the effect.

Figure 3-1: Chart Showing Typical Classifications of the Significance of Effects



Note: Source [10]

The above terminology will be used throughout this report unless superseded by an environmental topic best practice in assessing ER. Where specialist topics defer from these terms, a topic specific methodology will be provided for within the relevant chapter.

3.2 Assessment of Cumulative Impacts

Cumulative impacts refer to impacts that result from incremental changes caused by other past, present, and approved developments, and as far as practicable from reasonably foreseeable development(s), together with the Proposed Development.

4 POLICY, PLANNING AND DEVELOPMENT

4.1 Introduction

This chapter provides a detailed description of the plans and policies that support the Proposed Development. Relevant details on the planning history for both the Site and the surrounding area are also outlined

4.2 Planning History

Following a review of the files on the Carlow County Council ePlanning website, three previous planning applications were identified within the Site Boundary. Please refer to Table 4-1 below.

Table 4-1: Carlow County Council – Planning Permission within the Proposed Site Boundary

Planning Ref.	Applicant	Year	Description	Distance from the Site	Planning Status
16/325	Nolan PV	2017	Permission for development of a solar PV Panel Array consisting of up to 48,800 m ² of solar panels on ground mounted steel frames, electricity control room, power inverter unit, underground cable ducts, CCTV and lighting, security fence and all associated works at Friarstown Tullow Co Carlow	Within the proposed Site Boundary	Granted Permission expired in 2022.
21/23	Summit Solar Ltd	2021	10 Year permission for development consisting of the construction of a Solar PV development comprising photovoltaic panels laid out in arrays over a total development site area will be ca. 65.6 ha, the construction of a 38kV substation (ca 114.4m ² x 4.75 tall) a transformer unit (ca. 18m ² x 4m tall) and associated bund (ca. 55m ²), along with ancillary development including; 24 no. Power Hubs (ca. 15.25m ² x 2.4m) which incorporate an inverter and a transformer, 1 no. single storey communications building (11.1m ² x 2.5m), 1 no. single storey client side sub-station building (15.25m ² x 2.9m), 1 no. single storey equipment storage building (7.5m ² x 2.7m), 10 no. CCTV cameras mounted on 4m high poles, perimeter security fencing, site access, site egress and all ancillary works. Permission currently exists for a PV development on part of the site (Planning Permission Ref No. 16325). A Natura Impact Statement will accompany the planning application.	Within the Proposed Site Boundary	Refused by Carlow County Council Granted by ABP in 2021-309987-21
2360290	Prt Solar Limited	2023	10-year permission. The development will consist of the construction of (i) a Solar PV development comprising	Within the Proposed Site Boundary	Granted with Conditions on the 24/09/2024

Planning Ref.	Applicant	Year	Description	Distance from the Site	Planning Status
			photovoltaic panels laid out in arrays over a total development site area of ca. 91.2ha, (ii) the construction of a 38kV substation building ((6.1m (h) x 20.9 (l) and 7.3 (w)) and associated compound area, a transformer unit (ca. 6m x ca. 3.6m) and associated bund, (iii) 352 number Battery Energy Storage System units comprising 22 modules (ca. 21.9m x ca.5.2m) each with 16 number cabinet units within each module and (iv) all ancillary development including 15 number transformer integrated units (ca. 10.5m x ca.2.7m), 12 number inverter units (ca. 6.0m x ca.2.4m), 7 number CCTV cameras mounted on 4m high poles, a 3m high acoustic barrier, with berm and fencing, perimeter security fencing, site access, site egress and all ancillary works and services. The development will have a 40-year operational lifetime. Permission currently exists for a PV development on ca/65.6ha of the site (Planning Permission Ref No. 21/23) that will be superseded by this application if approve		

In addition, planning consent has been obtained for a separate PV development in the vicinity of the Site, as outlined in Table 4-2. Due to the similar nature of these developments, where applicable, cumulative impacts have been assessed as part of this environmental report.

Table 4-2: Carlow County Council – Planning Permission within the Surrounding Area

Planning Ref.	Applicant	Year	Description	Distance from the Site	Planning Status
20/44	Johnstown Solar Farm	2020	A 10-year permission for the erection and operation of a solar photovoltaic energy development. The Proposed Development will consist of the erection and operation of a solar photovoltaic energy development which includes the erection of fixed solar panels on ground mounted frames, electrical transformer and inverter units, distribution systems operator (DSO) sub-station, customer substation, underground cabling and ducting, storage containers, boundary fencing, security entrance gates, CCTV,	Bennekerry Carlow 2.2km northwest of the Site	Granted with conditions

Planning Ref.	Applicant	Year	Description	Distance from the Site	Planning Status
			internal access road and all associated ancillary activities.		
21/38	Ardnehue Solar Farm	2022	Permission for a development to include a solar farm on an area of approximately 17.6 hectares, comprising photovoltaic panels on ground mounted frames, 1 no. onsite 38kV substation, 10 no. single storey inverter/transformer stations, security fencing, a palisade double security gate, 2 no. storage containers, CCTV, a temporary construction stage wheel wash system and all associated ancillary development works. Elgin Energy Services Ltd. are applying for the proposed solar farm to have planning permission that is effective for 10 years (an operational period of 40 years). A Natural Impact Statement (NIS) has been prepared and will be submitted to the planning authority with the planning application	Ardnehue And Friarstown Directly North	Granted with conditions
22/149	Friarstown Solar and Storage Park	2023	for proposed works to include a solar and storage park on an area of approximately 68.8 hectares, comprising linear arrays of solar photovoltaic panels mounted on steel supported structures with associated cabling and ducting (including cable connection to the proposed onsite 110 kV tail fed substation), 50 inverter substations, a storage park (including 30 no. containers with battery cells, transformers and power conversion units), perimeter fencing, 8 no. palisade double security gates, 3 no. temporary construction compound/material storage areas, 6 no. steel storage containers, 17 no. turning bays, CCTV, a temporary construction stage wheel wash system and all associated ancillary development works. Elgin Energy Services Ltd. are applying for the Proposed Development to have planning permission that is effective for 10 years (and an operational	Friarstown Directly North	Granted with conditions

Planning Ref.	Applicant	Year	Description	Distance from the Site	Planning Status
			period of 40 years). A Natural Impact Statement (NIS) has been prepared and will be submitted to the planning Authority with the Planning Application.		
23/92	Neoen Renewables Ireland Limited	2023	A ten-year planning permission for a solar energy development with a total site area of 77 hectares comprising (i) photovoltaic solar panels on steel mounting frames; (ii) electrical inverters; (iii) electrical power stations; (iv) underground electrical and communications cabling; (v) containerised battery energy storage facility; (vi) the upgrade of 2 no. disused site entrances, decommissioning of 2 no. existing site entrances and development of 1 no. new site entrance; (vii) on-site access tracks; (viii) a temporary construction compound; (ix) security fencing and security gates; (x) pole-mounted security cameras; and (xi) all associated site and ancillary site development, landscaping and reinstatement works. The operational lifetime of the Proposed Development is 40-years. The planning application is accompanied by an Environmental Impact Assessment Screening Report and an Appropriate Assessment Screening Report.	Friarstown, Carlow. Adjacent to northwestern section of the Site.	Granted by Carlow County Council. Appealed to An Bord Pleanála.

4.3 Need for the Development

4.4 Global Policy Context

Globally, there is clear recognition that action to mitigate climate change is necessary. This initially resulted in the Paris Agreement 2015 – an international effort to keep the global increase in temperature to 2°C above pre-industrial levels. According to the Fifth Assessment Report (AR5) of the United Nations Intergovernmental Panel on Climate Change (‘IPCC’), in order to keep the temperature increase below 2°C, global GHG emissions must be reduced by 40-70% by 2050 compared to 2010 and be near zero by 2100 [12]. Key to achieving this level of emissions reduction will be the preparation and implementation of low-carbon development.

The EU target for 2030 was to achieve a 40% reduction in domestic GHG emissions compared to 1990 [13].

At the 2021 United Nations Climate Change Conference ('COP26'), the participating countries reaffirmed earlier commitments under the Paris Agreement (2015) to the goal of holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels. There was also a recognition that limiting global warming to 1.5 °C requires rapid, deep, and sustained reductions in global greenhouse gas emissions, including reducing global carbon dioxide emissions by 45 per cent by 2030 relative to the 2010 level and to net zero around mid-century, as well as deep reductions in other greenhouse gases.

Renewable energy technologies play a vital role in the reduction of greenhouse gas ('GHG') emissions. In Ireland, wind energy generated 28% of all electricity consumption in 2018, which is second only to natural gas [14]. However, 7% of electricity in Ireland is still generated by coal, the fuel with the highest GHG emissions, as well as emissions of other pollutants [15]. It is paramount to transition to non-fossil fuel sources of electricity as fast as possible in order to achieve national (and international) GHG emissions reduction goals.

Ireland had an overall target of 16% of gross final energy consumption to come from renewable energy sources by 2020 [16]. This was to be achieved by 40% from renewable electricity, 12% from renewable heat, and 10% from renewable transport.

Ireland did not meet the 2020 overall renewable energy target. The overall share of renewable energy was 13.5% compared to the target of 16%. Ireland succeeded against its EU 2020 renewable energy target for transport (10.2% vs. 10%) and just missed its renewable energy target for electricity (39.1% vs. 40%). Ireland achieved just half its 2020 renewable energy target for heating and cooling (6.3% vs. 12%). Energy from renewable sources grew by 8.9% in 2020 [14].

The EPA also recently reported that Ireland is not on track towards decarbonising the economy in the long term [13]. As it stands, Ireland is not on course to achieve its short- or long-term climate goals, and steep challenges will have to be faced toward 2050 [16]. We now have some of the most demanding decarbonisation targets globally, with the necessity to halve emissions by 2030 and reach net-zero by 2050 now enshrined in Irish law [14].

Developments such as the Proposed Development are not only essential to achieving renewable energy goals, but also to achieving the wider goal of decarbonising the economy in Ireland.

4.5 European Policy Context

4.5.1 European Green Deal

Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, the European Green Deal will transform the EU into a modern, resource-efficient, and competitive economy, ensuring [17]:

- *No net emissions of greenhouse gases by 2050;*
- *Economic growth decoupled from resource use; and,*
- *No person and no place left behind.*

4.5.2 EU Renewable Targets

The EU wants to accelerate the take-up of renewables to contribute to and reach the goal of reducing net greenhouse gas emissions by at least 55% by 2030.

Increasing the share of renewable energy across the different sectors of the economy is therefore a key building block to reach the EU's energy and climate objectives by cutting greenhouse gas emissions by at least 55% (compared to 1990) by 2030 and becoming a climate-neutral continent by 2050.

4.5.3 Renewable Energy Directive 2018/2001/EU

In December 2018, the recast Renewable Energy Directive 2018/2001/EU entered into force as part of the clean Energy for All Europeans package, aimed at keeping the EU a global leader in renewables and, more broadly, helping the EU to meet its emissions reduction commitments under the Paris Agreement. Building on the 20% target for 2020, the recast Renewable Energy Directive 2018/2001/EU established a new binding renewable energy target for the EU for 2030 of at least 32%, with a clause for a possible upwards revision by 2023 [18].

On 21 July 2021, the Commission proposed a revision of the renewable energy directive in July 2021 as part of the package to deliver on the European Green Deal as detailed above. The proposal raises the ambition of the existing legislation to align it with the EU's increased climate ambition and sought to increase the current target to at least 40% renewable energy sources in the EU's overall energy mix by 2030. In May 2022, this target was subsequently increased to 45% as part of the European Commission's REPowerEU Plan, as detailed below.

4.5.4 REPowerEU Plan

On 18 May 2022, the Commission published the REPowerEU plan, which sets out a series of measures to rapidly reduce the EU's dependence on Russian fossil fuels well before 2030 by accelerating the clean energy transition. The REPowerEU plan is based on three pillars: saving energy, producing clean energy, and diversifying the EU's energy supplies. As part of its scaling up of renewable energy in power generation, industry, buildings and transport, the Commission proposes to increase the target in the directive to 45% by 2030, thereby increasing the targets set out in the current Renewable Energy Directive.

This would bring the total renewable energy generation capacities to 1236 GW by 2030, in comparison to 1067 GW by 2030 envisaged under the 2021 proposal.

4.5.5 Commission Recommendation

Alongside the REPowerEU plan, the Commission also presented a Recommendation on fast permitting for renewable energy projects and a legislative proposal on permitting that will contribute to the further acceleration. [19].

It acknowledged that “slow and complex permitting processes are a key obstacle to unleashing the renewables revolution and for the competitiveness of the renewable energy industry. Obtaining a permit can take up to 9 years for wind projects and up to 4.5 years for ground-mounted solar projects. Varying permitting times between Member States demonstrate that national rules and administrative capacities complicate and slow down permitting.”

For the purposes of the recommendations below and the accompanying guidance, renewable energy projects are understood to encompass ‘production plants for the generation of renewable energy as defined in the Renewable Energy Directive (including in the form of renewable hydrogen), as well as the assets needed for their **grid connection** and for the storage of the energy produced.’

The recommendation includes:

- Faster and Shorter Procedures;
- Facilitating Citizen and Community Participation;
- Improving Internal Coordination;
- Clear and Digitalised Procedures;
- Sufficient Human Resources and Skills;
- Better Identification and Planning of Locations for Projects;

- Easier Grid Connection;
- Innovative Projects;
- Facilitating Power Purchase Agreements; and,
- Monitoring, Reporting and Review.

4.5.6 The Climate and Energy Policy Framework 2030

The Climate and Energy Policy Framework 2030 [20] includes EU-wide targets and policy objectives for the period between 2021-2030. It seeks to drive continued progress towards a low-carbon economy and build a competitive and secure energy system that ensures affordable energy for all consumers and increase the security of supply of the EU's energy supply. It sets targets of at least a 40% reduction (set to rise to at least 55%) in greenhouse gas emissions and at least a 32% share of renewable energy from all energy consumed in the EU by 2030.

4.6 National Policy Context

4.6.1 The National Planning Framework - Project Ireland 2040 (Ireland 2018)

The National Planning Framework ('NPF') is a high-level strategic plan to shape the future growth and development of the country to 2040. It is focused on delivering 10 National Strategic Outcomes ('NSOs').

NSO 8 focuses on the '*Transition to a Low Carbon and Climate Resilient Society*' and recognises the need to harness both on-shore and off-shore potential from energy sources, including solar and deliver 40% of our electricity needs from renewable sources.

Transitioning to a low-carbon and climate-resilient society and achieving sustainable mobility are vital strategic outcomes identified in the NPF. This reflects the Government's 2014 National Policy Position on Climate Action and Low-Carbon Development, which establishes the fundamental national objective of achieving the transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050 [21].

The NPF states the objectives regarding renewable energy, including:

- New Renewable Electricity Support Scheme ('RESS') to support up to 4,500 megawatts of additional renewable electricity by 2030;
- Energy research funding to accelerate diversification away from fossil fuels to green energy, including wind, wave, solar, biomass, biofuels, biogas, and hydrogen; and,
- Full roll-out of the new Support Scheme for Renewable Heat.

Section 5.4 of the NPF, 'Planning and Investment to Support Rural Job Creation', notes that in meeting the challenge of transitioning to a low-carbon economy, the location of future national renewable energy generation will, for the most part, need to be accommodated on large tracts of land that are located in a rural setting, while also continuing to protect the integrity of the environment and respecting the needs of people who live in rural areas.

It is a National Policy Objective (NPO 55) to '*promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050*'.

4.6.2 Planning and Development Act 2024

The Planning and Development Act 2024 ('the Act') was signed into law on 17 October 2024.

The Act places increased emphasis on a plan-led system based on an integrated hierarchy of plan-making consisting of a National Planning Framework, regional spatial and economic strategies, and council development plans. Thus, the Act provides a decision-making

framework fit for the purpose of delivering on key infrastructure, including renewable energy projects.

It provides the potential to accelerate the delivery of renewable energy projects and cutting carbon emissions by advocating the acceleration the timeframes for making planning decision.

4.6.3 Climate Action Plan 2023

In 2023, the Government of Ireland released the Climate Action Plan 2023 - Changing Ireland for the Better, a plan which sets out a major programme of change. It outlines the current state of play across key sectors, including Electricity, Industry, Built Environment, Transport, Agriculture, Forestry and The Marine Environment and charts a course to achieve an ambitious net-zero emissions target by 2050 [22]. The plan commits to evaluating in detail the changes required to adopt such a goal in Ireland.

Decarbonising electricity is at the centre of the Climate Action Plan strategy, as this will also aid in the decarbonisation of other sectors such as transport, heating, and industry. The share of electricity from renewable energy increased from 7.2% to 36.4% between 2005 and 2021 [22]. Demand for electricity is forecast to increase by between 19% and 50% above existing capacity in the next decade, in line with economic forecasts. Ensuring we build renewable, rather than fossil fuel, generation capacity to help meet this demand is essential. It makes economic sense and also facilitates decarbonising our heating and transport through electrification. It is planned to increase the proportion of renewable electricity to up to 80% by 2030, and a target of 9 GW from solar by 2030 [22].

The renewables sector is very dynamic in nature, with technologies still rapidly evolving. Ensuring increased levels of renewable generation will require substantial new infrastructure, including wind and solar farms, grid reinforcement, storage developments, and interconnection:

‘Increasing the share of electricity demand generated from renewable sources to up to 80% where achievable and cost effective, without compromising security of electricity supply’.

As renewable generation is intermittent and often unpredictable, this creates new challenges for utilities, market participants, and policymakers. Intermittency also creates the need for a range of technology solutions, which include large-scale interconnection, storage and dispatchable capacity [22]. Up until recently, intermittency was a key obstacle to the expansion of renewable electricity, especially wind, and therefore, fossil fuels continue to be the dominant electricity-generating technology.

Specific actions for the electricity sector, with the aim of keeping Ireland on target for our 2030 decarbonisation ambitions, are set out in the Climate Action Plan, 2023. Specifically, the following actions:

Table 4-3: CAP Actions

Action No.	Description
Action EL/23/1	<i>‘Establish a taskforce to accelerate renewables’</i>
Action EL/23/2	<i>‘Publish the Renewable Electricity Spatial Policy Framework’</i>
Action EL/23/3	<i>‘Publish a roadmap for the development and implementation of Regional Renewable Electricity Strategies’</i>
Action EL/23/4	<i>‘Prepare new draft Wind Energy Development Guidelines for onshore renewables.’</i>
Action EL/23/5	<i>‘Complete analysis to update Shaping Our Electricity Future to accommodate 80% renewables and align with carbon budgets and sectoral emissions ceilings for electricity.’</i>

Action No.	Description
Action EL/23/6	<i>‘Ensure electricity generation grid connection policies and regular rounds of connection offers which facilitate timely connecting of renewables, provides a locational signal and supports flexible technologies.’</i>
Action EL/23/7	<i>‘Publish an annual report setting out identifiable public benefits delivered by the renewable energy sector, including employment and skills/ training metrics, local investment and community benefits.’</i>
Action EL/23/10	<i>‘Deliver onshore and offshore RESS auctions as per the annual RESS auction calendar.’</i>
Action EL/23/11	<i>‘Publish decision and mechanism for Premium Export Guarantee to facilitate larger on-site generation investments’</i>
Action EL/23/13	<i>‘Publish the Small-scale Generation high-level design and launch scheme to support the deployment of rooftop and ground-mounted solar.’</i>
Action EL/23/14	<i>‘Ensure that hybrid technology grid connections are facilitated and remaining barriers removed.’</i>
Action EL/23/16	<i>‘Publish updated Interconnection Policy to reflect Ireland’s increased climate and energy ambition, the revised EU TEN-E Regulation, Brexit challenges and the increased significance of hybrid interconnectors.’</i>
Action EL/23/17	<i>‘Following completion of DECC Interconnector Policy, CRU to update its Interconnection Policy.’</i>
Action EL/23/21	<i>‘Carry out further studies to identify the investments and upgrades needed to facilitate 80% renewable electricity annual share.’</i>
Action EL/23/22	<i>‘Publish a policy framework for electricity storage based on electricity system needs.’</i>
Action EL/23/23	<i>‘Review the regulatory treatment of storage, including licensing, charging and market incentives.’</i>

4.6.4 The Programme for Government – Our Shared Future

The Programme for Government – Our Shared Future includes a commitment to strengthen the policy framework to incentivise electricity storage.

Building on this, Climate Action Plan 2023 includes a commitment to *Publish a policy framework for electricity storage based on electricity system needs* - **Action EL/23/22 as outlined above.**

4.6.5 The White Paper ‘Ireland’s Transition to a Low Carbon Energy Future 2015-2030’

The White Paper sets out a vision and a framework to guide Irish energy policy between 2015 and 2030. It is a complete energy policy update, and its actions have been informed by the vision to transform Ireland into a low-carbon society and economy by 2050, with 2030 representing a significant milestone. This includes the reduction of GHG emissions from the energy sector by between 80% and 95% (compared to 1990 levels) by 2050 while ensuring that secure supplies of competitive and affordable energy remain available to our citizens and businesses.

Chapter 5 of the White Paper ‘Delivering Sustainable Energy: Efficiency, Renewables, Technology’ sets out an overview of current and planned policies to progressively reduce Ireland’s dependence on fossil fuels and support sustainability through energy efficiency, renewable energy, and related technologies [23].

Section 142 of Chapter 5. states:

‘Grid energy storage involves the storage of electrical energy on a large scale, transformed into other forms of energy, for optimum utilisation by the grid. A variety of technologies can be used, including pumped-storage hydroelectricity, compressed air storage, battery storage and thermal storage devices. Electrical energy is stored during times when production exceeds consumption, and this is returned to the grid when production falls below consumption. Grid energy storage can mitigate some of the grid-connection challenges posed by intermittent power plants, such as renewable electricity plants powered by wind, solar or tidal power, and can help to better manage the electricity system.’

In terms of Electricity Storage, section 161 of Chapter 5 states:

‘Electricity storage is expected to play an important role in facilitating the deployment of intermittent renewable energy technologies like wind, solar PV and ocean energy. The EU’s Energy Roadmap 2050 confirms that storage technologies remain critical and that future integration of RES-E will depend on increased storage capacity. Electricity storage can be deployed in a number of circumstances in Ireland, including at grid-scale and at consumer level.’

4.6.6 National Energy & Climate Plan (‘NECP’) 2021-2030

This 2019 National Energy and Climate Plan (‘NECP’) was prepared in accordance with Regulation (‘EU’) 2018/1999 on the Governance of the Energy Union and Climate Action to incorporate all planned policies and measures that were identified up to the end of 2019, and which collectively deliver a 30% reduction by 2030 in non-ETS greenhouse gas emissions (from 2005 levels).

It is an integrated document mandated by the European Union to each of its member states in order for the EU to meet its overall greenhouse gas emissions targets. The Energy and Climate Plan addresses all five dimensions of the EU Energy Union: decarbonisation, energy efficiency, energy security, internal energy markets and research, innovation, and competitiveness.

The plan establishes key measures to address the five dimensions of the EU Energy Union, including: By 2030, the Irish Government has now committed to:

- A 34.1% renewable energy target by 2030 under the NECP;
- Reduction of CO₂ emissions by 4.8% per annum from 2021- 2025 under the first carbon budget;
- Additional resources for 5,500MW of solar generation to support Ireland’s need for greater renewable electricity capacity and to accelerate the reduction of emissions;
- To achieve a 34% share of renewable energy in energy consumption by 2030; and,
- To increase electricity generated from renewable sources to 70%, indicative of up to 1.5GW of grid-scale solar energy.

In addition to reaching renewable energy and decarbonisation targets, Ireland is obligated to monitor the security of electricity supply within its territory over the medium to long term and is entitled to set and monitor the level of Security of Supply deemed appropriate for its own needs. Ireland also has the responsibility to comply with the requirements of the EU Target Model. In Ireland, the transmission system operator (‘TSO’) is EirGrid, and EirGrid is charged with reporting and advising on security of supply in electricity through adequate planning and operation of transmission capacity.

The Generation Capacity Statement 2022-2031, prepared by EirGrid, identified potential capacity deficits between 2022 to 2031. The deficits are expected to be the result of the

deteriorating availability of power plants in the short term; however, in the long term, deficits are expected to reduce as new capacity comes forward through Single Electricity Market ('SEM') capacity auctions. In addition, new electricity generation will be required to secure the transition to high levels of renewable electricity over the coming decades.

EirGrid have projected that all of Ireland will need upwards of 10 gigawatts ('GW') of electricity from clean sources, which will mean that renewable electricity will increasingly replace fossil fuels like coal and oil, but natural gas will still be used to generate electricity when wind and solar power are not available to meet the demand. EirGrid have projected that the amount of solar PV alone will grow linearly from 167MW to reach 1.67GW, reaching the renewable and electricity targets.

Therefore, the Proposed Development will be fully in line with these National Policies and commitments and is essential for achieving Ireland's National Renewable and Decarbonisation targets.

4.6.7 EirGrid Generation Capacity Statement 2022-2031

The Generation Capacity Statement ('GCS') is a way for EirGrid to signal future needs and requirements to the all-island energy market, as well as to policymakers and regulators who may have to react.

The GCS is published annually and allows the document to identify changing scenarios and allows time for developers, policy makers and regulators to respond. The ten-year outlook reflects the time required by the wider energy ecosystem to build the necessary infrastructure that can address identified problems.

GCS is a significant source of information for the SEM Capacity Auctions, which are run annually to meet electricity capacity needs for a specified year, typically four years later. These are known as "T-4" auctions, and the most recent one was run in 2022 to source capacity for September 2025 to September 2026. For Ireland, since 2016, EirGrid has warned via the GCS of an increasing tightness between supply and demand. There is no question that the current outlook, based on the best information available, is serious. It is likely that in the coming years, we will experience system alerts and will need to work proactively to mitigate the risk of more serious impacts.

This year's (2023) GCS predicts a challenging outlook for Ireland, with capacity deficits identified during the 10 years to 2031. In the short term, the deficits will increase due to the deteriorating availability of power plants, resulting in their unavailability ahead of intended retirement dates. In later years, the deficits are expected to reduce as new capacity comes forward through the SEM capacity auctions. EirGrid's analysis for Ireland and Northern Ireland shows that further new electricity generation will be required to secure the transition to high levels of renewable electricity over the coming decades. A balanced portfolio of new capacity is required, and this includes the need for new, cleaner gas-fired generation plant which are renewable gas-ready, especially at times when wind and solar generation are low. This balanced portfolio is also crucial to ensuring Ireland meets its carbon budgets between now and 2030 for the electricity sector, which positions the electricity sector to achieve the zero net carbon target by 2050. Furthermore, by 2030, there will be a significant new additional load from the heat and transport sectors as they are electrified, in line with government targets set out in the Climate Action Plan.

Policy and regulation actions are required to manage the shortfalls highlighted by the GCS through a combination of short-term measures and longer-term market-based enduring solutions. To address the challenge, the Commission for the Regulation of Utilities ('CRU'), incorporating some of the recommendations of EirGrid and in conjunction with the Department

of Environment, Climate and Communications (‘DECC’), has developed a programme of work actions that will be delivered over the coming years. These include:

- The delivery, through the all-island capacity auctions, of over 2,000 MW of enduring flexible gas-fired generation capacity, which is renewable gas ready, by 2030;
- Procurement of 650 MW of temporary emergency generation capacity to remain available until the necessary replacement capacity has been secured. This capacity only be called upon in the event of a shortfall in capacity and where alerts on the system are likely;
- Extending the operation, on a temporary basis, of older generators to delay the loss of up to 1,200MW of capacity, to allow time for the enduring measures to be implemented. This includes MONEYPOINT operating on coal/HFO UNTIL 2025 and Tarbert operating on HFO until the end of 2023. In Cork, Aghada is losing one of its generators in 2023 with a loss of 90MW; and,
- Actions to enhance the responsiveness of Demand Side Units and develop additional demand side capacity.

These temporary measures, if there are all fully implemented in time, help bring the adequacy position back to the standard set by the CRU. There are many risks associated with the deliverability of these measures and the CRU, Department of the Environment, Climate and Communications and EirGrid are all working closely to manage these.

The adequacy assessment of Ireland system shows an initial deficit position in all of the core scenarios and remains in deficit over the study horizon. The median demand scenario is a central scenario that EirGrid plans to. Taking this scenario as a reference, EirGrid observes significant capacity deficits in 2024 and 2025. These shortfalls are driven by a number of existing generation plant leaving the system and strong demand growth, which is forecast to be 180 MW/year up to 2025; this is 40 MW per year higher than the same forecast period in GCS 2021-2030. Across all scenarios, significant deficits exist for the remainder of the decade.

By 2026, EirGrid observes a forecast decrease in the deficit as new capacity units are expected to enter the system, but the deficit remains very significant. The benefit of this new capacity is somewhat tempered by the increasing demand (average of 90 MW/year in the median scenario between 2026-2031) and the impact of expected annual run hour limitations (ARHL) on some of the new capacity units. It should be noted that the new T-4 capacity auction will cover the period from October 2026 to September 2027, and this will run later in 2022. Further new capacity may come forward as part of this auction, which would further reduce the deficit. In 2027, the energisation of the Celtic Interconnector will reduce the deficit further. However, beyond 2028, the deficits increase each year to 2031 due to the increasing demand.

4.6.8 Delivering a Secure, Sustainable Electricity System (‘DS3’).

In response to binding National and European targets, EirGrid Group began a multi-year programme, “*Delivering a Secure, Sustainable Electricity System*” (‘DS3’). The aim of the DS3 Programme is to meet the challenges of operating the electricity system in a secure manner while achieving the 2020 renewable electricity targets.

EirGrid introduced a suite of 14 grid ancillary services, setting a fixed tariff for each, under their DS3 Programme. These are known as DS3 System Services, and this market has been up and running since May 2018 in Ireland. Battery technology is an excellent source of capability for a number of these services, particularly the faster acting frequency and reserve products.

4.7 Regional Policy Context

4.7.1 Regional Spatial and Economic Strategy 2020 ('RSES') for the Southern Region

The Southern Regional Assembly supports the implementation of the Government's Climate Action Plan 2019. The RSES identifies three priority areas for action to address climate change and to bring about a transition to a low-carbon economy. The three priority areas include:

1. Decarbonisation: To develop a Regional Decarbonisation Plan to provide a framework for action on decarbonisation across all sectors;
2. Resource Efficiency: To utilise the Earth's limited resources in a sustainable manner while minimising impacts on the environment; and,
3. Climate Resilience Aims: To reduce the vulnerability of the environment, society and economy to the current and future risks posed by climate change.

4.8 Local Context

4.8.1 Carlow County Development Plan 2022-2028

The policies and objectives contained in the Carlow County Development Plan ('the CDP') 2022-2028 set strategic planning initiatives for sustainable development, ensuring that future growth and development are for the long-term benefit of the county.

Chapter 7 of the CDP 2022-2028, 'Climate Action and Energy, outlines the approaches to and provides the policy context for climate change mitigation and adaptation in the County.

The aim 'To combat climate change and its impacts in the County by promoting and supporting policies and objectives which contribute towards a transition to a low carbon and climate resilient future, and which focus on reducing greenhouse gas emissions and energy demands through appropriate and effective climate mitigation and adaptation measures'.

Climate Action – Overarching Policies

CA P1: *Promote and support the implementation of European, national, regional, and local objectives for climate change adaptation and mitigation as detailed in the following documents and taking into account all other provisions of the Plan (including those relating to land-use planning, sustainable travel and transport, and flood risk management and drainage).*

CA P2: *Support the transition of the County to a competitive, low carbon, climate resilient and environmentally sustainable economy by 2050, by way of reducing greenhouse gases, increasing renewable energy, and improving energy efficiency.*

CA P6: *Encourage innovation and facilitate the development of pilot schemes that support climate change mitigation and adaptation measures.*

Renewable Energy – Policies

It is the policy of the Council to:

RE P1: *Encourage and facilitate the production of energy from renewable sources, such as from wind, solar, bioenergy, hydroelectricity, and geothermal, subject to compliance with proper planning and environmental considerations.*

RE P2: *Support the co-location of renewable energy technologies on a case-by-case basis subject to compliance with planning and environmental criteria.*

Renewable Energy – Objectives

It is an objective of the Council to:

RE O1: *Seek to achieve a minimum of 130MW of renewable electricity in the County by 2030, by enabling renewable energy developments, and through micro-generation including rooftop solar, wind, hydro-electric and bioenergy combined heat and power (CHP).*

Infrastructural Facilitators – Policies

It is the policy of the Council to:

IF P1: *Support the development, reinforcement, renewal, and expansion of key supporting infrastructure to facilitate renewable energy developments, subject to compliance with proper planning and environmental considerations.*

Solar Energy - Objectives

It is the policy of the Council to:

SE O1: *Increase the penetration of solar energy developments at appropriate locations subject to compliance with proper planning and environmental considerations.*

SE O2: *Promote the integration of solar energy into existing and planned developments.*

SE O3: *Investigate the feasibility of promoting solar energy developments on Council owned land and property and to seek the implementation of viable sustainable projects thereby contributing to the transition to a low carbon county.*

Energy Storage – Policies

It is the policy of the Council to:

ES P1: *Promote the use of efficient energy storage systems and infrastructure that support energy efficiency and reusable energy system optimisation, subject to compliance with proper planning and environmental considerations.*

4.9 Carlow Climate Change Adaptation Strategy 2019-2024

The Carlow Climate Change Adaptation Strategy guides the process of the Council's climate adaptation planning. It features a range of actions across key thematic areas, including Clean Energy.

4.10 Carlow County Renewable Energy Strategy 2021 ('RES')

The RES includes a comprehensive assessment and spatial evaluation of the County to identify the most suitable locations for renewable energy technologies, taking account of available natural resources, environmental considerations, impacts on local communities and quality of life. The RES provides a robust policy position for the consideration of renewable energy in land-use planning and will allow the County to maximise its contribution to achieving EU and national targets through the optimum use of natural resources.

The RES is underpinned by an agreed vision, as follows: *"To encourage and support the transition of Carlow to a sustainable county through community engagement, energy efficiency and the sustainable development of renewable energy, whilst providing environmental and economic benefit at a local and national level, and in accordance with all relevant planning and environmental considerations".*

5 DESCRIPTION OF THE PROPOSED DEVELOPMENT

5.1 110kV Substation

The proposed 110kV electrical substation in Friarstown, on a site of ca.1.7ha will consist of:

- 1 no. electrical substation compound and access road, palisade fencing and gates, measuring 100.75m x 126.75m;
- 1 no. electrical substation / IPP control building measuring 10.74m x 20.15m and 6.920m in height;
- 1 no. Eirgrid switch room building measuring 18m x 25m and 8.55m in height;
- 6 no. lightning protection monopoles measuring up to 18m in height;
- Associated electrical apparatus, plant, and equipment; overhead and underground electrical and communications cabling and ancillary works;
- Upgrading of existing access road;
- Temporary site construction compound; and
- All associated ancillary works above and below ground including landscaping.

CCTV

The on-site CCTV would be remotely monitored via a 24/7 operational team who would alert all relevant personnel in the event of a break-in or vandalism at the Site. The cameras will only be focused along the fence line and will not be focused on any residential properties.

Fencing

The switchyard will be enclosed in a palisade-type security fence. A perimeter fence which will be installed to provide security, restrict access, and be deer-proof.

Lighting

Emergency lighting will only occur as part of the Proposed Development.

5.1.1 110kV Grid Connection

The proposed 110kV UGC will be ca. 8km in length. The UGC will interconnect the Proposed 110kV substation to the existing 220kV ESB Kellistown substation.

The UGC will consist of:

- Three 160mm diameter HDPE power cable ducts;
- Two 125mm diameter HDPE communications duct; and,
- One 63mm diameter earth continuity duct to be installed in an excavated trench, typically 825mm wide by 1,315mm deep.

Variations on this design to adapt to bridge crossings, service crossings and watercourse crossings, etc. The power cable ducts will accommodate one power cables per duct. The communications duct will accommodate a fibre cable to allow communications between the Grangeford Solar Farm Substation and Kellistown 220kV substation. The inclusion one earth continuity conductor duct will also be required.

The 110kV UGC route will exit the proposed 110kV Substation and traverse in a southerly direction within the permitted development (PR 2360297) along existing internal access tracks and exit directly onto the R725. The UGC will then follow the R725 in an easterly direction for ca. 550m before turning onto the local road.

The UGC will continue in a southerly direction to the existing ESB 220kV Kellistown Substation. The cable will be installed in a cable trench as per industry standards, including ducting, fibre optic conductor, insulated earthing conductor where required and link boxes at some jointing locations. The ESB will ultimately be responsible for ensuring that the most appropriate connection option will be selected. This asset, together with the substation, will be owned and operated by the Independent Power Producer ('IPP').

Full details of the proposed cable route development are provided within the TLI Group Construction Methodology Report, which will be submitted in support of this application. This report outlines the summary of features along the UGC design route. The Proposed Site Layout is illustrated in Appendix B.

5.1.2 Drainage

Surface Water Drainage

A Sustainable urban Drainage System ('SuDS') approach is proposed for the surface water drainage. Rainfall runoff from the control building roof in the substation will be collected and piped to a rainwater harvesting tank for reuse in the onsite toilets. As water use for flushing toilets will be very low due to the infrequent use of the building, the majority of rainwater from the roof will drain into a proposed soak-away.

The Proposed Development access road shall be surfaced with a layer of permeable stone hardcore. This free-draining material will allow rainfall to permeate into the ground. A small proportion of the access roads on site will be surfaced in concrete. The surface water run-off from this area will drain freely into the surrounding free-draining areas, which will be constructed in hardcore stone. Rainfall in these areas will permeate through the stone into the ground as per the green field conditions.

Foul Water

There will be no foul drainage required. During the construction phase, portable toilets will be provided at the temporary Contractors' Compound for the duration of the construction phase only. All waste from the portable toilets will be removed and disposed of off-site by an approved contractor.

During the operational phase, the substation building will contain a sink and toilet. As the welfare facilities on-site will be infrequently used, it is proposed that foul water will be diverted into a below-ground holding tank. All wastes collected in this holding tank will be removed by a suitably licensed waste contractor as required.

No specific drainage infrastructure will be required for the Proposed Development.

5.1.3 Earthworks

Localised levelling works will be required for the development of the Site. The detailed design of the substation will determine the extent of the earthworks. However, the substation will comprise a concrete foundation for the transformers and electrical equipment, with the rest of the area filled with crushed rock.

It is estimated that the majority of the excavated materials will be reused within the Site for a berm creation that will extend from the Permitted Development to the perimeter of the proposed substation.

5.1.4 Site Access

Construction Phase

The Site is currently accessed via the existing commercial site entrance on the R725, which currently provides access for Nolan Farming, an ongoing farming business. This road runs west to east and is situated along the southern section of the Site. The existing entrance is

wide and well-serviced and will be readily capable of taking all the vehicle movements during the construction phase of the 110kV substation.

It should also be noted that the existing commercial entrance on the R725 was successfully used while hosting the World Ploughing Contest in 2006, accommodating large numbers of farming equipment and spectator vehicles.

A temporary construction access via the L6113 was authorised as part of the permitted PV development (Ref No. 23/60297). For this Proposed Application, it is proposed that the L6113 will also serve as an alternative egress.

This existing access and egress were granted as part of the permitted development (PR:23/60297). It should also be noted that Transport Infrastructure Ireland ('TII') or the municipal district engineer had no objection to the permitted development.

Construction Phase Egress

It is proposed that the construction vehicles will follow the previously permitted one-way system to traverse the Proposed Development, thereby ensuring all Construction Phase egress will be via an existing site access point on the L6113 that also provides access to Nolan Farming. This is situated along the eastern section of the Site. This proposed one-way system will negate the need for construction traffic to exit the Proposed Development directly onto the R725, as previously requested by the Council.

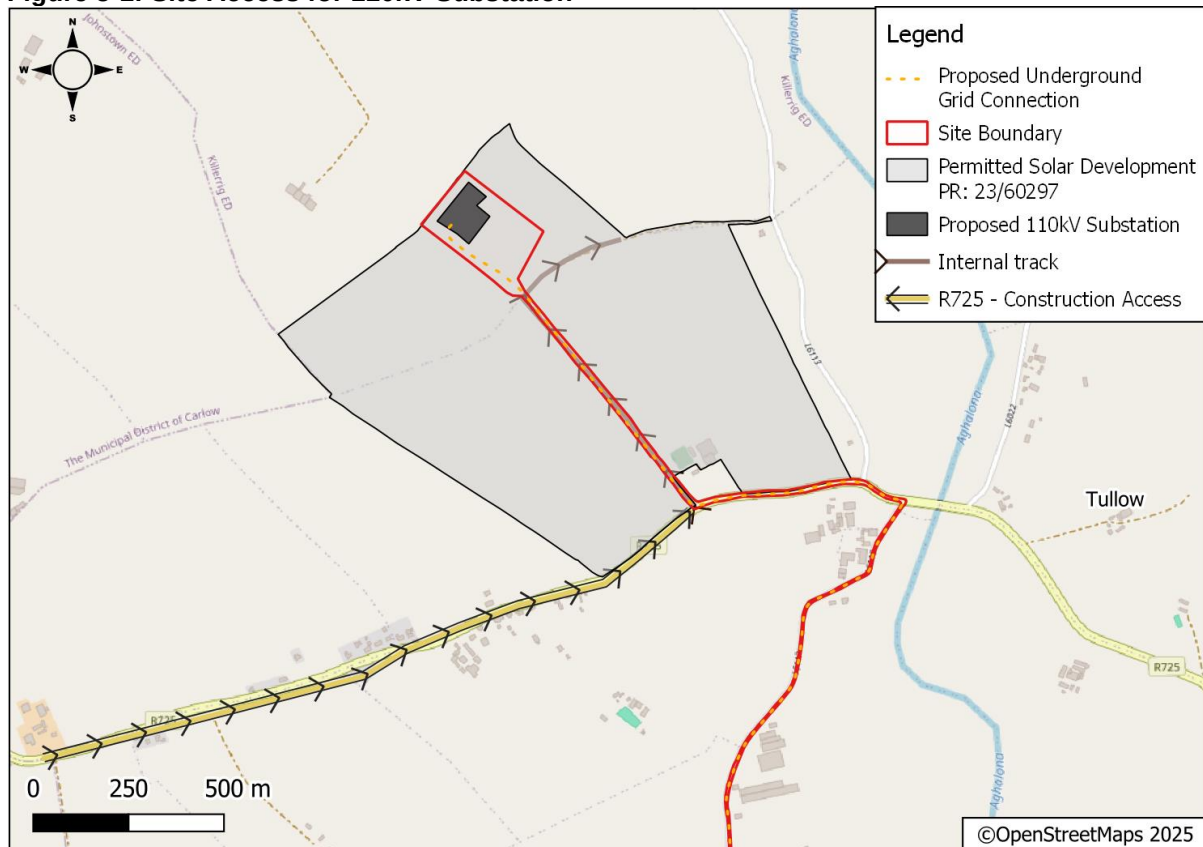
Internal Access

The Site will be accessed from the secure temporary compound in the Nolan farmyard via a network of pre-existing hardcore tracks extending to all areas of the Site and will be the principal means of all internal access. This was granted as part of the permitted PV development (PR 21/23; ABP Ref No. 309987-21).

Operational Phase Access and Egress

All Operational Phase access and egress will be via an existing commercial site entrance on the R725. This was granted as part of the permitted PV development (PR 21/23; ABP Ref No. 309987-21 and PR 23/60297).

Figure 5-1: Site Access for 110kV Substation



5.1.5 Sightlines

All site access and egress sightlines are in accordance with all sightline visibility requirements, as set out by the TII Design Manual for Roads and Bridges.

For vehicles entering the Site, the forward visibility in both directions is in excess of 150m, and for vehicles departing the Site, the forward visibility in both directions is in excess of 90m.

Both the R725 and L6113 provide adequate stopping Site distances and satisfy current standards; therefore, the Proposed Development will not contribute significantly to the risk to road users. TII or the municipal district engineer had no objection to these sightlines submitted as part of the permitted PV development (Ref No.23/60297).

5.1.6 Security Fencing / Hoarding Fencing

The Site will be secured by palisade fencing and gates. New double gates will be installed at the site entrance that will be kept locked and secured to prevent any unauthorised site access.

5.2 Specialist Ecological Input / Sensitive Design

Specialist ecological input was a key element of the design of the Proposed Development. This ensured that the design was extremely sensitive to valued ecological features that occur or may occur within the Site and the surrounding landscape. The key measures relevant for this Proposed Development are detailed below:

- The construction and maintenance of the Proposed Development will use the approved access as per Ref No.2360297 which utilises the existing farm access point. Options to access the Site have been carefully considered to ensure safe access to the Site;

- Buffers will be implemented and maintained throughout the lifecycle of the Proposed Development including:
 - A >100m buffer between all works and substation infrastructure and any designated European site;
 - A >500m buffer between all works and substation infrastructure and any EPA-designated watercourse;
 - A ca. 6m buffer between all works, substation infrastructure and existing hedgerows / treelines;
 - A ca. 5m setback from the perimeter fence and all infrastructure; and,
 - A minimum ca. 200m buffer between likely solar farm acoustic emission infrastructure and sensitive residential dwellings.

5.3 Construction Procedure

During the Construction Phase, the methods of working will comply with all relevant legislation and best practice guidelines in reducing the environmental adverse effects of the works. Although Construction Phase adverse effects are generally of a short-term duration and are localised in nature, the adverse effects will be reduced as far as practicable through compliance with current construction industry guidelines.

It is intended that there be a single construction programme for the Permitted Development and the Proposed Development.

A Construction Environmental Management Plan ('CEMP') will be prepared and submitted to the planning authority by the appointed contractor in advance of works commencing at the Site. The pCEMP will be a 'living document', and the final CEMP will be issued by the appointed contractor prior to construction commencing. The following guidance will be referred to and will be followed during the construction phase of the project to prevent environmental pollution that may occur:

- C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [24];
- C811 - Environmental Good Practice on Site (5th edition) [25];
- C648 - Control of Water Pollution from Linear Construction Projects: Technical Guidance [26];
- Guidance for the Treatment of Otters Prior to the Construction of National Road Schemes [27];
- All works will be undertaken in accordance with the Inland Fisheries Ireland ('IFI') *'Requirements for the Protection of Fisheries Habitat during Construction and Development'* [28];
- The recommendations included within National Roads Authority ('NRA') Guidelines for the crossing of watercourses [29]; and,
- NRA, 'Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' [30].

The following measures will be incorporated and adhered to in order to ensure that the proposed works do not result in any contravention of wildlife legislation:

- All activities will comply with all relevant legislation and best practice to reduce any potential environmental impacts. The measures detailed within this report will be fully adhered to;

- In advance of works, all Site personnel will receive an induction which will include reference to measures in relation to protected species and measures to prevent the spread of invasive species;
- Should construction works be required outside of daylight hours, the appointed project Ecological Clerk of Works ('ECoW') will be consulted as required; and,
- If protected or notable species are encountered during operations at the proposed development, the ECoW will be contacted for advice.

5.3.1 UGC Construction Methodology

The UGC ducts will be installed and the trench reinstated in accordance with the local roads authority within Carlow County Council, where installed on public roads and reinstated in accordance with the landowner's requirements where installed on private lands. The installation of the electrical cabling / fibre cable will be pulled through in some sections. Construction methodologies to be implemented and materials to be used will ensure that the UGC is installed in accordance with the requirements of the Council and private landowners.

Please refer to the outline construction methodology prepared by TLI and submitted as part of the overall submission.

5.3.1.1 Joint Bays and Associated Chambers

Joint Bays are to be provided approximately every 750-850 m along the UGC routes to facilitate the jointing of two lengths of UGC. 110kV Joint Bays are typically 6m x 2.5m x 2.05m pre-cast concrete structures installed below the finished ground level. Joint Bays will be located in the non-wheel bearing strip of roadways; however, given the narrow profile of local roads, this may not always be possible.

In association with Joint Bays, Communication Chambers are required at every joint bay location to facilitate communication links between the Proposed Development and the existing 220kV substation at Kellistown, Co. Carlow. Communication Chambers are located close to Joint Bays and will typically be pre-cast concrete structures with an access cover at the finished surface level.

Please refer to the outline construction methodology prepared by TLI and submitted as part of the overall submission for full details regarding Joint Bay and Associated Chambers construction and installation methodology.

5.3.2 Trenching Methodology

Trenches need to be excavated to install the uPVC power cable duct, communications cable duct and an earth continuity cable.

According to the TLI Group Outline Construction Methodology Report, the methodology for trenching will be as follows:

- *The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the planning application and accompanying reports and as required by conditions where relevant.*
- *All existing underground services shall be identified on site prior to the commencement of construction works.*
- *At watercourse crossings, the contractor will be required to adhere to the environmental control measures outlined within the planning application and accompanying reports, the detailed Construction Environmental Management Plan (CEMP);*

- *Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Irish Water specifications.;*
- *Traffic management measures will be implemented in accordance with those included in the Traffic Management Report, and a detailed Traffic Management Plan;*
- *The excavated trench will be a minimum width of 325mm and approximately 1315mm deep both within the public road network and within private lands;*
- *•Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features. All stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECoW);*
- *•Excavated material shall be employed to backfill the trench where appropriate and any surplus material will be transported off site and disposed at a fully authorised soil recovery site;*
- *Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement.*
- *The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;*
- *Where required, grass will be reinstated by either seeding or by replacing with grass turves;*
- *No more than a 100-metre section of trench will be opened at any one time. The second 100 metres will only be excavated once most reinstatement has been completed on the first;*
- *The excavation, installation and reinstatement process will take on average of 1 no. day to complete a 100m section;*
- *Where the cable is being installed in a roadway, temporary reinstatement may be provided to allow larger sections of road to be permanently reinstated together;*
- *Works will only be conducted in normal working hours of Monday to Friday 08:00 to 20:00 and Saturday 08:00 to 18:00, with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency; and,*
- *Following the installation of ducting, pulling the cable will take approximately 1 no. day between each joint bay, with the jointing of cables taking approximately 1 week per joint bay location.*

5.3.3 Horizontal Directional Drilling

The proposed cable route will require three Horizontal Directional Drilling ('HDD') crossings for Bridges 1,2,3. Where the cable route intersects with existing watercourses, a detailed construction method statement will be prepared by the Contractor before the commencement of construction and is to be approved by the relevant environmental agency.

No in-river works will be required during the construction of the Proposed Development. As part of the UGC, the Aghalona River, Roscat River and Burren River will be crossed by the Proposed Development. The crossing will be carried out using HDD. This method will drill

beneath the watercourses and will avoid any disturbance to these streams. The methods used for the HDD will involve:

- *A works area of circa 40m² for the HDD entry side, and circa 20m² on the HDD exit side, will be required for the HDD equipment and vehicles. These areas will be fenced off during the HDD implementation;*
- *The drilling rig and fluid handling units will be located on the entry side and will be appropriately banded using sandbags, which will contain any fluid spills and stormwater runoff;*
- *Entry and exit pits (approximately 2m (w) x 3m (L) x 1m deep) will be excavated using an excavator, and the excavated material will be temporarily stored within the works area and used for reinstatement or disposed of to a licensed facility;*
- *The HDD pilot bore will be undertaken using a wireline guidance system. Assembly will be set up by the drilling team and steering engineer;*
- *The pilot bore will be drilled to the pre-determined profile and alignment under the watercourse crossings;*
- *The steering engineer and drill team will monitor the drilling works to ensure that modelled stresses and pressures are not exceeded;*
- *The drilled cuttings will be flushed back by drilling fluid to the entry and exit pits and re-cycled for reuse;*
- *Once the first pilot hole has been completed a hole-opener or back reamer will be fitted in the exit side which will then be pulled back to the entry side as part of the pre-reaming / hole opening process to enlarge the hole to the correct size;*
- *When the pre-reaming / hole opening / hole cleaning has been completed, a reamer of a slightly smaller diameter than the final cut will be installed on the drill string to which the ducts will be attached for installation;*
- *The drilling fluid will be disposed of at a licensed facility;*
- *The ducts will be cleaned and proven and their installed location surveyed;*
- *The entry and exit pits will be reinstated to the specification of ESB Networks and any requirements of Carlow County Council; and,*
- *A joint bay / transition chamber / transition coupler will be installed on either side of the road following the horizontal directional drilling as per ESB requirements.*

5.3.4 Culvert Crossings

All crossings will be culverted, and it has been confirmed that there is sufficient cover within the local road to accommodate the UGC ducting. The installation will be at a minimum depth cover of 450mm to accommodate the cable ducts, as per the ESNB specifications. The ESB code of practice for crossing bridges will be followed during trenching and cabling works. Also, the permanent reinstatement of the road will be carried out to the specifications of the Local Authority.

5.3.5 Road Opening Licences

The proposed UGC will require a road opening licence under Section 254 of the Planning and Development Act 2000-2015 from Carlow County Council. A Traffic Management Plan ('TMP') will be agreed upon with Carlow County Council before the commencement of the development.

In the event that planning consent is granted for the Proposed Development, the TMP will be updated prior to commencement of development to address the requirements of any relevant planning conditions, including any additional mitigation measures, which are conditioned and will be submitted to the planning authority for written approval.

The TMP will outline the location of traffic management signage, together with the location of any necessary road closures and the routing of appropriate diversions. Where diversions are required, these will be agreed with Carlow County Council in advance of the preparation of the TMP.

5.3.6 Hours of Work

Working hours will generally be restricted to between 08:00 until 20:00 hours Monday to Friday inclusive and between 08:00 and 18:00 hours on Saturdays. Construction work will not be permitted on Sundays, public holidays or at night-time except where safety concerns necessitate it or if agreed in advance with the Planning Authority.

5.3.7 Temporary Construction Compound

Given the overall Development will be constructed as a single construction project, the secure construction compound will be set up in the existing farmyard at Grangeford as part of the Permitted Development. This was approved by Carlow County Council as part of the Permitted Development.

All materials for the construction of the Proposed Development will be deployed and stored within the temporary construction compound located in the Nolan farmyard. Equipment and machinery will be stored in an existing lockable agricultural shed, and bunded fuel stores will also be available.

Nolan's Farming Tillage Business provides a concreted area with a wide sweep, and it will make an ideal delivery area where materials for the construction of the solar development can be deployed and stored.

All equipment and materials unloaded in the construction compound will be distributed throughout the site using smaller machines, such as bobcats, via a network of pre-existing hardcore tracks extending to all areas of the Site that will serve to provide internal access.

The Proposed Site Compound and Welfare area will be erected on existing hardstanding only and it will be located within the existing farmyard that is currently utilised for Nolan Farming. No earthworks or sub-surface disturbance will occur as part of these proposed facilities.

5.3.8 Waste Management – Construction

- All excavated materials within the Site will be reused onsite, where possible. Excavated material from the grid route along the public road shall be employed to backfill the trench where appropriate and any surplus material will be transported off-site and disposed of at a fully authorised soil recovery site;
- Waste materials will be collected and stored in suitable receptacles before they are taken offsite;
- Waste materials will not be allowed to accumulate because of the fire / vermin risk; and,
- All wastes will be appropriately segregated with the objective of maximising the level of recycling.

To ensure the efficient management of the construction works, a Temporary Construction Compound will be set up for the duration of the construction works. Sewage will be chemically treated and removed off-site by a licensed contractor to a licensed disposal facility.

5.3.9 Monitoring Works.

An ECoW will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works to ensure that they are completed in line with the measures detailed within this ER, along with the NIS and CEMP, and all wildlife legislation.

The ECoW will also either deliver or provide the resident engineer with sufficient environmental information to deliver a Site induction to all personnel working onsite.

5.4 Operational Procedures

Once operational, significant maintenance works will not be required. The Proposed Development will be an unmanned facility, which will be remotely monitored by way of CCTV. Any fault flagged on the control system will be inspected by maintenance personnel or dealt with remotely if possible. All systems onsite will be automated, with remote access provided to the control building.

The Proposed Development will require as low as one maintenance visit per year to undertake routine, non-intrusive maintenance tasks such as Site inspection, cable and power plant checks and servicing, cleaning of panels, hedgerow maintenance, etc. Only small vans / jeeps will be used to access the Site.

The transformer units will contain oil that will be banded. Under normal operation, this oil is maintained within the system, and no emissions will occur. To prevent unforeseen impact on the environment, the transformer and step-up transformer units will be monitored and maintained.

5.4.1 Waste Management

There will be no operational waste associated with the Proposed Development with the exception of the foul wastewater that will need to be removed periodically from the storage tank by a licensed contractor. The decommissioning plan prepared as part of the overall planning application addresses all aspects of waste management during the operational phase.

5.5 Decommissioning

The operation of the facility will be for approximately 40 years, as determined by the grant of planning. At this time, a decision will be made as to whether the permitted solar farm and battery storage facility that will be connected to the Proposed Development will be decommissioned. If the decision is taken to decommission the Permitted Development, then the Proposed Development will also be decommissioned, and the Site will return to agricultural usage. However, if the solar farm were to be repowered, then the Proposed Development would remain in use.

It is intended that there will be a single decommissioning programme for the Permitted Developments and the Proposed Development.

The decommissioning tasks and removal of all solar farm components from the leased land will be completed within twelve months of the cessation of electricity generation by the solar farm, and the Site shall be reinstated to its former use.

At the end of the Proposed Development's lifetime, the substations will be completely dismantled (including underground electrical interconnection and distribution cables) and the Site will be restored to its preconstruction state.

The decommissioning plan addresses all aspects of waste management post-Operational Phase. The Applicant will re-use or recycle as many of the substation's components as reasonably practicable. All residual waste will be removed by a licensed contractor and transported to a licensed waste facility.

Given the nature of the Proposed Development and the small amount of infrastructure required, it is considered highly unlikely that any adverse effects would occur as a result of decommissioning works. However, decommissioning works will have to be carried out in accordance with best practices and any legislation applicable at the time of decommissioning.

Full details of the decommissioning works are included within the 'Decommissioning Plan' submitted as part of the overall planning application.

6 BIODIVERSITY

This chapter of the report provides a description and assessment of the potential, likely and significant impacts of the Proposed Development on ecology.

A detailed Ecological Appraisal of the Proposed Development has been carried out by a team of fully qualified and experienced ecologists. In addition, an assessment on potential impacts on European sites was also undertaken and is presented in the Stage 2: Appropriate Assessment – Natura Impact Statement, which should be read in conjunction with this chapter.

6.1 Methodology

6.1.1 Legislation / Policy Context

Within Ireland, a number of sites of international or national importance to nature conservation, as well as many species of animal and plants are afforded some degree of legal protection, for details see Box 1 below.

A study of biodiversity-related planning policy at the national and local level has been undertaken for the Site and locality to highlight any potential conflicts with the relevant legislation and guidance documents as outlined in Box 1.

Box 1	Designated Wildlife Sites and Protected and Otherwise Notable Habitats and Species
The National Park and Wildlife Service ('NPWS') notifies sites in Ireland that are of international or national importance for nature conservation (although some sites that are of national importance for certain species have not been so designated). Internationally important sites may also be designated as: • Special Areas of Conservation ('SACs') and Candidate Special Area of Conservation ('cSACs'): the legal requirements relating to the designation and management of SACs in Ireland are set out in the European Communities (Birds and Natural Habitats) Regulations 2011-2021 (S.I. No. 477/2011); • Special Protection Areas ('SPAs') and candidate Special Protected Areas ('cSPAs'): strictly protected sites classified in accordance with Article 4 of the EC Directive on the Conservation of Wild Birds (2009/147/EC), also known as the Birds Directive; and, • Ramsar sites: wetlands of international importance designated under the Ramsar Convention, to which Ireland is a signatory. Other statutory site designations relating to nature conservation are: • National Heritage Areas ('NHA'): these represent examples of some of the most important natural and semi-natural terrestrial and coastal habitats in the country and are afforded protection under the Wildlife (Amendment) Act 2000. NHAs are legally protected from damage and receive protection from the date they are formally proposed for designation; and, • Proposed Natural Heritage Areas ('pNHAs'): these sites are not afforded the same protection as NHAs. These sites are proposed by the NPWS but are not statutorily proposed or designated. Prior to statutory designation these are subject to a very limited legal protection. They are, however, sites of significance for wildlife and habitats and are important for the purposes of this Biodiversity Chapter. Legally protected species Many species of animal and plant receive some degree of legal protection. For the purposes of this study, legal protection refers to: • Species included in the Wildlife (Amendment) Act 2000, excluding species that are only protected in relation to their sale, reflecting the fact that the site disposal will not include any proposals relating to the sale of species; and, • Species afforded protection under the Flora (Protection) Order 2022 (S.I.No.235/2022). Other notable habitat/species categories • Biodiversity Action Plan ('BAP') species: those targeted in local or national BAPs as being of particular conservation concern (priority species). • Red and Amber List birds: those listed as being of high or medium conservation concern as listed by Birdwatch Ireland on the Birds of Conservation Concern in Ireland 2020-2026 [31]. • Other Irish Red Data Book species [32] and Nationally/Regionally/Locally Notable species where appropriate.	

6.1.2 National Planning Context

6.1.2.1 Project Ireland 2040

Project Ireland 2040 was launched by the Government in February 2018 [15] and incorporates two policy documents - the National Planning Framework and the National Development Plan.

6.1.2.2 National Planning Framework

Under the biodiversity section “Project Ireland 2040 National Planning Framework”, the National Policy Objective 59 is to:

‘Enhance the conservation status and improve the management of protected areas and protected species by:

- Implementing relevant EU Directives to protect Ireland’s environment and wildlife;
- Integrating policies and objectives for the protection and restoration of biodiversity in statutory development plans;
- Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites; and,
- Continued research, survey programmes and monitoring of habitats and species.’

The National Policy Objective 60 in the same document is to:

‘Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance.’

Updated Draft Revised National Planning Framework (November 2024)

Following a decision of the Government in June 2023, the preparation of a revised National Planning Framework commenced to take account of changes that have occurred since it was published in 2018 and to build on the framework that is in place. Public consultation took place from 10th July 2024 to 12th September 2024, following which the Government agreed to progress and publish a draft schedule of amendments to the First Revision to the National Planning Framework, in November 2024. Finalisation will be subject to environmental assessments.

Objectives under the ‘Strategic Planning for Biodiversity’ section of this draft framework include the following:

National Policy Objective 84

‘In line with the National Biodiversity Action Plan and European Union Nature Restoration Law, and best available scientific information, regional and local planning authorities shall support the preparation and implementation of the National Restoration Plan.’

National Policy Objective 85

‘In line with the National Biodiversity Action Plan; the conservation, enhancement, mitigation and restoration of biodiversity is to be supported by:

- *Integrating policies and objectives for the protection and restoration of biodiversity, including the principles of the mitigation hierarchy of - avoid, minimise, restore and offset - of potential biodiversity impacts, in statutory land-use plan.*
- *Retention of existing habitats which are currently important for maintaining biodiversity (at local/regional/national/international levels), in the first instance, is preferable to replacement/restoration of habitats, in the interests of ensuring continuity of habitat provision and reduction of associated risks and costs.’*

National Policy Objective 86

‘In line with the objectives of the National Biodiversity Action Plan, planning authorities should seek to address no net loss of biodiversity within their plan making functions.’

National Policy Objective 87

‘Enhance the conservation status and improve the management of protected areas and protected species by:

- Implementing relevant EU Directives to protect Ireland’s environment and wildlife and support the objectives of the National Biodiversity Action Plan;*
- Developing and utilising licensing and consent systems to facilitate sustainable activities within Natura 2000 sites; and,*
- Continued research, survey programmes and monitoring of habitats and species.’*

The National Development Plan 2021-2030

The National Planning Framework and the National Development Plan will continue to align and form a single vision for Ireland under Project Ireland 2040.

The National Development Plan [33] also lists the following items as strategic investment priorities in relation to National Heritage and biodiversity:

- ‘Implementation of the current and future National Biodiversity Action Plan, delivery of National Parks and Wildlife Service Farm Plans and LIFE projects, enhanced wildlife crime investigation capacity and identification and delivery conservation measures at designated sites as identified in the Prioritised Action Framework for Ireland (2021-2027).’*
- ‘Investment in nature and biodiversity, to improve the quality of natural habitats and support native plants and animals, including those under threat, and to bolster broader societal wellness and sustainability goals.’*
- ‘Future-proofing obligations under the Biodiversity Strategy 2030, including potential national designations and the preparation and delivery of a National Restoration Plan.’*

6.1.2.3 Ireland’s 4th National Biodiversity Action Plan 2023-2030

Ireland’s 4th National Biodiversity Action Plan (‘NBAP’) sets out a number of strategic objectives that lay out a clear framework for Ireland’s approach to biodiversity and demonstrate Ireland’s commitment to protecting our biodiversity and halting the decline. The following objective within the current NBAP was considered relevant to the Proposed Development and this report:

Objective 2 of the NBAP aims to:

‘Meet urgent conservation and restoration needs,’

A number of targeted outcomes are listed under this objective which are considered relevant to the Proposed Development. These include the following:

Outcome 2B:

‘Biodiversity and ecosystem services in the wider countryside are conserved.’

Outcome 2C:

‘All freshwater bodies are of at least ‘Good Ecological Status’ as defined under the EU Water Framework Directive.’

Outcome 2G:

‘Invasive alien species (IAS) are controlled and managed on an all-island basis to reduce the harmful impact they have on biodiversity and measures are undertaken to tackle the introduction and spread of new IAS to the environment.’

Objective 3 of the NBAP is to:

‘Secure Nature’s Contribution to People.’

Under Objective 3, the following targeted outcome is considered relevant to the Proposed Development:

Outcome 3A:

‘Ireland’s natural heritage and biocultural diversity is recognised, valued, enhanced and promoted in policy and practice.’

6.1.3 Regional Planning Context

6.1.3.1 Eastern & Midland Regional Spatial and Economic Strategy 2019-2031

The Eastern & Midland Regional Spatial and Economic Strategy 2019-2031 (‘RSES’) [34] recognises the need to conserve and enhance biodiversity through co-ordinated spatial planning in the eastern and midland region.

One of the guiding principles of this document relating to the Proposed Development is to:

‘Explore opportunities for biodiversity enhancement to improve ecological connectivity as part of the strategic re-intensification of urban infill and brownfield sites.’

Under the biodiversity section, the following regional policy objectives relative to the Proposed Development are listed:

RPO 7.16

‘Support the implementation of the Habitats Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans.’

RPO 7.17

‘Facilitate cross boundary co-ordination between local authorities and the relevant agencies in the Region to provide clear governance arrangements and coordination mechanisms to support the development of ecological networks and enhanced connectivity between protected sites whilst also addressing the need for management of alien invasive species and the conservation of native species.’

RPO 10.6

“Delivery and phasing of services shall be subject to the required appraisal, planning and environmental assessment processes and shall avoid adverse impacts on the integrity of the Natura 2000 network.”

6.1.4 Local Planning Context

6.1.4.1 Carlow County Development Plan 2022-2028

Natural and built Heritage

The Carlow County Development Plan 2022-2028 [35] contains a number of policies which relate directly to the protection of natural heritage in the context of proposed developments.

The overarching aim is to: *To protect, conserve, manage and enhance the natural and built heritage features of the County, to ensure the survival of their intrinsic value for future generations and to ensure they contribute to the future sustainable development of the County.*

General: Natural Heritage - Policies

NH P1

‘Protect, manage, and enhance the natural heritage, biodiversity, landscape, and environment of County Carlow in recognition of its importance as a non-renewable resource, a unique identifier, and as a natural resource asset.’

NH P2

‘Ensure, as far as is practicable, that development does not adversely impact on wildlife habitats and species, and that biodiversity is conserved for the benefit of future generations in the interests of sustainability. This will include moving towards no net loss of biodiversity from plans adopted by and projects granted permission/authorised by the Council.’

NH P3

‘Support and co-operate with statutory authorities such as the National Parks and Wildlife Service (‘NPWS’) and others on measures to manage designated nature conservation sites in order to achieve their conservation objectives. Specific regard shall be had to conservation objectives and conservation management plans where they exist for design.’

NH P5

‘Recognise that nature conservation is not just confined to designated sites and acknowledge the need to protect non-designated biodiversity, habitats and species not otherwise protected by legislation.’

NH P9

‘To promote the carrying out of ecological/habitat assessments to inform the layout and design of development proposals and ensure they integrate the protection and enhancement of biodiversity and landscape features wherever possible, by minimising adverse impacts on existing habitats (whether designated or not) and by including mitigation and/or compensation measures, as appropriate.’

General Natural Heritage - Objectives

It is an objective of the Council to:

NH P1

‘Implement relevant actions from the National Biodiversity Action Plan 2017-2021 (and any superseding plan) and to prepare a County Heritage Plan and Biodiversity Action Plan during the lifetime of this County Development Plan in accordance with RPO 126 in the RSES, to ensure the protection and appreciation of heritage and nature at local level including recognition of rich biodiversity of designation of existing special areas of conservation i.e. Blackstairs Mountains, Slaney River Valley and River Barrow and River Nore SAC.’

Natura 2000 Sites - Policies

It is the policy of the Council to:

NS P1

‘Support the conservation and enhancement of Natura 2000 Sites, and to protect the Natura 2000 network from any plans and projects that are likely to have a significant

effect on the coherence or integrity of a Natura 2000 Site, in accordance with relevant EU Environmental Directives and applicable National Legislation, Policies, Plans and Guidelines.'

NS P2

'Screening for Appropriate Assessment and if required Appropriate Assessment is undertaken for all plans to be adopted and projects to be granted permission/authorised by the Council. Where likely significant effects have been identified in respect of any plan or project not directly connected with or necessary to the management of a Natura 2000 site, either individually or in combination with other plans or projects, ensure appropriate assessment, in accordance with Article 6(3) of the Habitats Directive. The Council shall only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site concerned, unless the plan or project is subject to the provisions of Article 6(4) of the Habitats Directive.'

NS P3

'Consider impacts within a plan or project's zone of influence, which may include Natura 2000 sites outside the County, when assessing whether a plan or project is likely to have significant effects on Natura 2000 sites.'

NS P4

'Maintain or restore the favourable conservation status of County's Natura 2000 sites qualifying interest habitats and species.'

Natura 2000 Sites – Objectives

It is an objective of the Council to:

NS O1

'Strictly protect areas designated or proposed to be designated as Natura 2000 sites, including any areas that may be proposed for designation or designated during the period of this Plan.'

Non-designated areas and habitats and species - Policies

It is the policy of the Council to:

ND P1

'Conserve the existing flora, fauna, and wildlife habitats in the County, including rare and threatened plant, animal, and bird species, through the preservation of ecological corridors and ecological networks.'

ND P2

'Ensure that development does not have a significant adverse effect on rare and threatened species, their breeding places, resting places, habitat, or environment, as applicable, including those protected under the Wildlife Acts 1976 to 2021, the Birds Directive (2009/147/EC), the Habitats Directive (92/43/EEC) and including plant species listed on the Flora (Protection) Order 2015 (S.I. No. 356 of 2015).'

ND P3

'Require the submission of an Ecological Impact Assessment, where deemed necessary, for any development proposal likely to have a significant impact on existing flora, fauna, and wildlife habitats, including rare and threatened plant, animal, and bird species.'

ND P4

‘Ensure that, where evidence exists of species that are protected under the Wildlife Act 1976 (as amended), the Bird Directive 1979, and the Habitats Directive 1992, appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment. In the event of a Proposed Development impact on a site known to be a breeding or resting site of species listed in the Habitats Regulations or the Wildlife Act 1976 (as amended) a derogation licence, issued by the Department of Housing, Local Government and Heritage, may be required.’

ND P5

‘Consult with the National Parks and Wildlife Service (NPWS) and take account of any licensing requirements when undertaking, approving, and authorising development which is likely to affect plant, animal or bird species protected by law.’

ND P6

‘Ensure that the management of the Council’s open spaces and parks is pollinator-friendly and provides more opportunities for biodiversity, supporting the objectives of the National Pollinator Plan 2021-2025. Where it is used, herbicide should be certified and applied as per the manufacturer’s instructions.’

ND P7

‘Support the implementation of the All-Ireland Pollinator Plan 2021-2025 and to incorporate actions as appropriate into a Biodiversity Plan for County Carlow providing more opportunities for biodiversity in accordance with RPO 128.’

ND P8

‘That biodiversity data generated during the lifetime of this Development Plan for the preparation of environmental assessment reports, shall be made available to the National Biodiversity Data Centre (NBDC).’

Woodland, Trees, and Hedgerows - Policies

It is the policy of the Council to:

WTP1

‘Protect and manage existing woodlands, trees and hedgerow which are of amenity or biodiversity value and/or contribute to landscape character and ensure that proper provision is made for their consideration, protection and management when undertaking, approving, or authorising development.’

WTP2

‘Ensure that hedgerow removal to facilitate development is kept to an absolute minimum and, where unavoidable, a requirement for mitigation planting will be required comprising a hedge of similar length and species composition to the original, established as close as is practicable to the original and where possible linking in to existing adjacent hedges. Native plants of a local provenance should be used for any such planting.’

WTP3

‘Adhere to the provisions of the Wildlife Act 1976 (as amended) in prohibiting the cutting of hedges during the bird nesting season (1st March to 31st August), except in certain legally defined circumstances.’

WTP4

‘Encourage the protection of historic hedgerows or significant hedgerows which serve to link habitat areas to each other and the surrounding countryside.’

WTP5

‘Recognise the biodiversity and archaeological importance of townland boundaries, including hedgerows, and promote their protection and retention.’

WTP6

‘Protect individual or groups of trees which are important for environmental, recreational, historical, biodiversity and/or aesthetic reasons or by reason of contribution to sense of place, and to discourage the felling of mature trees to facilitate development.’

WTP7

‘To contribute towards the protection where possible of the trees which are considered to be an important component of demesne landscapes.’

WTP8

‘Ensure a Tree Management Plan is provided so as existing tree planting is adequately protected during development and incorporated into the layout and design of new developments.’

Inland Waters and Riparian Zones - Policies

It is the policy of the Council to:

IWP1

‘Protect the biodiversity of rivers, streams, and other watercourses, to maintain them in an open state, to discourage culverting or realignment, and where possible, uncover existing culverts and restore the watercourses to acceptable ecological standards and for the passage of fish.’

IWP2

‘Ensure that the County’s watercourses are retained for their biodiversity and flood protection values and to conserve and enhance where possible, the wildlife habitats of the County’s rivers, streams, and riparian zones, including those which occur outside of designated areas, in order to provide a network of habitats and biodiversity corridors throughout the County.’

IWP3

‘Control the encroachment of development on watercourses and riparian zones and provide for protection measures to watercourses and their banks, including but not limited to: the prevention of pollution of the watercourse, the protection of the riverbank from erosion, the retention and/or provision of wildlife corridors and the protection from light spill in sensitive locations, including during construction of permitted development’

IWP4

‘Require the submission of an Ecological Impact Assessment, where deemed necessary (and where necessary an Appropriate Assessment where in relation to Natura 2000 sites), including bat and otter surveys, for development proposals along rivers, streams and canal corridors and areas of ecological importance

IWP5

‘Maintain a biodiversity protection (buffer) zone of not less than 10 metres from the top bank of all watercourses in the County, with the full extent of the protection zone to be

determined on a case-by-case basis by the Planning Authority, based on site specific characteristics and sensitivities and consultation with Inland Fisheries Ireland.'

IWP7

'Require that runoff from a development area will not result in deterioration of downstream watercourses or habitats, and that pollution generated by a development is treated within the developed area prior to discharge to local watercourses'

IWP9

'Ensure that development proposals do not adversely affect groundwater resources and groundwater dependent habitats and species.'

6.1.5 Desk Based Studies

The following literature sources were consulted as part of this desktop study:

- Review of aerial maps of the Site and surrounding area;
- The National Parks and Wildlife Service ('NPWS') website was consulted with regard to the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment [36];
- The Carlow County Council Planning Portal to obtain details about existing / proposed developments in the vicinity of the Site [37];
- The National Biodiversity Data Centre ('NBDC') website was consulted with regard to species distributions [38]; and,
- The EPA Maps website was consulted to obtain details about watercourses in the vicinity of the Site [39].

6.1.6 Field Survey

A Site walkover was undertaken on the 17th May 2024, by a suitably qualified and experienced MOR Environmental ecologist, to assess the extent and the quality of habitats present on the Site and to identify any potential ecological receptors associated with the European sites. A follow up survey was completed on 29th January 2025.

These surveys aimed to assess the extent and quality of habitats present on the Site and to identify any potential ecological receptors. All the surveys were undertaken using the Fossitt's Heritage Councils – 'A Guide to Habitats in Ireland' [40] and were conducted in line with the Heritage Council's 'Best Practice Guidance for Habitat Survey & Mapping' [41]. This is the standard habitat classification system used in Ireland and includes both a desk-based and field-based assessment.

The assessment was extended to also identify the potential for these habitats to support other features of nature conservation importance, such as species afforded legal protection under either Irish or European legislation (see Box 1).

6.1.6.1 Protected / Notable Species

The methodologies used to establish the presence / potential presence of faunal species are summarised below. These relate to those species / biological taxa that the desk study and habitat types present indicated could occur on the Site.

Flora

The Site was assessed for the presence of notable / protected flora species in accordance with the following:

- Flora (Protection) Order 2022 (S.I. No. 235/2022); and,

- Ireland Red List No. 10: Vascular Plants [42].

Amphibians

The Site was assessed for its potential to provide sheltering, foraging and breeding habitat for amphibians. These included water bodies suitable for egg-laying and terrestrial habitats comprising open areas with mixed-height vegetation, such as heathland, rough grassland, open scrub or water body margins. Suitable well-drained and frost-free areas are needed to enable amphibians to survive the winter.

The survey was undertaken in line with the NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [43].

Otter

The habitat survey was extended to investigate and examine areas where otter might occur by noting any evidence of otter observed. Evidence of otter searched for included:

- Holts (features log piles, caves, and cavities);
- Slides (flattered areas of mud or vegetation);
- Paw prints;
- Evidence of foraging (usually in the form of feeding remains such as fish scales and shellfish); and,
- Spraints.

The field survey of the Site was conducted in line with the following relevant guidance for otter:

- Scottish Natural Heritage ('SNH'), '*Technical Advice Note #2: Otter Surveys*' [44];
- DoAHG, 'National Otter Survey of Ireland 2010 / 12' [45]; and,
- NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [43].

Badger

The survey aimed to identify and examine areas where badgers (*Meles meles*) might occur by noting any evidence of badger activity. This included:

- Mammal paths;
- Badger hairs caught in sett entrances / fences / vegetation;
- Paw prints;
- Evidence of foraging (usually in the form of 'snuffle holes');
- Badger Scat (isolated badger droppings);
- Latrines (shallow pits/holes occurring together comprised of exposed badger droppings); and,
- Badger setts.

A mammal path was assumed to be used by badgers if the character of the path (in terms of size) was appropriate and/or if any other signs were in close vicinity (e.g. a badger sett).

The field survey of the Site was conducted in line with the following relevant guidance for badgers:

- Scottish Badgers, '*Surveying for Badgers: Good Practice Guidelines*,' [46];

- The Mammal Society, 'Surveying Badgers,' [47]; and,
- NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [43].

Bats

An initial assessment was carried out during the habitat survey for the suitability of the habitats within the Site to support bat roosting, foraging and commuting. The inspection was undertaken using close-focusing binoculars.

The following criteria were used to assess mature trees onsite:

- Presence of natural cavities, splits, cracks, loose bark, and rot holes in the trunk or boughs of the tree;
- Presence of dense and woody ivy (*Hedera helix*) growth that could be used by bats for roosting;
- Evidence of bat droppings, which may also be seen as a black streak beneath holes, cracks, branches, etc;
- Presence of smooth edges with dark marks and urine stains at potential entrances to roosts;
- Bat specimens (live or dead);
- Evidence of fur-oil staining;
- Adjoining habitats which are likely to be important to bats and hedge / treelines within the survey area that offer a variety of potential foraging, roosting and commuting opportunities for bats; and,
- Adjoining potential roosts / known roosts identified. This raises the likelihood of a tree being of benefit as bats may move roosts if the roost becomes too hot or cold during roosting, and a nearby alternative roost is highly desirable.

The survey was undertaken in accordance with recognised best practice as outlined below:

- DoEHLG, '*Bat Mitigation Guidelines for Ireland*' [48];
- NRA '*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*' [49]; and,
- Bat Conservation Trust ('BCT'), '*Bat Surveys for Professional Ecologists Good Practice Guidelines 4th Edition*' [50].

Birds

The Site was assessed for its potential to support important assemblages of birds of rare or notable species, as well as designated bird species. The survey aimed to identify and examine the suitability of the Site for potential wintering and breeding birds. Any bird activity onsite and potential nesting habitats were noted.

Hedgehogs and Pygmy Shrews

The habitats within and adjacent to the Site were appraised for their potential to support hedgehogs (*Erinaceus europaeus*) and pygmy shrews (*Sorex minutus*) in line with the NRA, now TII, '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,' [43].

Invasive Species

The Site was visually assessed for the presence of any noxious / invasive species that are regulated under the European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374/2024) [51] such as Japanese knotweed (*Reynoutria japonica*) and Himalayan balsam (*Impatiens glandulifera*).

The Site was also assessed for the presence of non-regulated invasive species that have the potential to impact local biodiversity.

Other Species

In addition, an assessment was carried out of the potential for the Site to support any other species considered to be of value for biodiversity, including those that were identified as occurring locally based on the findings of the desktop study and professional judgment.

6.1.6.2 Survey Limitations

No survey limitations were encountered.

6.1.7 Assessment Methodology

The starting point for the assessment was to undertake a scoping exercise for those ecological receptors that would require further consideration as part of the assessment. This involved differentiating the biodiversity receptors (i.e., designated sites, habitats, and species populations) that could be significantly affected by the Proposed Development.

The approach that was used for determining which receptors have the potential to be significantly affected by the Proposed Development involved using baseline data collected through the desk study and field surveys for the Site. Based on professional judgement data from the following radii was collected: 2km away for protected species, 15km for Natura 2000 sites and 5km away from Natural Heritage Areas. The desk and field-based data was used to determine:

- Which, if any, of the species or habitat that have been recorded are legally protected or controlled (see Box 1); and,
- Which, if any, sites, areas of habitat and species that have been recorded are of importance for biodiversity conservation.

The next stage of the assessment was to determine whether the identified receptors are of sufficient biodiversity value that an impact upon them would be of potential significance in terms of this ER. In this regard:

- Biodiversity conservation value relates to the quality and / or size of sites or habitats, or the size of species' populations; and,
- Potential significance means that the effect could be of sufficient concern or, for positive effects, of such substantial benefit that it could be material to influencing the decision on planning.

Receptors that have been identified as having sufficient value, and that an impact upon them could be of potential significance, have been taken forward for further consideration. Legally protected species were also considered further (refer to Box 1 above). This involved:

- Identifying, for each receptor, any significant impact that is likely to be caused by the Proposed Development, which has the potential to lead to a significant effect and / or to contravene relevant legislation;
- Determining the area within which the likely impacts would cause a potentially significant impact on the identified receptor and / or could contravene relevant legislation (ecological zone of influence); and,

- If the receptor occurs or is likely to occur within the zone of influence and concluding that the receptor could be significantly affected and / or the relevant legislation contravened, the receptor would be subject to further assessment.

6.1.8 Evaluation of the Conservation Importance of the Site

In terms of biodiversity conservation value, identified receptors have been valued using the National Roads Authority ('NRA') Scheme [52], using the following scale:

- International importance;
- National importance;
- County importance (or vice-county in the case of plant or insect species);
- Local importance (higher value); and,
- Local importance (lower value).

6.2 Study Results

6.2.1 Desk Study

Prior to conducting any site surveys, a desk-based review of information sources was completed. This baseline information provides a valuable insight to the types of flora and fauna that may occur onsite and allows for the identification of features / habitats located off-site that may require further assessment.

6.2.1.1 Statutory Nature Conservation Sites

In accordance with the European Commission Methodological Guidance [53] and policies NSP1, NSP2, NSP3 and NSP4 of the CCDP [35], a list of European sites that can be potentially affected by the Proposed Development has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government [54] states that defining the likely Zone of Influence for the screening and the approach used will depend on the nature, size, location, and the likely effects of the project. The key variables determining whether or not a particular Natura 2000 site is likely to be negatively affected by a project are:

- The physical distance from the Proposed Development to the Natura 2000 site;
- The presence of impact pathways;
- The sensitivities of the ecological receptors; and,
- The potential for in-combination effects.

All SPAs and SACs within 15km have been considered to assess their ecological pathways and functional links. As acknowledged in the OPR guidelines [55], few projects have a Zone of Influence this large, however the identification of Natura 2000 sites within 15km has become widely accepted as the starting point for the screening process. For this reason, all SPAs and SACs in 15km have been identified for consideration as part of the screening.

There are four European sites located within 15km of the Site - these are identified in Figure 6-1 and Table 6-1.

Figure 6-1: Proposed Development Location and European Designated sites within 15km

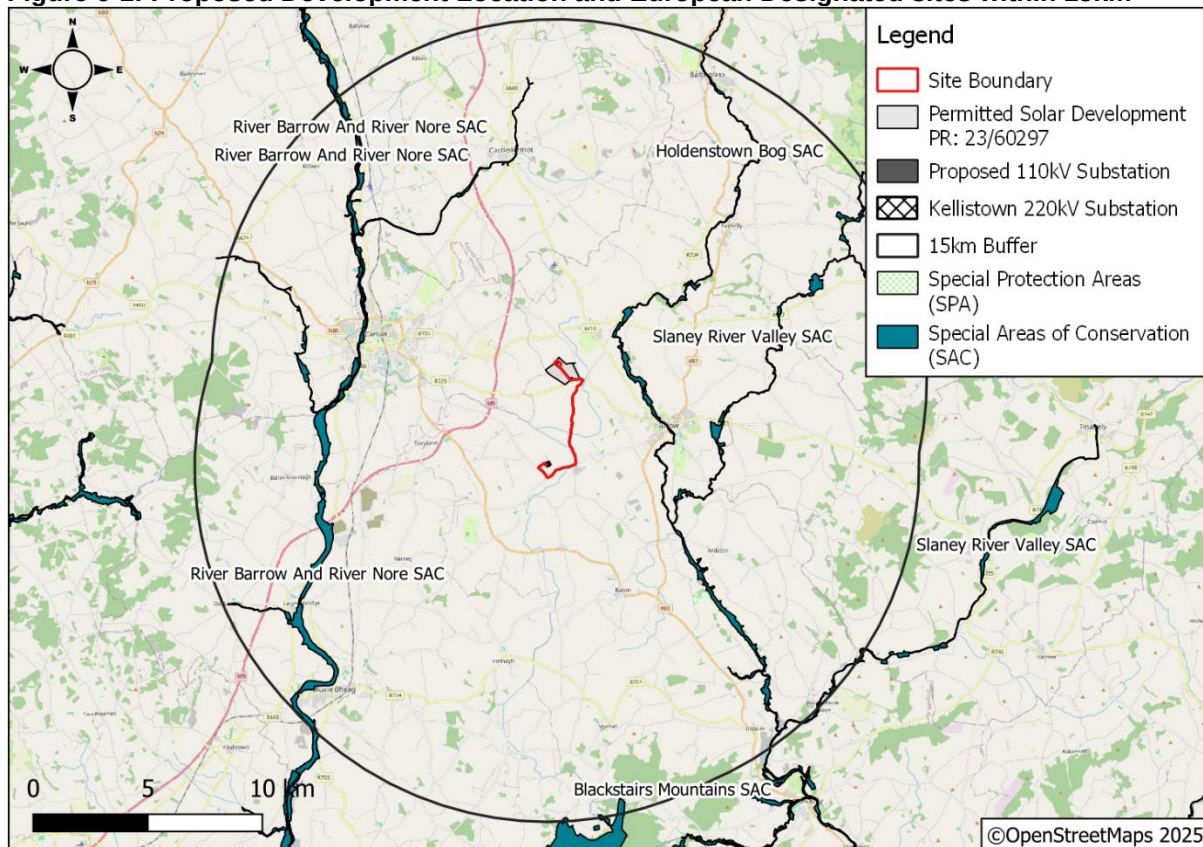


Table 6-1: European Designated sites within 15km of the Proposed Development

Site Name	Code	Distance (km)	Direction from the Site
Special Areas of Conservation ('SAC')			
River Barrow and River Nore SAC	002162	ca. 8.40km	W
Slaney River Valley SAC	000781	ca. 2.0km	E
Holdenstown Bog SAC	001757	ca. 12.6km	NE
Blackstairs Mountains SAC	000779	ca. 14.3km	S

The Site is not located within or directly adjacent to any European sites, however, the boundaries of four SACs are located within 15km from the Site.

A Natura Impact Statement ('NIS') has been prepared in support of this SID application. The NIS has fully considered the European sites located within 15km of the Proposed Development.

6.2.1.2 Nationally Designated Conservation sites

There are no Natural Heritage Areas ('NHA') located within 5km of the Proposed Development and one proposed Natural Heritage Areas ('pNHA') (refer to Figure 6-2 and Table 6-2).

Figure 6-2: Nationally Protected sites within 5km

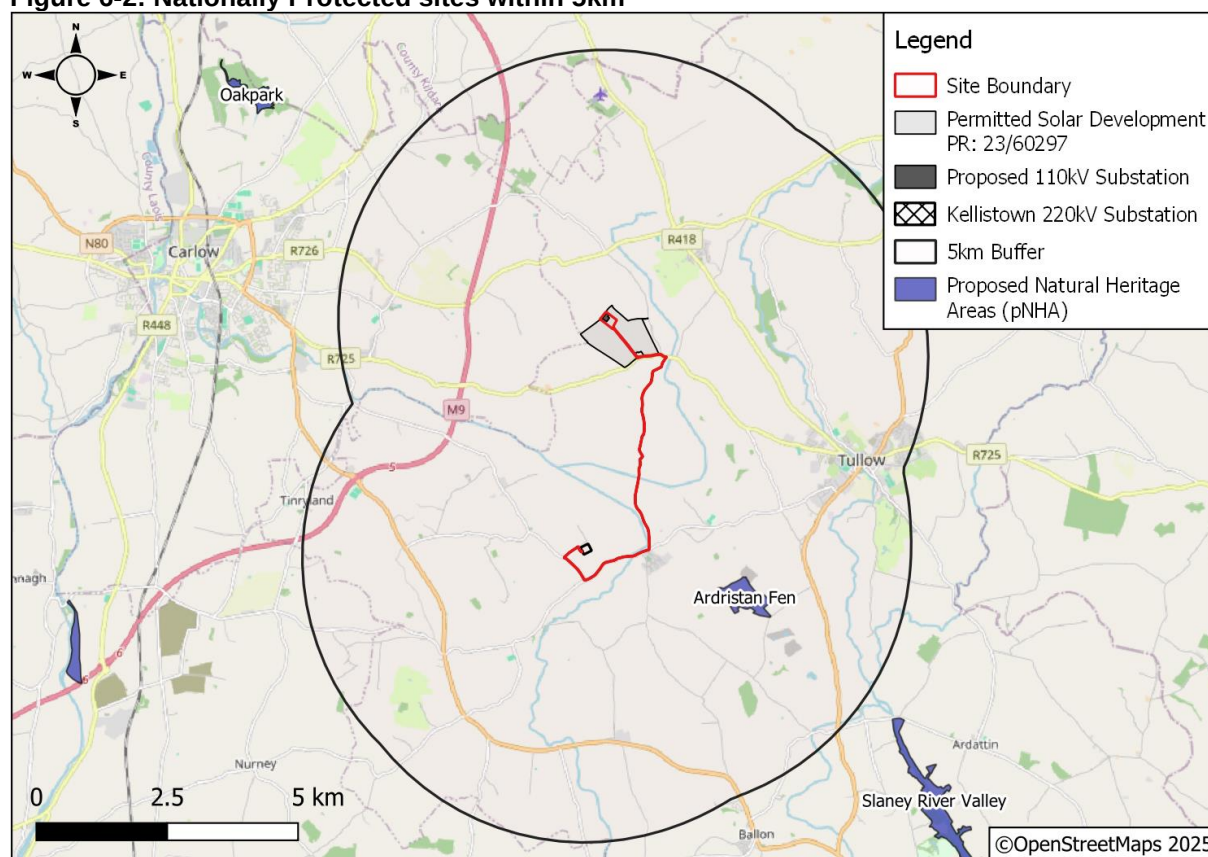


Table 6-2: National Protected sites within 5km

Site Name	Code	Distance (km) & Direction	Qualifying Interests
Proposed Natural Heritage Areas ('pNHA')			
Ardristan Fen pNHA	000788	1.5km SE	This site is located about 3km south-west of Tullow in Co. Carlow and was once an extensive fen and marsh area. However, much of it has been reclaimed since a 1975 survey. The remaining area is notable for its diverse calcareous flora, including species like Broad-leaved Cottongrass, Great Fen-sedge, and Fragrant Orchid. It also features wet woodland with alder and birch trees.

6.2.1.3 Notable / Protected Species

Table 6-3 provides a summary of records of legally protected or otherwise notable species that occur within 2km of the Site at the time of writing this report [38]. The NBDC records were checked on the 20th December 2024. The following NBDC 2km grids have been checked: S77V, S77X, S77Y, S87A, S87B, S87C, S87D.

Only species recorded within the past 10 years were included in Table 6-3. The parameter of 10 years was chosen on the basis of habitat adaption and modification, it is considered that any records over 10 years old are not representative of the current distribution of species populations.

Table 6-3: NBDC Records of Notable / Protected Species within a 2km of the Proposed Development (Grid Codes: S77V, S77X, S77Y, S87A, S87B, S87C, S87D)

Common Name	Scientific Name	Date of last record	Designation
Aquatic Species			
Freshwater White-clawed Crayfish	<i>Austropotamobius pallipes</i>	22/08/2017	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II and Annex V species
Birds Species			
Buzzard	<i>Buteo buteo</i>	01/11/2022	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Green List
European Golden Plover	<i>Pluvialis apricaria</i>	06/11/2022	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section II and Annex III, Section III Bird Species Birds of Conservation Concern Red List
Fieldfare	<i>Turdus pilaris</i>	25/02/2014	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Green List
House Sparrow	<i>Passer domesticus</i>	17/07/2015	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Amber List
Northern Lapwing	<i>Vanellus vanellus</i>	03/05/2022	Wildlife Acts 1976 / 2000 EU Habitats Directive Annex II Section II Bird Species Birds of Conservation Concern Red List
White-throated Dipper	<i>Cinclus cinclus</i>	17/07/2015	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Green List
Yellowhammer	<i>Emberiza citrinella</i>	17/07/2015	Wildlife Acts 1976 / 2000 Birds of Conservation Concern Red List
Terrestrial Mammals			
West European Hedgehog	<i>Erinaceus europaeus</i>	25/06/2023	Wildlife Acts 1976 / 2000
Invasive Species			
European Rabbit	<i>Oryctolagus cuniculus</i>	08/06/2018	Medium Impact Invasive Species
Jenkins Spire Snail	<i>Austropotamobius pallipes</i>	22/08/2017	Medium Impact Invasive Species

Common Name	Scientific Name	Date of last record	Designation
Japanese Knotweed	<i>Reynoutria japonica</i>	01/07/2015	High Impact Invasive Species Regulation S.I. 374 (Ireland)

6.2.2 Field Survey

6.2.2.1 Habitats

Site Context and Surrounding Habitats

The majority of the Site is comprised of agricultural grassland and existing road infrastructure, which is used for the production of arable crops. The principal natural or semi-natural habitat features noted during the Site survey were the hedge / treelines bordering the Site

A description of the habitats and features of ecological significance are outlined in the sections below. The distribution of the habitats and location of features of interest are shown in Figure 6-3.

Buildings and Artificial Surfaces (BL3)

The majority of the Site is located with the existing road infrastructure, as such there is limited botanical diversity. No notable species were identified.

Arable Crops (BC1)

The proposed 110kV substation and a portion of the proposed UGC route is located within agricultural fields that are currently cultivated and managed for the production of arable crops.

At the time of the survey, the majority of these areas had been heavily cultivated and managed, resulting in the area being species poor. The arable margins were noted to be narrow and dominated by perennial rye grass (*Lolium perenne*), docks (*Rumex spp.*), ragwort (*Senecio jacobea*), hogweed (*Heracleum sphondylium*), and nettles (*Rubus cockburnianus*).

Drainage Ditch (FW4)

No drainage ditches were located within the Site. However, a drainage ditch was identified to the northeast of the Site within the Permitted Development Site Boundary, ca. 50m from the Proposed Substation Development. A slow flow was noted within this drainage ditch which supported limited plant diversity wetland vegetation.

The majority of the banksides adjacent to the drainage ditch was dominated by broadleaved herbs, grass, and tall ruderals, including large patches of gorse, nettles, and brambles (*Rubus spp.*) providing a suitable habitat for multiple species of flora and fauna.

Hedgerows (WL1) / Treelines (WL2)

The northern portion of the proposed 110kV substation location is located adjacent to hedgerow treeline. In addition, hedgerow / treelines made up the principle field boundaries within the vicinity of the Site. The quality of the hedgerow / treelines varies from well-structured and diverse to patchy and sparse.

The hedge / tree lines located across the Site are mostly dominated by ash (*Fraxinus excelsior*), beech (*Fagus spp.*), sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) with other tree and shrub species represented including alder (*Alnus glutinosa*), elder (*Sambucus nigra*), Yew (*Taxus baccata*) and gorse.

Brambles and nettles are frequent in the understorey layer throughout. Ivy is common both in the trees and in the ground layers.

A typical array of herbaceous species were recorded in the ground layer of the hedgerows, including ground ivy (*Glechoma hederacea*), cleavers (*Galium aparine*), creeping thistle (*Cirsium arvense*), broad-leaved dock (*Rumex obtusifolius*), ragwort, Wild privet (*Ligustrum vulgare*), hemlock (*Conium maculatum*), lesser burdock (*Arctium minus*), redshank (*Persicaria maculosa*), chickweed (*Stellaria media*) and cow parsley (*Anthriscus sylvatica*). Additional small plant species recorded within the hedgerow include shield fern, harts-tongue fern, bracken (*Pteridium spp.*), and herb Robert (*Geranium robertianum*).

Figure 6-3: Habitat Map



6.2.3 Notable / Protected Species

Flora

No plant species protected under the Flora Protection Order were recorded onsite.

Amphibians

The NBDC does not hold any records of amphibian species within 2km of the Site [38].

However, the open nature of the onsite terrestrial habitats and the drainage ditch within and adjacent to the Site provide suitable habitats for native amphibian species. Amphibians require static or slow-moving water bodies in order to successfully lay their eggs and tend to favour shallow areas where they are less susceptible to being preyed on by fish.

Although no observations of the common frog spawn (*Rana temporaria*) or smooth newt (*Triturus vulgaris*) were made within the Site, it is possible that they may utilise the onsite drainage ditch and watercourse adjacent to the Site. In addition, the grassland habitats on the Site and within the wider area may also be suitable for amphibians during the terrestrial phase of their lifecycle.

Badger

The NBDC holds no records for badger within 2km of the Site [38]. However, the field survey identified signs of badger activity including mammal paths (Figure 6-3, Mammal Path) and badger scat (Figure 6-3, TN1) within the Permitted Development area adjacent to the Site.

The well-established hedgerows and treelines surrounding and traversing the Site provide suitable foraging habitat and connectivity to the wider landscape. In addition, the areas of agricultural grassland both on-site and within the wider area also provides further suitable foraging habitat for this species. It is therefore considered highly likely that badger utilise this area for commuting and foraging purposes.

Bats

NBDC Records and Landscape Suitability

The NBDC holds no records for bat species within 2km of the Site. In addition, as per the NBDC landscape suitability metric, the Site and surrounding area is considered to be of moderate suitability for bats (Landscape Suitability Metric Score: 21-28).

Please note that the landscape suitability metric is calculated using a desk-based model only and is a regional-scale assessment. The metric is not tailored to local site-specific ecological features or conditions but rather averages over a much larger landscape. The metric is an average score; it does not guarantee that the Site itself is of high bat suitability.

The predictor layers are constructed from this database, ranging in scale from 0.5km to 20.5km, which shows suitable regions for each species to exist but makes large generalisations of species occurrence rather than site-specific detail obtained during field surveys. This metric is not a substitute for a Site visit to assess bat suitability by a suitably qualified and experienced ecologist following the current best practice guidelines [56].

Following the Site visit, it was concluded that the suitability metric reflects the current site-specific conditions.

Bat Commuting and Foraging Suitability

Bats are known to follow linear features as they commute through the landscape and therefore the sections of continuous hedge / tree line along the boundaries of the Site and extending into the adjacent fields provide suitable foraging habitat and connectivity to the wider landscape for commuting bats. The areas of improved grassland, drainage ditches and

adjacent waterbody are also considered to provide suitable foraging habitat for bat species. No buildings suitable for this species were identified within the Site.

However, the suitability of the hedgerows / treelines along the UGC was reduced by the light pollution spilling from both the local roads onto these linear features.

Bat Roost Suitability

Bats are known roost in mature trees and buildings with suitable emergence / re-entry points. A ground-based inspection was undertaken to assess the Site for bat roost suitability.

It was considered that the tree / hedge lines boarding the Site have features that are considered to be suitable to support roosting bats species, these features include thick ivy growth, knot holes, cracks, and loose bark.

Birds

The NBDC holds records for a number of protected bird species within 2km of the Site [38]. However, no notable or protected bird species were identified onsite during the Site walkover. A range of bird species were identified utilising the habitats throughout the Site during the Site walkover including starling (*Sturnus vulgaris*), (Corvus frugilegus), and wood pigeon (*Columba palumbus*), robin (*Erithacus rubecula*), blackbird (*Turdus merula*), song thrush (*Turdus philomelos*), and wren (*Troglodytes troglodytes*).

Given the nature of the onsite habitats, the majority of the bird species recorded onsite, would have been expected, are common species within the countryside. The areas of tree / hedge-line provide both suitable nesting sites and foraging areas for a range of common bird species.

Otter

The NBDC holds no records for otter within 2km of the Site in the last 10 years [38]. Additionally, no evidence of otter was found onsite in the form of holts, slides, feeding remains or spraints during the Site visits. The drainage ditches located onsite are not considered to be of significant value to otter given that they are largely devoid of vegetation and suitable cover, and the fact that no suitable prey species were noted during the Site surveys.

Given the nature of the onsite habitats, it is considered unlikely that the Site is of any value to otter.

Other Species

The NBDC holds records of protected and notable mammals within 2km of the Site [38]. It is considered that the well-established hedgerows / treelines and surrounding habitats provide suitable foraging habitat and connectivity to the wider landscape for a wide range of commonly occurring species, such as fox, field mice, hedgehog, pygmy shrews, and rabbit.

Hedgehogs are common and widespread species that typically occur in scrub, woodland, and rank grassland habitats. Hedgehogs were recorded within 2km of the Site [38]. However, no evidence of this species was identified onsite. However, the hedgerow / treeline bounding the Site has the potential to support foraging and commuting hedgehogs.

No other protected or otherwise notable species were noted during the Site walkover. However, multiple mammal paths were identified onsite (Figure 6-3).

Invasive Species

The NBDC holds records for Japanese Knotweed within 2km of the Site [38]. However, Japanese Knotweed was not noted within the vicinity of the Site during the Site walkover.

No other invasive species were noted during the Site walkover.

6.3 Characteristics and Potential Impacts

6.3.1 Sensitive Design

Specialist ecological input was a key element of the design of the Proposed Development. This ensured that the design was extremely sensitive to valued ecological features that occur or may occur within the Site and the surrounding landscape. The key measures relevant for this Proposed Development are detailed in section 5.3.

6.3.2 Identification of Potentially Significant Effects on Identified Receptors

Based on the methodology that is set out in Section 6-1, Table 6-4 sets out the findings of the evaluation of important and legally protected receptors. Each receptor is assessed and a scoping justification for each receptor is provided for the Construction and Operational Phases.

Table 6-4: Valuation of Potential Ecological Receptors

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Result and Justification	Scoping Results
Protected Sites				
European Sites	European Communities (Natural Habitats) Regulations 1997 (as amended)	Internationally designated sites for conservation	A Natura Impact Statement ('NIS') was prepared for the Proposed Development in line with objectives outlined in the CCDP. The NIS screening report concluded that the Proposed Development would not cause any significant adverse effects on any European designated sites or any of their designated features of interest and that progression to Stage 3 of the Appropriate Assessment process (i.e., Natura Impact Statement) was not considered necessary.	This receptor has been scoped in for further consideration.
Natural Heritage Areas (NHAs)	Wildlife Act 2000 (as amended)	Nationally designated sites for conservation	Natural Heritage Areas ('NHA') were assessed in compliance line with objectives of the CDP 2022-2028. However, there are no NHAs within 5km of the Proposed Development. There is one proposed Natural Heritage Area ('pNHA') within 5km of the Proposed Development. Impacts on Ardistan Fen pNHA can be discounted given the lack of impact pathways and intervening land separating this site from the Proposed Development.	This receptor has been scoped out from further consideration.
Habitats				
Arable Crops (BC1)	N/A	Low Local Value	This is a common habitat type throughout Ireland and provides limited ecological value. This habitat was highly modified and intensively managed. This habitat is not of significant conservation value given it was species poor and no notable or protected species were identified. In order to facilitate the Proposed Development, this habitat will be lost, however it is not considered to be significant. Therefore, this receptor has been scoped out from further consideration.	This receptor has been scoped out from further consideration

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Result and Justification	Scoping Results
Hedge / Treelines (WL1 / WL2)	Wildlife Act 2000 (as amended)	Low Local Value	Hedgerows / treelines are a common habitat throughout Ireland, and a review of aerial imagery surrounding the Site shows that this habitat is common within the vicinity of the Site. As part of the Proposed Development, all hedgerow and treelines onsite will be maintained and protected. Furthermore, as part of the Permitted and Proposed Development, ca. 731m of additional planting will be implemented as part of the landscape plan, resulting in an overall net gain of hedgerows following completion of the project will occur. Additional planting will also take place as necessary for bolstering and gap filling across the Site ca. 2,865m. Should any vegetation works be required, all clearance works will need to take account of protected species, such as nesting birds. All clearance works will be scheduled to take place outside of the nesting bird season (typically considered to be between 1st March to 31st August - weather dependant). Taking into account the measures that will be implemented for trees and hedgerows (Section 6.6.3), and that all works, and substation infrastructure will be set back a minimum of ca.6m, this receptor has been scoped out from further consideration.	This receptor has been scoped in for further consideration
Drainage Ditch (FW4)	N/A	Low Local Value	All drainage ditches located onsite will be maintained and protected as part of the sensitive design of the proposed development. All works and proposed infrastructure will be set back a minimum of 6m onsite drainage ditches. However, there is some risk of minor pollution from oil or fuel spills within as part of construction phase works. Therefore, water mitigation measures will be implemented throughout the construction phase which will ensure protection of water quality within the drainage ditch network (Section 7.7).	This receptor has been scoped in for further consideration
Buildings and Artificial Surfaces (BL3)	N/A	Low Local Value	The UGC will be within existing unvegetated access tracks and public road infrastructure. Limited botanical diversity was recorded within across these habitats. This habitat is common and not of significant conservation value.	This receptor has been scoped out from further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Result and Justification	Scoping Results
Flora and Fauna				
Protected Flora	Flora (Protection) Order 2022 (S.I. No. 235/2022)	N/A	No plant species protected under the Flora Protection Order were noted onsite. Overall, the impact of the Proposed Development on notable / protected flora is considered unlikely to be significant as the Site holds no value as a habitat for these protected species.	Protected Flora have been scoped out from further consideration.
Amphibians	Wildlife Act 2000 (as amended) EU Habitats Directive Annex V	Moderate Local Value	The NBDC does not hold any records of amphibians within 2km of the Proposed Development in the last 10 years [38] and no evidence of any amphibian species were identified during the survey. Amphibians are commonly associated with agricultural grassland habitats. It should be noted that these species are relatively widespread and abundant in Ireland, however they are of conservation interest and are protected under the Schedule V of the Wildlife Act The drainage ditch within the Site has the potential to support amphibians. However, all suitable habitats will be protected and retained as part of the Proposed Development, and therefore it is not considered that any significant impacts will occur and therefore no mitigation measures are required. Nonetheless, if any amphibians are discovered onsite during the construction works, all works within the affected area will cease and the project ECoW will be consulted. Therefore, this receptor has been scoped out from further consideration.	Amphibians have been scoped in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Result and Justification	Scoping Results
Badgers	Wildlife Act 2000 (as amended)	Moderate Value Local	The NBDC holds no records of badger within 2km of the Site in over 10 years [38]. However, signs of badger activity were noted during the field survey, including mammal paths and badger scat (TN1). See Figure 6.3 above. Given the nature of the habitats to be impacted by the works, and the fact that all hedge / treeline will be retained it is considered unlikely that any impacts on badger will occur. However, given the presence of suitable commuting and foraging habitats onsite and within the wider area for badger and other small mammals, and the potential for this species to become entrapped in trenches / excavations. Therefore, taking a precautionary approach, measures will be implemented during the construction works, refer to Section 6.5.	Badgers have been scoped in for further consideration.
Bats	Wildlife Act 2000 (as amended) EU Habitats Directive Annex IV	Moderate Value Local	The NBDC contains no records of bat species within 10km of the Site in the last 10 years. Furthermore, the site is considered of moderate landscape suitability. All tree / hedge lines, which provide suitable foraging and roosting areas, or bats will be retained as part of the works. In addition, as part of the Landscape Plan for the Overall Development, it is proposed to plant ca. 731m of additional planting resulting in a net gain of hedgerow onsite. This vegetation will provide opportunities for commuting bats and maintain connectivity in the Site and within the wider landscape. Emergency lighting only is proposed as part of the development and therefore no impacts on nocturnal species from light spillage will occur given this temporary nature. Furthermore, the Permitted and Proposed Development provides opportunities to enhance the Site for bat species, through enhancement measures that will be incorporated in the BMP, which will result in an increase in insect prey suitable for foraging bats. These measures will benefit foraging bats. Therefore, it can be concluded that no impacts will occur to bats as a result of the Proposed Development	Bats have been scoped out from further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Result and Justification	Scoping Results
Birds	Wildlife Act 2000 (as amended)	Moderate Local Value	The hedgerow and treeline habitats located onsite and within the immediate surrounding of the Site are considered to provide suitable nesting and foraging habitat for breeding birds. It should be noted that these habitats are not exclusive to the Site and are common within the wider landscape. It is not considered that the Proposed Development will have a significant impact on birds given that all treelines and hedgerows will be retained and protected. Birds may be subject to some temporary disturbance during construction; however, this is not considered likely to be significant. Birds are highly mobile and therefore will move away from disturbances to a suitable area elsewhere given the abundance of similar and suitable habitat within the vicinity of the Site. Overall, it can be concluded that the Site and the areas within the immediate vicinity of the Site are not considered to be major sites of importance to any designated bird species. Nonetheless, once breeding bird species have established a nest, they will be less likely to move away from disturbances. Therefore, should any bird species nest onsite, it is considered that, without appropriate mitigation measures, there may be impacted if any vegetation clearance works are undertaken. Therefore, if required, all vegetation clearance will be scheduled to take place outside of the nesting bird season (typically considered to be between 1st March to 31st August - weather dependant).	Birds have been scoped in from further consideration.
Otter	Wildlife Act 2000 (as amended)	High Local Value	The NBDC holds no records for otter within 2km of the Site. Furthermore, no signs of otter were noted during the field surveys. The Site is considered to be of limited value for this species and, it is considered unlikely that otter utilise the Site. All drainage ditches identified onsite, and adjacent watercourse will be protected and retained as part of the development works, and therefore there is no potential for impacts to occur. It should also be noted that a setback of ca. 50m will be implements from the Ardnehue River and all proposed infrastructure. Furthermore, during the operational phase of the Overall Development, it is considered that there will be no disturbances to this species due to the fact that all infrastructure capable of producing noise emissions will be located be over 200m from any watercourse and ca. 2km from the nearest SAC boundary.	Otter have been scoped in for further consideration.

Potential Biodiversity Receptor	Relevant Legislation	Valuation	Scoping Result and Justification	Scoping Results
			As a precautionary measure, mitigation will be put in place in order to minimise any potential disturbances from potential otter within the vicinity of the Site (Section 6.5).	
Invasive Species	Regulation S.I. 374	N/A	No invasive species were identified within the Site boundary; however, standard biosecurity measures will be implemented onsite to ensure no unintentional spread of invasives occur onsite.	Standard bio-security measures will be implemented.
Other fauna	Wildlife Act 2000 (as amended) EU Habitats Directive Annex II and V	N/A	It is considered that the Proposed Development will not give rise to any significant impacts to other fauna, given that the key habitat features will be retained and safe guarded as part of the development at the Site.	Other fauna have been scoped in for further consideration.

The following receptors have been taken forward for further consideration, Mitigation Measures have been included in Section 6.5 below:

- Hedgerow / Treeline (WL1 / WL2);
- Drainage ditches (FW4);
- Terrestrial Non-volant Mammals (badger, otter and other fauna);
- Birds;
- Amphibians;
- Invasive Species; and,
- Other fauna

In addition to the species listed above, general mitigation / best practice measures have also been included for the Proposed Development.

6.4 Mitigation Measures

The following mitigation measures will be incorporated and adhered to during the Construction and Operation Phases of the Proposed Development to ensure that the works do not result in contravention of wildlife legislation.

6.4.1 Construction Phase

Disturbance to fauna during the construction stage may potentially arise as a result of a short-term increase in human presence onsite and additional construction noise and lighting within the Site. However, all construction works will be temporary and short-term in nature, estimated to last approximately 12 months. The works will not involve any major site clearance or earthworks. Nonetheless, during the construction phase, all works will comply with all relevant legislation and best practice guidance to reduce any potential environmental impacts.

The following guidance will be referred to and will be followed during the construction phase of the project to prevent water pollution and impacts on flora and fauna that may occur within the area. [57]

- C532 – Control of Water Pollution from Construction, Guidance for Consultants and Contractors [58];
- CIRIA C811- Environmental Good Practice on Site (5th edition) [25];
- CIEEM, Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (2018 and revisions) [59];
- NRA, 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes,' [60];
- NRA, 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' [49];
- NRA, 'Best Practice Guidelines for the Conservation of Badgers in the Planning of National Road Schemes' [61];
- NRA, 'Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' [30];
- DoEHLG, 'Bat Mitigation Guidelines for Ireland' [48]; and,
- Inland Fisheries Ireland - 'Requirements for the Protection of Fisheries Habitat during Construction and Development' [62].

A final CEMP will be prepared by the appointed main contractor and will be submitted to the planning authority in advance of works commencing as detailed in Section 5.3.

The following mitigation measures will be incorporated and adhered to in order to ensure that the proposed works do not result in any contravention of wildlife legislation:

- All activities will comply with all relevant legislation and best practice to reduce any potential environmental impacts. The mitigation measures detailed within this report will be fully adhered to;
- The Site manager shall ensure that all personnel working onsite will be trained and made aware of the mitigation measures detailed within the ER;
- In advance of works, all Site personnel will receive an induction which will include reference to mitigation measures in relation to protected species and measures to prevent the spread of invasive species;
- Should construction works be required outside of daylight hours, the appointed project ECoW will be consulted as required; and,
- If protected or notable species are encountered during operations at the proposed development, the ECoW will be contacted for advice.

An EcoW will inspect the Site in advance of works commencing and will undertake Site inspections as required during the works, to ensure that all works will be completed in line with the CEMP and all wildlife legislation.

6.4.1.1 Protection Measures for Water Quality

Standard measures will be put in place in order to ensure that construction works, and the operations of the Proposed Development do not result in any deterioration to local water quality and subsequently no adverse effects to species and habitats downstream of the Site.

Measures to ensure the protection of water quality will be implemented as outlined in the accompanying Natura Impact Statement and in Chapter 7 (Water).

6.4.1.2 Protection for Hedgerows / Treelines

All hedgerows and treelines onsite are to be maintained and protected as part of the proposed works, this is in line with Woodland, Trees, and Hedgerows - Policies (WT P1 – WT P8) of the Carlow CDP. Should any clearance works be required, it will be scheduled to take place outside of the nesting bird season (typically considered to be between 1st March to 31st August - weather dependant) in compliance with Heritage Objective 2 .

To ensure that no impacts occur on the retained trees and hedgerows, care will be required to protect the sections of hedgerows and treelines onsite from both direct and indirect disturbance during construction. All infrastructure will be set back a minimum of 6m from the existing boundary features and it is therefore considered highly unlikely that any impacts will occur. Furthermore, care will be required to prevent disturbance to root systems. The standard measure to achieve this is that every effort will be made to minimise works within the outer canopy limit of the trees:

- Hedgerows / Treelines close to the construction areas will be fenced off by effective construction proof barriers before construction works commence. These barriers will remain in place for the duration of the works to prevent accidental disturbance and define the limits for construction vehicles and other construction staff;
- Care will be required to prevent disturbance to root systems – a buffer zone / construction exclusion zone of unexcavated ground will be maintained along the retained hedgerows / treelines;

- No materials, equipment or machinery will be stored within the Root Protection Area ('RPA'). Storage of materials will be sited as far as possible from retained hedgerows / treelines;
- Where machinery access has to encroach areas within close proximity to the retained hedgerows / treelines, a Root Protection Area ('RPA') will be established, and suitable ground protection will be put in place to prevent any significant soil compaction or root damage. This will either take the form of suitable strength ground protection mats or a cellular confinement system capable of supporting the appropriate weight;
- During any works close to the buffer zone, should the operators encounter any root smaller than 35mm in diameter they should be pruned carefully with an appropriate cutting tool such as a saw or secateur, and roots larger than this will require consultation with an arboriculture specialist;
- No materials or equipment will be stored within the buffer zone;
- Trench digging or other excavation works for services, etc. will not be permitted within close proximity to retained trees unless approved and supervised using methods outlined in BS5837: Trees in relation to design, demolition, and construction (2012);
- In order for these tree protection measures to work effectively, all personnel associated with the operation of heavy plant machinery must be familiar with the above principles for the protection of treelines;
- Care will be taken when planning Site operations to ensure that wide or tall loads or plant with booms, jibs and counterweights can operate without coming into contact with retained trees; and,
- Notice boards, wires, etc. will not be attached to any trees. Site offices, materials and contractor parking will all be outside the root zones of the hedge and treeline.

6.4.1.3 Protection Measures for Nocturnal Species

The foraging and roosting behaviour of bats can also be adversely affected by luminance. Inappropriate lighting can result in delayed emergence and subsequently bats missing peak insect levels at dusk. The foraging behaviour of bats can also be altered by short-wave frequency ('UV') light, causing insect populations to congregate around the light and increasing the chances of bats being preyed on. Excess luminance can also cause bats to desert roosts due to light spillage on roost exit points.

- Emergency lighting will be turned down / off when not required;
- Construction will be limited to daylight hours in order to minimise adverse effects on nocturnal fauna;
- Lighting will be directed away from sections of hedgerows and trees; and,
- Lighting will be aimed only where it is needed, with no upward lighting.

6.4.1.4 Protection Measures for Terrestrial Non-Volant Mammals

Given the presence of habitats with features that have the potential to support sheltering, foraging and commuting mammals (inclusive of badger), and in order to ensure that the works in relation to the Proposed Development will not have significant impacts on mammals, general construction procedures and mitigation measures, which are in line with the NRA (now TII) 'Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes' [49] and 'Guideline for the Treatment of Otters Prior to the Construction of National Road Schemes' [63] will be undertaken. This is in compliance with Non-designated areas and habitats and species - Policies (ND P1 to ND P8) of the Carlow CDP:

- A pre-construction survey will be carried by a suitably qualified and experienced ecologist out to check for any badger setts within or close to the works areas and confirm absence of terrestrial mammals within or close to the works areas;
- Where deep excavations will be required onsite, appropriate measures to protect mammals from ingress will be installed;
- Should construction works be required outside of daylight hours during the site clearance works, the appointed project ecologist will be consulted as required; and,
- If unidentified burrows, holts, or setts are identified within the works area during construction, works will cease within the area and the project ECoW will be contacted for advice.

6.4.1.5 Protection Measures for Breeding Birds

In order to ensure no impacts, occur to birds as a result of the Proposed Development, the following measures will be put in place:

- Any vegetation clearance required will take place outside of the nesting bird season (1st March to 31st August), as per Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000.

In the event that works need to be undertaken within the main breeding season, the following measures will be implemented:

- The project ECoW will be consulted, and advice sought from the NPWS as required; and,
- Should birds' nest within the active working area during the Construction Phase, works within the area will stop within the area and the project ECoW will be consulted.

Following the implementation of the above measures, it is considered unlikely that birds will be significantly impacted as a result of the Proposed Development. However, it should be noted that birds may be subject to some temporary minor disturbances during construction. However, due to the fact that birds are a highly mobile species, should any birds be impacted, these birds will move away from the disturbance to a more suitable area, therefore, this is not considered likely to be significant.

6.4.1.6 Protection Measures for Invasive species

To mitigate against the unintentional introduction of invasive species during construction, the following measures will be followed in line with policies of the CDP [64]:

- All vehicles, machinery and any other equipment used for the works will be washed prior to its use at the Site to prevent the import of plant material or seeds;
- Before machinery or equipment is unloaded at the Site, equipment will be visually inspected to ensure that all adherent material and debris has been removed;
- Any vehicles and machinery that are not clean will not be permitted entry to the Site;
- All materials to be imported to the Site including additional planting will be sourced from a reputable supplier and records of all material and supplies will be maintained;
- In advance of works, all Site personnel will receive a toolbox talk with regards to invasive species; and,
- Everybody working onsite must understand the role and authority of the EcoW managing the issue of the non-native species.

6.4.2 Operational Phase

It is not anticipated that the Operational Phase of the Proposed Development will result in any impacts to species onsite or within the vicinity of the Site, and as such no operational phase mitigation measures will be required.

6.5 Ecological Enhancement Measures

A detailed Biodiversity Management Plan ('BMP') was prepared as an integral part of the Permitted Development to ensure that in the long-term, benefits to flora and fauna can be maximised and that any adverse impacts can be minimised. Under this BMP, the following will be implemented as part of the Permitted and Proposed Development.

The BMP was prepared in line with the recommendations as detailed within the CDP, in order to conserve and, where possible, enhance the areas of retained and created habitat within the Site.

- Enhancement of existing planted areas with additional hedgerow species-rich planting along the Site boundaries. Species should be selected to provide flowers and / or fruit for birds and night-scented flowers to attract insect-prey for bats;
- The creation of a Biodiversity enhancement Zone;
- The creation of grassland with a varied sward structure; and,
- The provision of wildlife shelters providing nesting opportunities for protected and locally important species including bird boxes, bat boxes, red squirrel boxes and mammal gates.

The BMP for the Permitted Development is attached in Appendix C.

6.5.1 Landscaping

A detailed Landscape Plan has been prepared as an integral part of the Permitted Development and will be implemented as part of the Proposed and Overall Development.

The landscape plan proposes to plant new native hedgerows and improve existing hedgerows on the Site. This new planting will help to screen, soften, and integrate the proposal into its environment and provide green connectivity to enhance ecological corridors in the local landscape. The species of trees and woody vegetation in the hedgerow have been chosen with consideration of those prevalent in the surrounding area and will include a wide variety of native species. The new planting will increase species diversity in the local landscape, improving the quality of canopy cover and resilience of the tree population to provide a significant improvement on the pre-development baseline. Please refer to Appendix D.

6.6 Cumulative Impacts

Based on the following, it is not anticipated that the Proposed Development will result in any significant cumulative impacts in relation to biodiversity:

- The Proposed Development is in line with Natura 2000 Sites - Policies (NS P1 to NS P4) of the Carlow CDP, which refers to avoidance of impacts on Natura 2000 sites;
- The Proposed Development is in line Energy Polycys2which refers to compliance with Article 6 of the Habitats Directive when planning for renewable energy developments;
- The absence of any notable species on the Site or in the immediate vicinity of the Site;
- The reduction in herbicides and pesticides due to the change of land use to pastoral;
- The retention of all hedgerow and treeline as part of the works; and,
- The opportunities for enhancing the Proposed Development area for biodiversity.

Furthermore, as part of this Proposed Development, a NIS has been prepared and assessed for any in combination effects with the adjoining PV developments. It was concluded that there will not be any significant in-combination contribution by the project to possible adverse effects on European Sites and that it will not cause any adverse effect on the integrity of any European site in combination with other plans and projects.

In addition, given the implementation of a Biodiversity Management Plan and Landscape Plan as part of the Overall Development, there will be an overall net gain of hedge and treeline, along with enhancement measures resulting in an increase of associated biodiversity within the Site and surrounding environs, and therefore an overall positive impact.

Therefore, the cumulative impact from the solar farms will not be likely to result in an impact to the surrounding biodiversity, and the Proposed Development will not cause any adverse effect on the integrity of any European site in combination with other plans and projects.

6.7 Conclusions

Based on the findings of a detailed desk-based study, a review of all the ecological information available for the Site and wider area and a field survey by MOR Environmental Ecologists, it is considered reasonable to conclude the following:

- The overall Site itself is currently of low ecological value;
- The Site is located in an area predominantly made up of agricultural grassland (arable). It is not of value to any Annex I or Annex II species or Red listed birds; and,
- The Proposed Development will not result in any significant impacts on ecological receptors identified both onsite and in the surrounding area following the implementation of appropriate mitigation measures / enhancement measures.

Taking into account the nature of the Proposed Development and the enhancement measures to be implemented as part of the Overall Development, it is considered that the Proposed Development is consistent with the National, Local and Municipal planning policies and objectives, will support the protection and enhancement of the environmental quality of the area. It is considered that the Proposed Development will have an overall positive impact on the local biodiversity.

7 WATER

The main objective of this chapter was to assess whether there are any likely hydrological impacts to water, including hydrology, hydrogeology, and flood risks, during all phases of the Proposed Development. To assess whether there are any flood risks that would warrant further consideration, a Preliminary Site-Specific Flood Risk Assessment ('PFRA') was completed.

7.1 Preliminary Site-Specific Flood Risk Assessment ('PFRA')

The following relevant best practice guidance was followed in the assessment:

- "The Planning System and Flood Risk Management – Guidelines for Planning Authorities" [65].

This guidance sets out a risk based sequential approach to flood risk assessment. Three key stages are identified as follows:

- **Stage 1 - Flood Risk Identification** - To identify whether there may be any flooding or surface water management issues related to a plan area or Proposed Development that may warrant further investigation;
- **Stage 2 - Initial Flood Risk Assessment** - To confirm sources of flooding that may affect a plan area or a Proposed Development site to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. The extent of the risk of flooding should be assessed. Where existing river or coastal models exist, these should be broadly used to assess the extent of the risk of flooding, and potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures; and,
- **Stage 3 - Detailed Flood Risk Assessment** - To assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed area or existing development, its potential impact on flood risk elsewhere and the effectiveness of any proposed mitigation measures. This will typically involve construction of a new, or use of an existing, hydraulic model of the river or coastal cell across a wide enough area to appreciate the catchment wide impacts and hydrological processes involved. The need to progress to Stage 3 is carefully considered following completion of Stage 1 and Stage 2.

7.2 Methodology

This PFRA has been carried out in accordance with the aforementioned relevant best practice guidance [65] and comprised the completion of the following key stages, using the phased approach;

- Stage 1 - Flood Risk Identification; and,
- Stage 2 - Initial Flood Risk Assessment.

Specifically, the agreed scope of works undertaken as part of the assessment comprised the elements detailed below.

7.2.1 Initial Desk-based Study

This task involved undertaking a detailed review of all available desk-based information in relation to historic flooding and potential future flood risk including the following published information:

- Tailte Éireann Online mapping [66];
- Geological Survey of Ireland ('GSI') Online mapping [67];

- The Office of Public Works ('OPW') website and Online mapping [68];
- Environmental Protection Agency ('EPA') Online mapping [39];
- Carlow County Development Plan (2022-2028) [69]
- Flood Risk Management Plan for the River Barrow (UOM14) [70]; and,
- Department of Environment, Community and Local Government Online mapping.

Additional information including Site specific design drawings were also received from the Applicant and utilised in the desk-based assessment work. A topographical survey was also conducted and reviewed as part of the desk-based assessment work.

7.2.2 Site Walkover Surveys

A Site walkover was completed on the 17th May 2024 and 29th January 2025 by an MOR Environmental Consultant. Visual assessments of ground conditions at the Site were undertaken during this visit. A windshield survey of activities in the immediate vicinity of the Site was also completed.

7.2.3 Data Assessment and Reporting

All available information from the site visits and desk-based studies has been evaluated and the findings are presented in this chapter.

7.3 Stage 1 – Flood Risk Identification

7.3.1 Topography

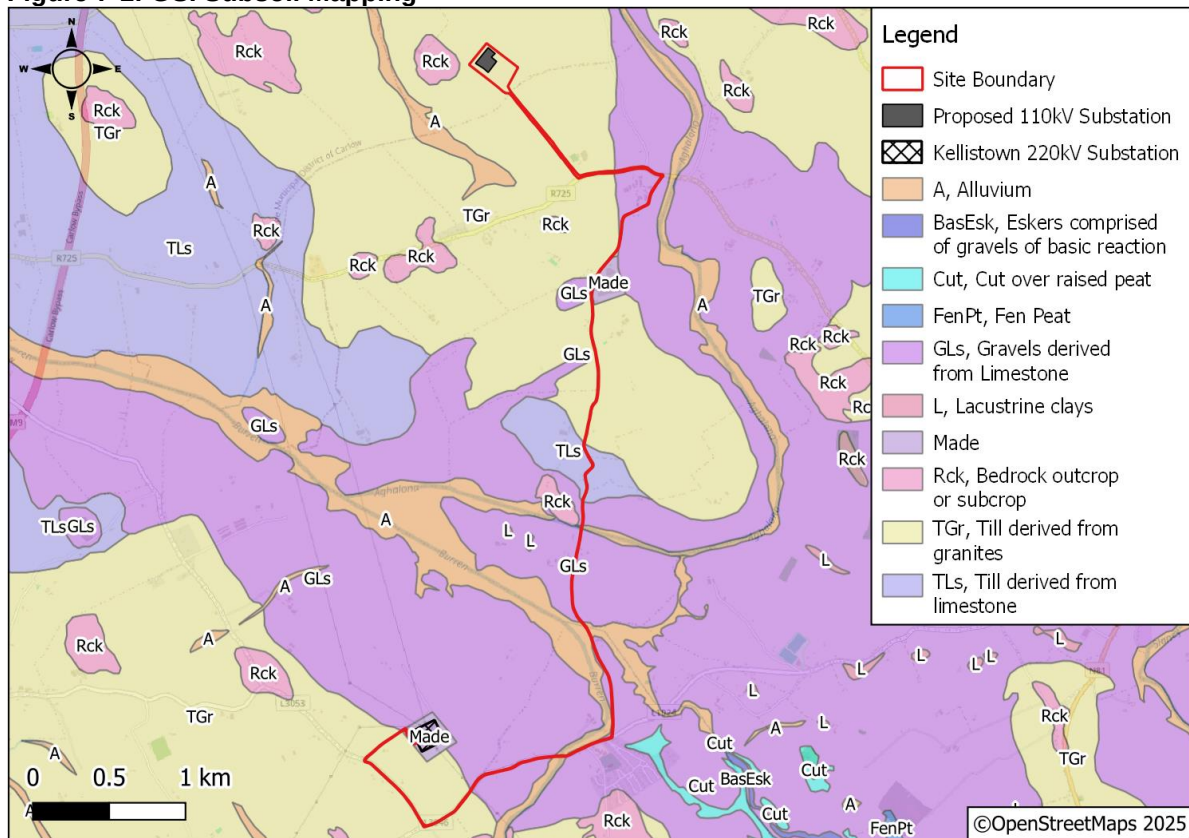
The Overall Development is located within a relatively low-lying landscape and is situated at an elevation of ca. 92 metres above Ordnance Datum ('mAOD') in the eastern section to 78mAOD in the west.

7.3.2 Subsoils and Hydrogeology

7.3.2.1 Subsoils

Based on the GSI subsoil maps, the majority of the Proposed Development is comprised primarily of tilled derived granites ('TGr'). Areas of gravels derived from limestone ('GLs'), till derived from limestone ('TLs') and alluvium ('A') are also present throughout the Site (refer to Figure 7-1).

Figure 7-1: GSI Subsoil Mapping

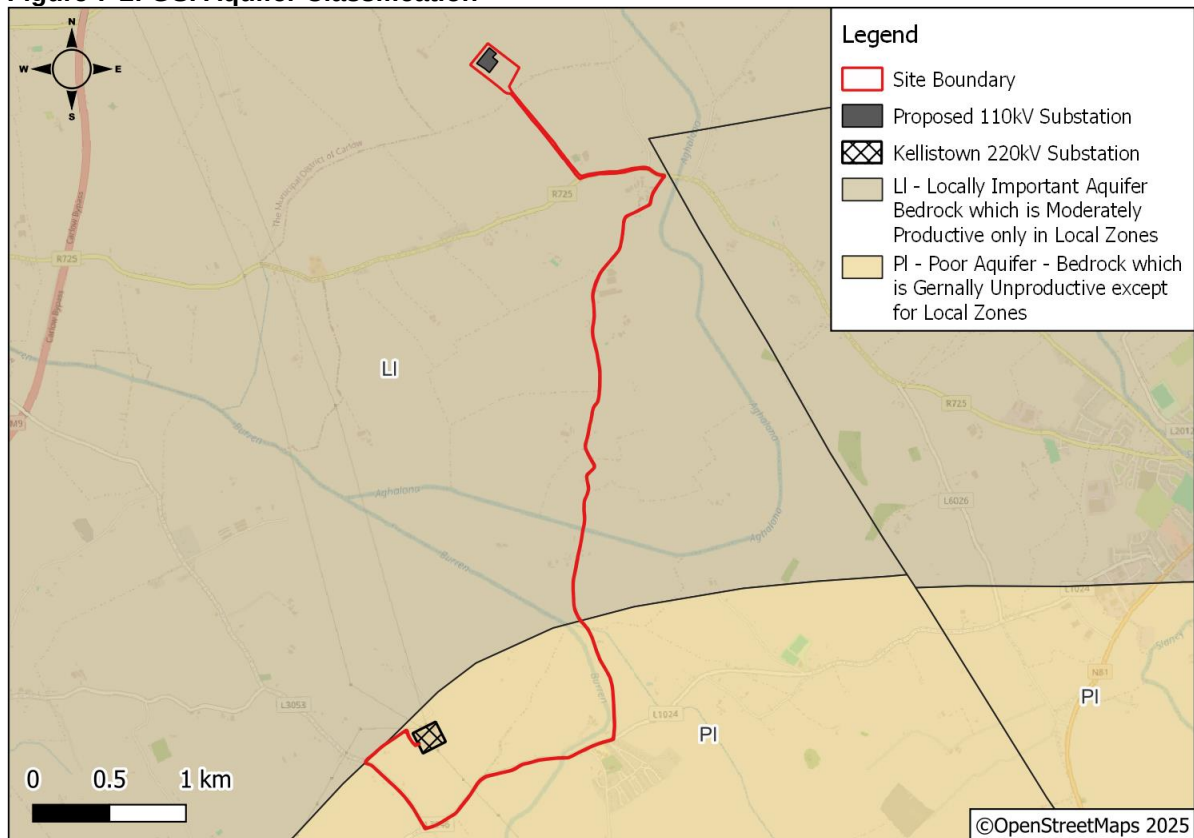


7.3.2.2 Bedrock Aquifer

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor), referring to the scale and production potential of the aquifer.

The underlying aquifer beneath the majority of the Site is classified as LI (locally important aquifer - bedrock, which is moderately productive only in local zones). The bedrock aquifer beneath a portion of the Site to the south, where a section of the proposed underground cable is situated, is classified as PI (poor aquifer – bedrock which is generally unproductive except for local zones) [71]. Refer to Figure 7-2.

Figure 7-2: GSI Aquifer Classification

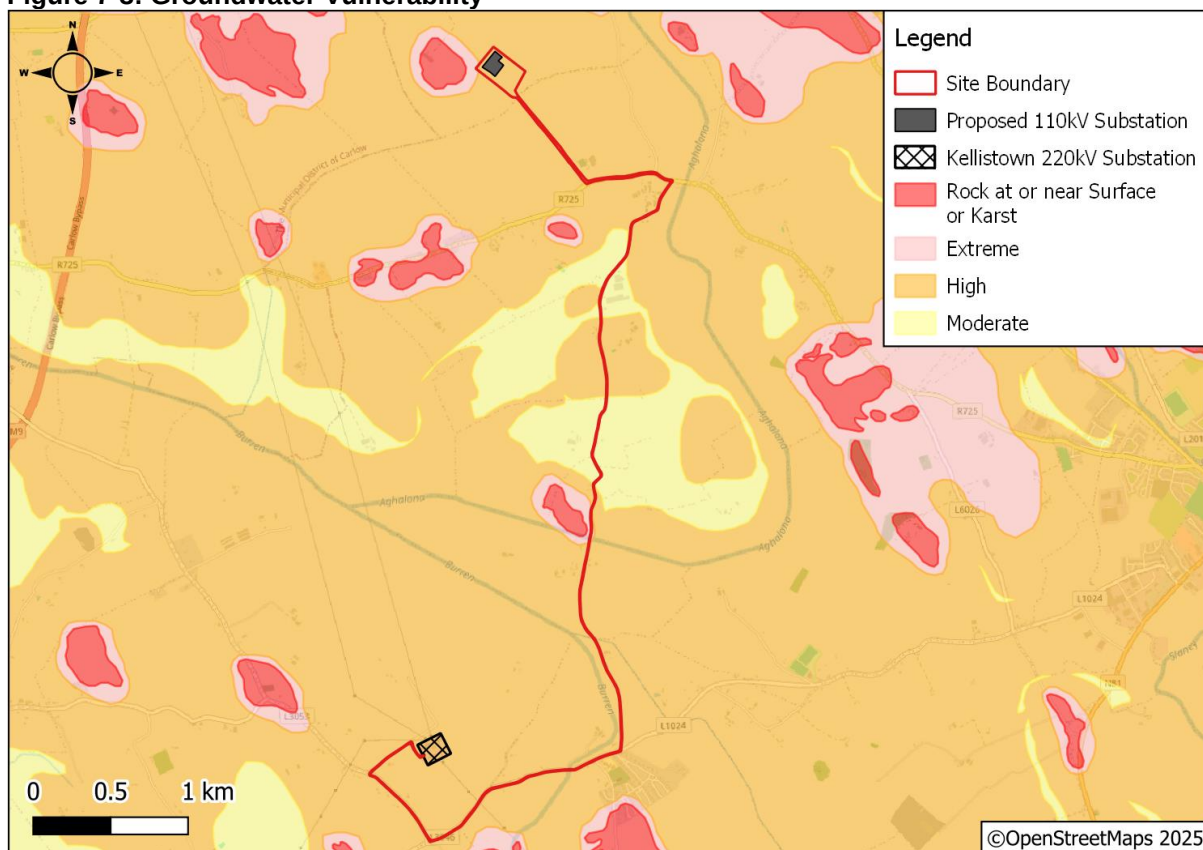


7.3.2.3 Groundwater Vulnerability

The GSI provides a methodology for aquifer classification based on vulnerability (Karst, Extreme, High, Moderate or Low), referring to the ease with which groundwater may be contaminated by human activities (vulnerability classification primarily based on the permeability and thickness of subsoils) [71].

According to the GSI database, the groundwater vulnerability across the Site ranges from High to Extreme [71]. However, a review of the GSI, shows no karst features within the vicinity of the Proposed Development.

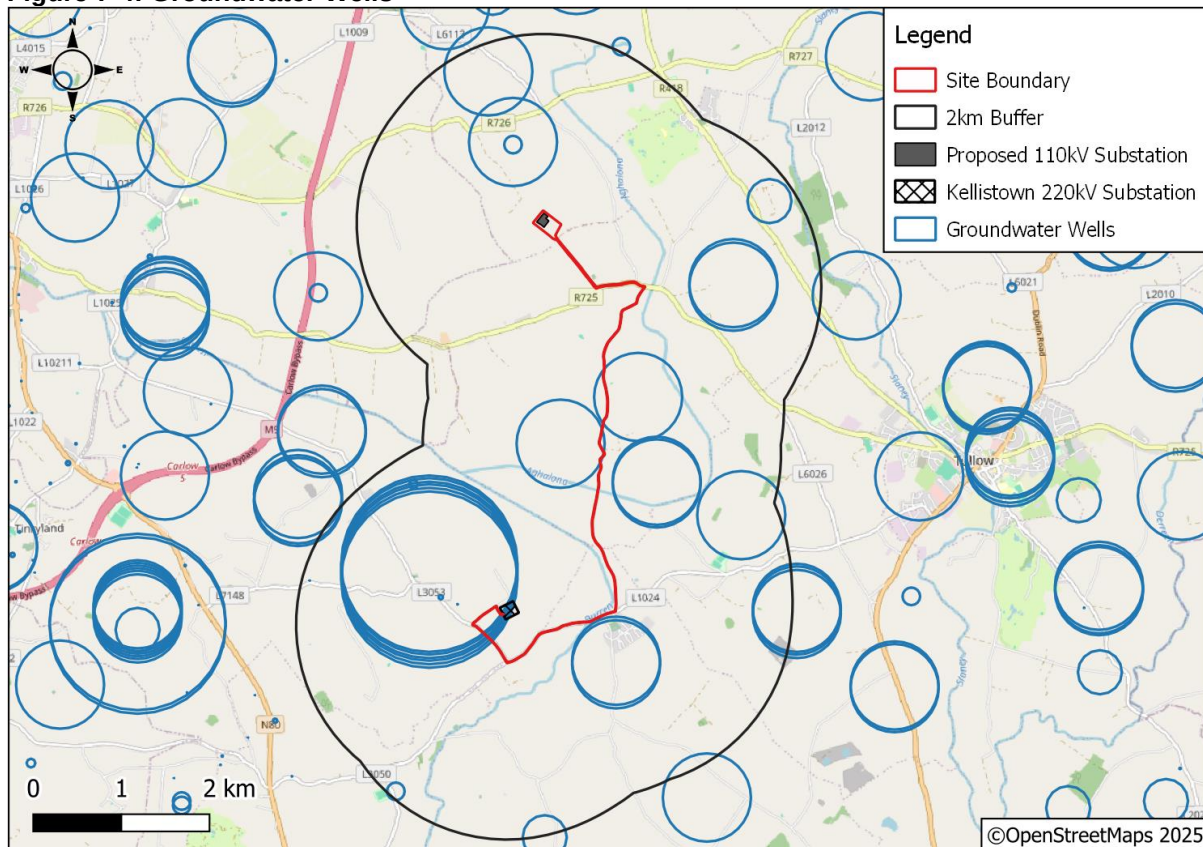
Figure 7-3: Groundwater Vulnerability



7.3.2.4 Groundwater Use and Source Protection

There are no source protection areas within 2km of the Site. A search of the GSI groundwater well database was conducted to identify registered wells in the surrounding area. There are sixteen groundwater wells recorded within a 2km radius of the Site [71]. The location of the identified groundwater wells is presented in Figure 7-4.

Figure 7-4: Groundwater Wells



7.3.2.5 Groundwater Quality

The European Communities Environmental Objectives (Groundwater) Regulations (S.I. 366 of 2016) [72] came into effect on 15th July 2016. The aim of the Regulations is to achieve the environmental objectives established for groundwater by Article 4 (1) (b) of the WFD (2000/60/EC).

Classification of groundwater bodies differs from that undertaken for surface water bodies, in that the surface water standards relate to ecological status. Groundwater status does not directly assess ecology, but the classification process takes account of the ecological needs of the relevant rivers, lakes and groundwater-dependent terrestrial ecosystems that depend on contributions from groundwater. Another key component of the groundwater classification is assessment of the impact of pollution on the uses (or potential uses) of groundwater from the groundwater body, for example, water supply.

The objectives of the WFD are to protect all high-status waters, prevent further deterioration of all waters and to restore degraded surface and groundwater to good status [73].

The Site is underlain by two Groundwater Bodies ('GWB'), the New Ross GWB and the Burren Valley Gravels GWB. The status of both GWBs (based on the monitoring period 2016 to 2021) is considered 'good'. Both GWBs are considered to be 'not at risk' in relation to the WFD objectives [39].

7.3.3 Hydrology

As per EPA maps, there are six hydrological features of note within close proximity to the Proposed Development.

The Site is situated within the Barrow WFD Catchment [Catchment_ID: 14] and the Barrow_SC_090 subcatchment [Subcatchment_ID: 14_13] [1].

There are no open watercourses within the proposed 110kV substation site. However, as per EPA maps there are six hydrological features of note within close proximity to the Site and three watercourses will be crossed via the UGC route.

1. The Ardnehue River.

The Ardnehue River is located ca. 560m to the west / southwest of the Site at its closest point. This river flows in a south-westerly direction, draining into the Burren 14 River, ca. 3.2km downstream of the Site. The Burren 14 flows in a west / north-westerly direction, eventually discharging into the River Barrow, ca. 11.6km downstream of the Site. The River Barrow forms part of the River Barrow and River Nore SAC.

2. Grangeford Old Stream

According to the EPA maps, the Grangeford Old Stream is located ca. 230m southwest of the Site and joins the Ardnehue River (described above). However, this watercourse **was not identified** as part of the site inspection complete in May 2024.

The absence of this watercourse remains consistent with the findings of the previous site surveys completed on in 2021 and 2023, as part of the previously permitted planning applications (21/23; ABP Ref No. 309987-21 and 23/60297). This portion of the Site is noted as being 'benefited land' that was drained as part of the Drainage District and has been infilled.

3. The Baunogenasraid Stream

The Baunogenasraid Stream runs parallel to the proposed UGC for ca. 200m and then flows in a south-westerly direction. The Baunogenasraid Stream discharges into the Burren River ca 2.8km downstream.

4. The Aghalona River

The Aghalona River will be crossed by the proposed UGC via Horizontal Directional Drilling ('HDD') under the existing bridge / culvert. This river flows in a south-westerly direction before discharging into the Burren River ca. 2.5km northwest of the Site.

5. The Roscat River

The Roscat River flows in a westerly direction and discharges into the Burren River ca.165m west of the proposed UGC route. This River will be crossed by the proposed UGC via HDD under the existing bridge along the road infrastructure.

6. The Burren 14 River ('Burren River')

The Burren River flows in a north-westerly direction and discharges into the River Barrow 11.6km downstream of the Site. The proposed UGC will cross the Burren River via HDD under the existing bridge. The River Barrow forms part of the River Barrow and River Nore SAC.

Water Quality Status and Risk

Under the Water Framework Directive (WFD) 2000/60/EC, the EPA classifies the status and the risk of not achieving good water quality status for all waterbodies in Ireland [1]. According to the river waterbody WFD 2016-2021 [1], the water quality status and risk for the above-mentioned watercourses is as follows:

- The Ardnehue River has a '*moderate*' water quality status and is considered to be '*not at risk*;
- The Grangeford Old Stream has a '*good*' water quality status and is classified as '*not at risk*;
- The Baunogenasraid Stream has a '*good*' water quality status and is classified as '*not at risk*;
- The Aghalona River has a '*moderate*' water quality status and is classified as '*at risk*;

- The Roscat River is classified as ‘*moderate*’ and ‘*under review*’; and,
- The Burren River has a ‘*moderate*’ water quality status and is deemed ‘*not at risk*’ along the section of river into which the Ardnehue and Aghalona rivers drain. Approximately 3.5km downstream, the Burren River is considered to be ‘*at risk*’ of not achieving a ‘*high*’ water quality status even though its water quality remains ‘*moderate*’.

The location of the key surface water features in the vicinity of the Site are illustrated in Figure 7-5 and 7-6 below.

Figure 7-5: Watercourse in Vicinity to the Proposed Substation

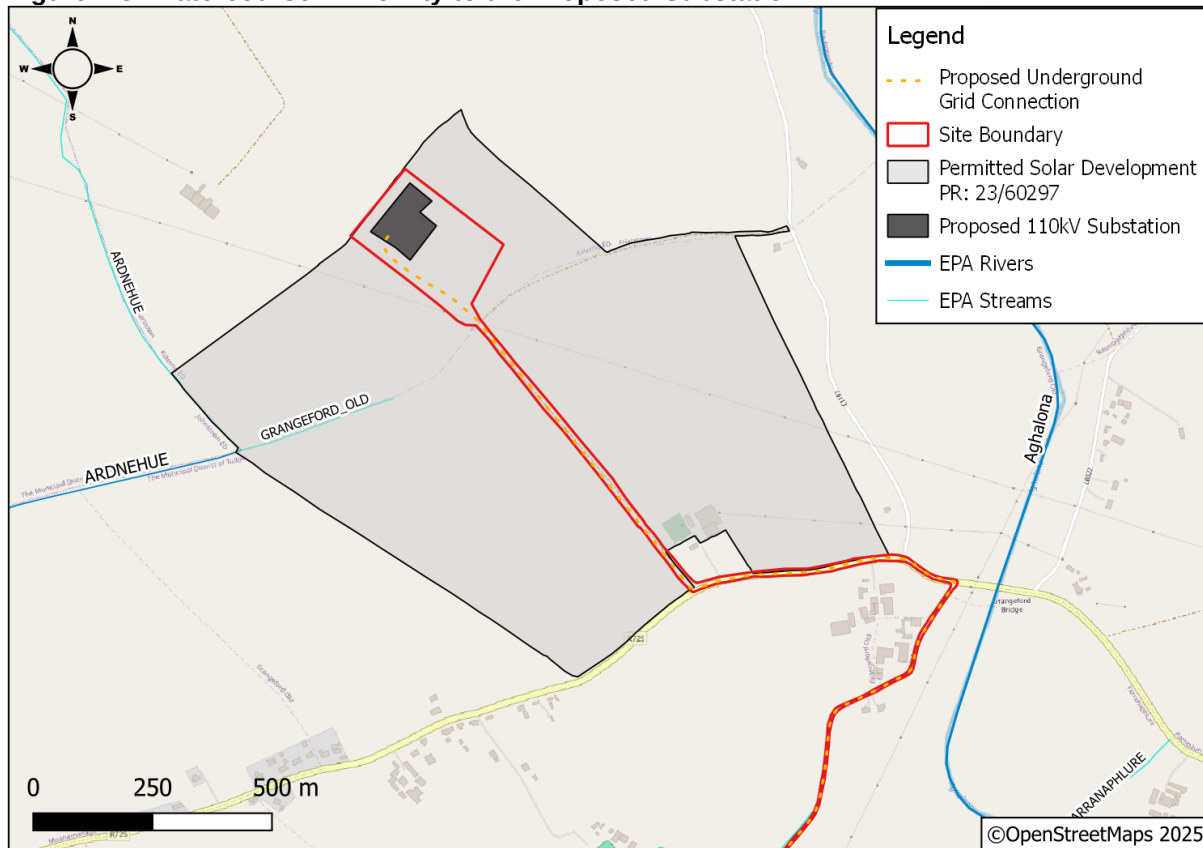


Figure 7-6: Watercourses in the vicinity to the Proposed Grid Connection

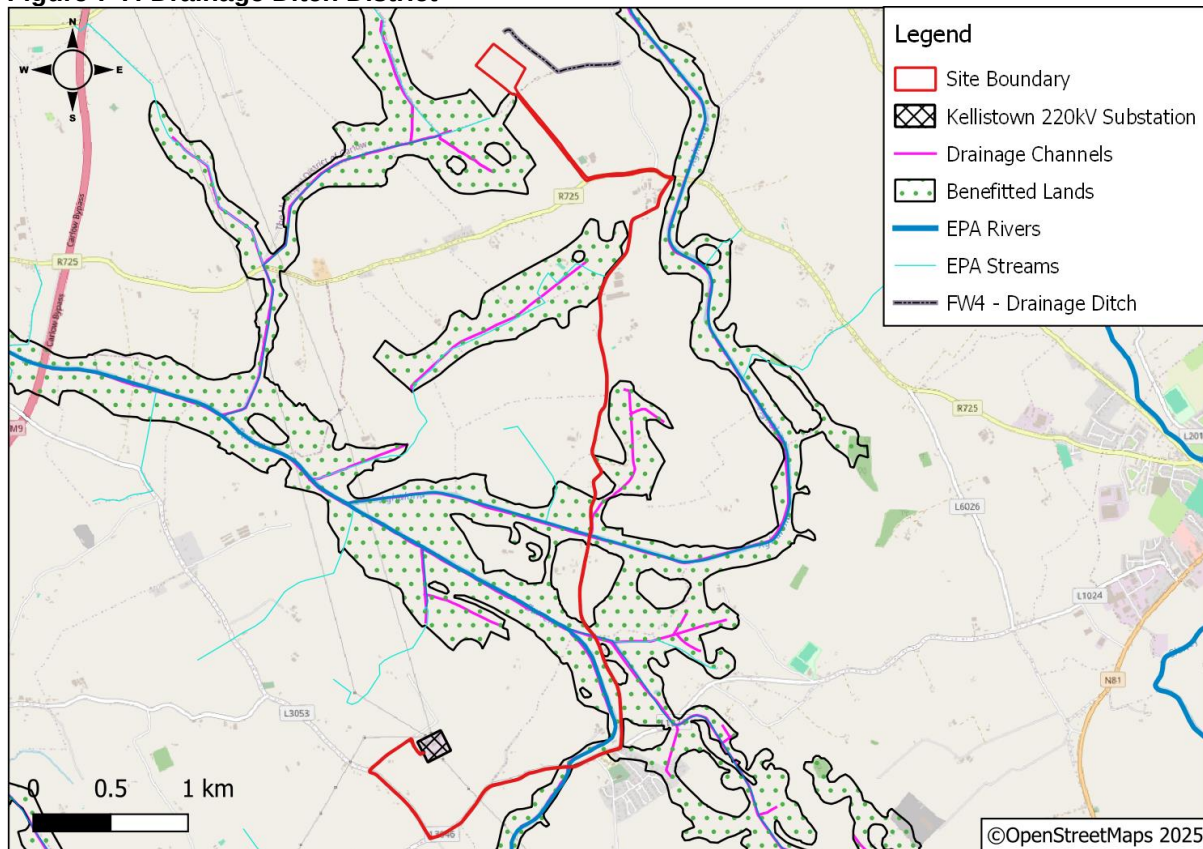


7.3.3.1 OPW Arterial Drainage Ditches

The Office of Public Works ('OPW') Flood Maps identifies Drainage Districts, Arterial Drainage Schemes and Benefited Areas. Arterial Drainage Schemes were works that were carried out under the Arterial Drainage Act, 1945 to improve land for agriculture and to mitigate flooding. The Benefited land identifies land that was drained as part of the Drainage District with the aim to improve land for agriculture and to mitigate flooding.

The Site does not form part of the Benefitted Lands Scheme, see Figure 7-7. However, a section of land within the western portion of the Permitted Solar Development, directly adjacent to the Site Boundary, forms part of the Benefitted Lands Scheme. Additionally, a drainage ditch channel was also identified within the Permitted Solar Development under the Barrow Drainage District Scheme. The drainage ditch channel is located predominately along the western perimeter of the Permitted Solar Development, ca. 100m at its closest point from the Proposed Development.

Figure 7-7: Drainage Ditch District



7.3.4 Drainage Ditch Network

There are a number of drainage ditches were noted within the vicinity of the Site, located adjacent to hedgerow / treelines along sections of the Permitted Solar Development perimeter. No drainage ditches were noted traversing the Site. The surveys undertaken at the Site in 2020, 2023 and 2024 confirmed that these ditches were not hydrologically connected to any EPA watercourse. See Figure 7-7. Such drainage regimes are typical features of agricultural lands as they facilitate drainage from the fields during periods of heavy rainfall to reduce flooding.

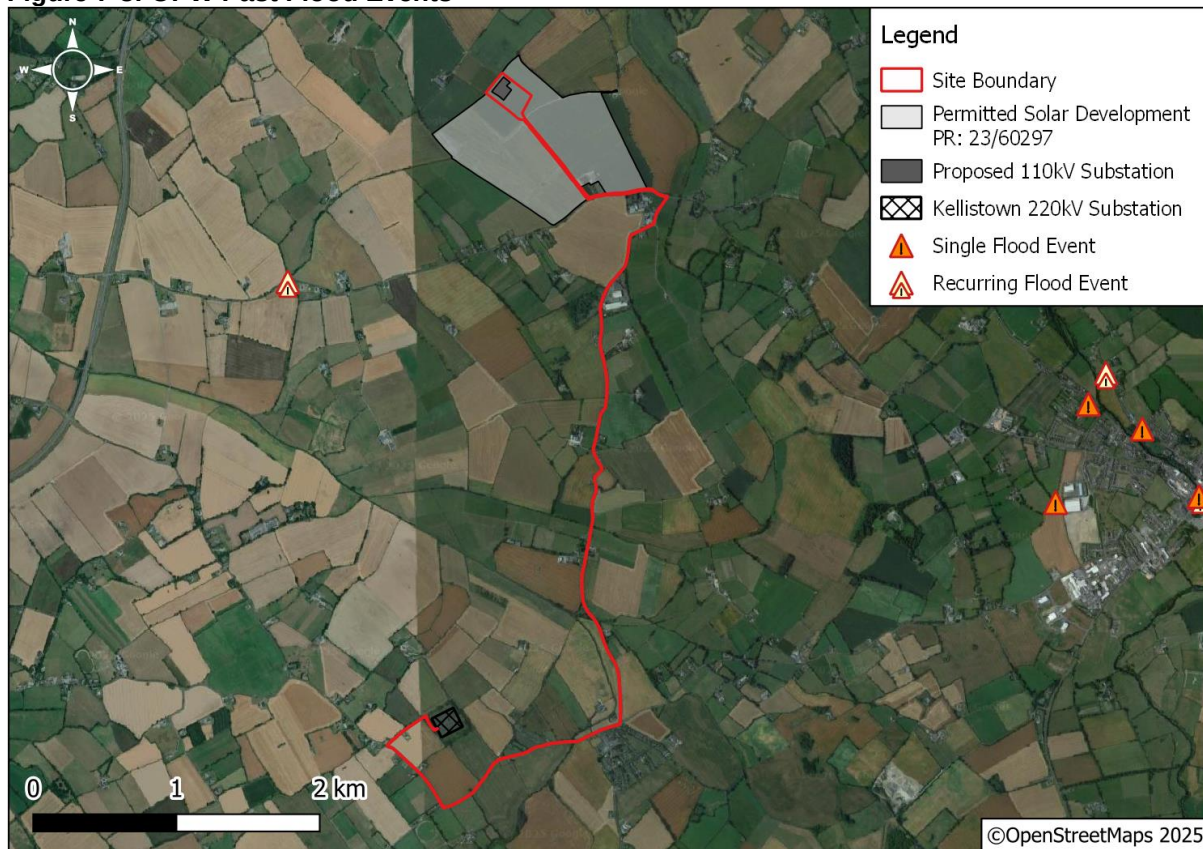
During the Site survey, a drainage ditch was noted as being located to the northeast of the Site. This drainage ditch was not hydrologically connected to the Ardnehue River. See Figure 7-7.

7.3.5 OPW National Flood Hazard Mapping

7.3.6 Potential Flood Risk

The OPW national flood hazard mapping was consulted [74]. There are no records of any flooding or flood events occurring within the Site itself. The closest historic flood event is located ca. 2.2km southwest of the Site [74]. It is noted that this is a recurring flood event during which flooding occurs along the Ford Bridge (Flood ID 2934) due to the Ardnehue River and that the flooding leaves the road impassable periodically [75].

Figure 7-8: OPW Past Flood Events



7.3.7 Available Detailed Flood Risk Assessments

Finalised flood risk assessment maps were published by the OPW as part of the Catchment Flood Risk Assessment and Management ('CFRAM') programme and were launched via the 'Flood Info' website in May 2018. Under this programme, a Flood Risk Management Plan for the Barrow River (UOM14) was compiled [76].

7.4 Stage 2 – Initial Flood Risk Assessment

7.4.1 Appraisal of the Availability and Adequacy of Existing Information

Based on the findings of the desk-based assessment and the Site surveys, and taking into account the additional available information, it is considered that there is sufficient technical information to complete this PFRA.

The key potential impacts to the receiving water environment which could arise from the Proposed Development have been identified as follows:

- Potential impact to surface water / groundwater quality; and,
- Potential flood risk.

Accordingly, each of these potential impacts have been further assessed for both the construction and operational phases of the Proposed Development.

7.4.2 Evaluation of Potential Sources of Flooding

The following types of flooding sources have been identified, which could affect the Proposed Development:

- Groundwater systems and infiltration capacity of the soils;
- Fluvial flood risk posed by nearby watercourses and onsite drainage ditches; and,

- Pluvial flood risk posed by heavy rainfall and associated surface water ponding.

Accordingly, each of these potential sources of flooding warrants further consideration as part of this assessment.

7.5 Review of Available Detailed Flood Risk Mapping – Key Findings

7.5.1 Groundwater Systems and Infiltration Capacity of the Soils

Based on the characteristics of the aquifer beneath the Site and the absence of any karst features, the potential flood risk posed by groundwater sources was considered to be negligible and will not be considered further.

7.5.2 Fluvial Flooding Risk posed by Onsite Drainage Ditch

Based on the currently available information from the OPW CFRAM mapping and National Indicative Fluvial Mapping, there is no identified risk of fluvial flooding on the Site or within close vicinity of the Site [68].

7.5.3 Pluvial Flood Risk posed by Heavy Rainfall and Associated Surface Water Ponding

A review of the currently available OPW information shows that there is no potential pluvial flooding (i.e., flooding as a result of rainfall-generated overland flowing before the water enters a watercourse) within the Site [68]. Furthermore, the Site is underlain by moderately well-draining soils and the drainage ditches onsite are regularly maintained. Therefore, it is not considered that there is a risk of pluvial flooding within the Site.

7.5.4 Potential Impact to Surface Water / Groundwater Quality

7.5.5 Construction Phase

The Proposed Development will involve the construction of a 110kV substation along with associated infrastructure and an UGC, as detailed in Chapter 5. Only minimal ground disturbance and localised levelling works will be required for the overall development of the Site. These will include the following:

- Topsoil will need to be removed specifically from the locations of the substation. However, it will be expected to comprise a concrete foundation for the substation building, with the rest of the area filled with crushed rock;
- Underground cable trenches and cabling connecting the proposed on-site 110kV substation to Kellistown 220kv substation; and,
- Associated groundworks and access tracks.

No in-river works will be required during the construction of the Proposed Development. As part of the UGC, the Aghalona River, Roscat River and Burren River will be crossed by the Proposed Development. The crossing will be carried out using HDD. This method will drill beneath the watercourses and will avoid any disturbance to these streams.

Construction and Site development works, in general, can potentially impact on surface water and groundwater quality. Potential impacts include the following:

- Silt runoff and the incorrect handling of deleterious materials such as lubricants, waste oils, cement etc.; and,
- Earthmoving activities have the potential to release sediment, and additionally, cement can enter waterbodies during construction works.

Should run-off of potential pollutants from the construction area reach groundwater, this could impact negatively on groundwater quality beneath the Site.

All construction works will be undertaken in accordance with recognised best practice guidance. Nonetheless, mitigation measures will be put in place as part of the Site-specific CEMP to minimise the potential risk to groundwater quality associated with the construction phase of the Proposed Development.

7.5.6 Potential Impact of Development when Operational

Once completed, the majority of the surfaces onsite will be permeable, i.e. hardcore installed on top of a geotextile; thus, rainwater will continue to percolate into the ground.

Small areas of the Proposed Development will be comprised of impermeable surfaces. The total area of hardstanding within the Proposed Development will be 666.5m², comprising the 110kV substation building (216.5m²) and the Eirgrid Switch Room (450m²).

However, all rainwater will run directly off these surfaces to the adjacent permeable surfaces of either grass or crushed stone, allowing rainwater to percolate directly to the ground. There will be no resulting alterations to the existing drainage patterns within the Site as a result of the Proposed Development.

The internal access tracks will comprise permeable hardcore, and the access road to the substation will also comprise permeable hardcore. This free-draining material will allow rainfall to permeate into the ground. It can be concluded that the Proposed Development has been designed to maintain existing greenfield conditions and, as such, will not impede drainage.

No wastewater discharges will be generated during the operational phase of the Proposed Development. As the welfare facilities on the Site will be infrequently used, it is proposed that foul water will be diverted into a holding tank. All wastes collected in this holding tank will be frequently removed by a suitably licensed waste contractor. In summary, no specific drainage infrastructure will be required for the Proposed Development.

7.5.7 Potential Impact of Development on Flooding Elsewhere

There will be no net increase in discharge rate or runoff volume arising from the Proposed Development. As part of the UGC, the Aghalona River, Roscat River and Burren River will be crossed by the Proposed Development. The crossing will be carried out using HDD. This method will drill beneath the watercourses and will avoid any disturbance to these streams. Therefore, the Proposed Development will not have an impact on flooding elsewhere.

7.5.8 Justification Test Criteria

According to best practice guidance [65] flood zones are geographical areas within which the likelihood of flooding is in a particular range, and they are a key tool in flood risk management within the planning process. There are three types / levels of flood zones defined for the purposes of these guidelines, as presented below:

- Flood Zone A: where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);
- Flood Zone B: where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 year for coastal flooding); and,
- Flood Zone C: where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

Based on available predictive flood mapping [74], the entire Site can be categorised as Flood Zone C. Furthermore, there is no historical evidence of any fluvial flooding in the immediate vicinity of the Site. The Proposed Development would be considered a highly vulnerable development to flood risk, as the development includes essential infrastructure (electricity generating power stations and sub-stations). However, as the Site is located in Flood Zone C,

the Proposed Development is deemed to be an ‘appropriate land use’ in accordance with the relevant Planning System and Flood Risk Guidelines [65]. Therefore, a Justification Test is not required. Refer to Figure 7-9.

Figure 7-9: Justification Test Criteria (Extract from DEHLG Guidelines, 2009)

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

7.6 Mitigation Measures

Given the above, no adverse impacts in regard to flooding as a result of the Proposed Development are anticipated.

As part of the Proposed Development, a site-specific CEMP will be implemented to ensure that construction works will have no significant impacts on water quality and will not result in excess runoff or soil erosion / compaction of the soils. The following measures will be implemented during the construction and operational phases of the Proposed Development.

7.6.1 Construction Phase

The following mitigation measures will be implemented through the Site-specific CEMP to ensure that water quality is protected within the vicinity of the Proposed Development. These measures will include the following:

- All materials shall be stored at the main contractor compound and transported to the works zone immediately prior to construction;
- Excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows;
- No surface water runoff will be discharged onto public roads, foul sewers, or adjacent property;
- Weather conditions will be considered when planning construction activities to minimise risk of run off from the Site;
- Provision of exclusion zones and barriers between any stockpiled materials and any surface water features to prevent sediment washing into the receiving water environment;
- An Environmental Clerk of Works shall be engaged to periodically inspect all elements of the works for their entire duration;
- Emergency response procedures will be put in place;
- Chemicals used will be biodegradable where possible;
- Preventive maintenance and relevant maintenance logs will be kept for all on-site plant and equipment;

- Adequate spill kits including absorbent booms and other absorbent material will be maintained onsite;
- All contractor workers will be appropriately trained in the use of spill kits;
- Any spillage of cementitious materials will be cleaned-up immediately;
- Any sediments adversely effected by contamination will be excavated and stored in appropriate sealed containers for disposal offsite in accordance with all relevant waste management legislation;
- The working area will be clearly defined, and construction activities will be carefully planned to minimise ground disturbance;
- Vegetation clearance will be limited where possible;
- Stockpiles of material will be covered during periods of prolonged or heavy rain and will be located away from ditches;
- Concrete pours will be adequately planned and executed;
- Any pouring of concrete will only be carried out in dry weather. Washout of concrete trucks will not be permitted onsite;
- Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening;
- Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete;
- Surplus concrete will be returned to the batch plant or offsite concrete wash facility after completion of a pour;
- Any spillage of cementitious materials will be cleaned up immediately;
- Washouts of equipment used for concrete operations will be done either off-site or within a designated washout area, which will comprise a container that will capture the washout material / water for reuse or disposal off-site.

The proposed measures to remove the risk from potential contamination and emergency procedures to be implemented in the event of an accidental release or spill of potentially contaminating substances are outlined below.

These procedures will be communicated to all relevant site staff. At a minimum, the following measures will be in place:

- Any chemical / oils to be stored onsite will be placed within a bund on an area of hardstanding to ensure there is no seepage of pollutants into groundwater or surface water;
- All bunds will have the capacity of the largest tank volume plus 10 per cent, at a minimum, with additional capacity to hold 30mm of rainfall;
- All drainage from bund areas will be directed to secure containment prior to suitable disposal;
- Fuelling, refuelling and lubrication of equipment will be carried out off-site;
- All plant and machinery will be serviced before being mobilised to the Site;
- No vehicle or equipment maintenance work will take place on-site;
- Appropriate containment facilities will be provided to ensure that any spills from vehicles are contained and removed off-site. Adequate stocks of absorbent materials, such as sand or commercially available spill kits, shall be available;

- The Contractor shall ensure that all personnel working onsite will be trained in pollution incident control response;
- A regular review of weather forecasts for heavy rainfall events will be undertaken with works scheduled accordingly;
- No storage of hydrocarbons or any polluting chemicals will occur within 5m of watercourses or surface water features;
- Design and installation of fuel bowsters to be in accordance with best practice guidelines;
- Drip trays and spill kits will be kept available onsite;
- Cabins, containers, workshops, plant, materials storage, and storage tanks shall not be located within 20m of any watercourse;
- Measures will be implemented to minimise waste and ensure correct handling, storage, and disposal of waste;
- Fuel and oil stores, including tanks and drums will be regularly inspected for leaks and signs of damage; and,
- Drip trays will be used for fixed or mobile plant, such as pumps and generators, in order to retain oil leaks and spills.

Periodic visual monitoring will be undertaken by the contractor during the construction works to ensure that the above measures are effective.

Additionally, the contractor will maintain a drainage inspection regime to ensure there is no negative impact to the drainage patterns at the Site.

7.6.2 Operational Phase

The Proposed Development will result in a change of land-use at the Site from agricultural land to a 110kV substation, greatly reducing the potential for fertilisers and pesticides entering into the nearby watercourses. Throughout the Operational Phase of the Proposed Development, monitoring and maintenance will be undertaken to ensure excess runoff or soil erosion / compaction does not occur.

During the Operational Phase, should there be any need to carry out works requiring machinery to traffic across the Site, an appropriate temporary construction access surface will be used, depending on ground conditions. Once operational, the development will receive occasional maintenance visits. Should any unforeseen changes in the soil management of the Site occur, they will be detected at an early stage, and remedial measures will be implemented accordingly.

Decommissioning

The Proposed Development will have a life span of 40 years, at which time the Overall Development will be decommissioned, and the Site returned to agricultural use. Upon decommissioning, the same measures will be applied as during the construction phase. After removal of the infrastructure, the Site will be inspected, cultivated and seeded to suit future land use requirements.

Mitigation measures outlined above will minimise the identified potential risks to soils and water quality associated with the Operational Phase of the Proposed Development.

7.7 Cumulative Impact

Based on the nature of the Proposed Development, as well as the design measures and mitigation measures to be implemented, it is not anticipated that the Proposed Development

will result in any significant cumulative impacts in regard to surface water / groundwater quality at the Site or in the surrounding area.

Furthermore, as part of the adjoining PV Development (Ref. No 1946), the Planners Report noted that the project would not impact on the flood regime elsewhere in the catchment. Therefore, the cumulative impact from the solar farm alongside the Proposed Development will not be likely to result in an impact on flooding.

7.8 Assessment Conclusions

- This PFRA has been completed for the Proposed Development, in accordance with the planning system and Flood Risk Management Guidelines [66];
- As there will be no net increase in the discharge rate or runoff volume from the Proposed Development, it will not have any impact on any potential off-site flooding events;
- In accordance with the relevant Planning System and Flood Risk Guidelines [66], a Justification Test is not required;
- The Proposed Development will not require any alterations to the existing drainage network; and,
- The Proposed Development will not result in any adverse impact to the hydrological regime of the receiving environment as there will be no identified impact on-site or any off-site receptors. Therefore, it is considered that the Proposed Development is an appropriate development for this location from a flood risk perspective.

8 NOISE

This chapter provides a noise impact assessment, comprehensively assessing the likely noise arising during the construction and operational phases of the Proposed Development over its lifetime. The Proposed Development is in lieu of the 38kV substations permitted (PR, 23/60297).

8.1 Scope

The aim of this Chapter is to:

- Characterise the existing ambient acoustic environment;
- Identify local Noise Sensitive Receptors ('NSRs') to the Site;
- Assess the likely noise emissions arising during construction;
- Assess the likely noise emissions from identified noise sources during operation of the Proposed Development;
- Assess the likely impact from the Proposed Development on NSRs; and,
- Identify any relevant mitigation measures, where appropriate.

A glossary of terms of the main parameters utilised are detailed below:

- $L_{Aeq,T}$ is the equivalent continuous sound level, used to describe the fluctuating noise in terms of a single noise level over the same sampling time period (T); and,
- $L_{A90,T}$ is the A-weighted noise level in the lower 90 percentile of the sampling interval 'T', excludes intermittent features typical of traffic and typically utilised to describe background noise.

A full acoustic glossary of terms is given in Appendix E-1.

8.2 Methodology

The following documentation was reviewed and utilised in the preparation of this report:

- BS 5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites, Noise [77];
- BS5228-2:2009, Code of practice for noise and vibration control on construction and open sites, Vibration [78];
- BS 7385-1 Evaluation and measurement for vibration in buildings – Part 1 Guide for measurement of vibrations and evaluation of their effects on buildings [79]
- S.I. No. 549/2018 European Communities (Environmental Noise) Regulations 2018 [80];
- AACI Environmental Noise Guidelines for Local Authorities [81]
- ANC Guidelines (Greenbook) Environmental noise measurement guide 2013 [82];
- ISO 1996-1:2016 Acoustics - Description, measurements, and assessment of environmental noise - Part 1: Basic quantities and assessment procedures 2003 [83];
- ISO 1996-2:2017 Acoustics - Description, measurements, and assessment of environmental noise - Part 2: Determination of sound pressure levels [84];
- ISO 9613-1:1993 Acoustics — Attenuation of sound during propagation outdoors — Part 1: Calculation of the absorption of sound by the atmosphere [85];

- ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation [86];
- ISO 9613-2:2024 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation [87];
- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) [88];
- Institute of Acoustics ('IOA') / Institute of Environmental Management and Acoustics ('IEMA') Guidelines for Environmental Noise Impact Assessment, 2014 [89];
- NRA Guidelines for the treatment of noise and vibration in National Road Schemes, 2004 [90];
- NRA Good practice guidance for the treatment of noise during the planning of National Road schemes, March 2014 [91];
- Smith, Peterson and Owens Acoustics and Noise Control, 1996 [92];
- World Health Organization's ('WHO') Night noise guidelines for Europe [93];
- World Health Organization's ('WHO') Environmental Noise Guidelines for the European Region 2018 [94];
- Carlow Noise Action Plan 2024-2028 [95]; and,
- Carlow County Development Plan 2022-2028 [69].

This Chapter took the following approach to assess potential impacts arising from the Proposed Development based on the best practice guidelines outlined above:

- Characterisation of the existing acoustic environment;
- Identification of NSR's through desk-based and a Site visit;
- Characterisation of the Proposed Development and the identification of likely noise emissions through a review of our in-house acoustic library and previous experience;
- Identification of the propagation of noise between the Proposed Development and NSR's utilising standard propagation equations as per ISO standards;
- Calculation of the likely impact on the acoustic environment through reference to best practice guidance and standards; and,
- Assessment of the significance of the likely impact from the Proposed Development.

8.2.1 Competency

The detailed desk-based assessment and the design of monitoring programme was undertaken by a MOR Environmental acoustician and Associate Director, who is a full member of the Institute of Acoustics ('MIOA') and a member of the Association of Acoustic Consultants of Ireland ('AACI'¹) with over 15+ years' experience.

8.2.2 Desk-Based Assessment

The assessment incorporated the following elements:

- Review of all drawings prepared for permitted development and the SID application;
- Review of the 'Construction Traffic Management Plan' Prepared by MOR Environmental;

¹ The Association of Acoustic Consultants Ireland ('AACI') is the European Acoustics Association (EAA's) membership society for the Republic of Ireland, since January 2021.

- Characterisation of the local noise environment utilising published and publicly available information; and,
- Review of best practice UK guidance for battery storage noise impact assessments in the current absence of an Irish or recognised international project-specific standards or guidance documents.

The CDP 2022-2028 has the following statement in relation to noise pollution policy objectives:

“NP. P1: Have regard to the provisions of the Environmental Protection Agency (EPA) Acts 1992 and 2003 and the Environmental Protection Agency Act (Noise) Regulations 1994 or any amendments there to when assessing planning applications.

NP. P2: Support and seek the implementation of the Carlow Noise Action Plan 2018 -2023 (and any revisions thereto during the life of this Plan).

NP. P3: Regulate and control activities likely to give rise to excessive noise, other than those activities which are regulated by the Environmental Protection Agency.

NP. P4: Ensure new development does not cause an unacceptable increase in noise levels affecting noise sensitive properties. Proposals for new development with the potential to create excessive noise will be required to submit a construction and/or operation management plan to control such emissions.”

The ‘National Planning Framework 2040’ was published in 2018 and specific reference to noise is made under Objective 65:

“Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans.”

8.2.3 Planning Reference 23/60297

Related to noise the following conditions from the Planning Application 23/60297 stated:

Condition 15

- a) Noise and vibration during the construction phase at sensitive receptors, shall be limited to the levels recommended in BS5228-1:2009+A1:2014 respectively.
- b) Noise emissions during the operational phase of the development when measured at noise sensitive locations shall not exceed the following limits:
 - i. Daytime (07:00 to 19:00) 55dB $L_{Ar,T}$;
 - ii. Evening (19:00 to 23:00) 50dB $L_{Ar,T}$; and,
 - iii. Night (23:00 to 07:00) 45dB $L_{Aeq,T}$.
- c) There shall be no tonal or impulsive element in night-time noise emissions during the operational phase of the development; and,
- d) Following the commissioning of the development and in order to demonstrate that operational noise limits are being adhered to, a programme for noise monitoring shall be submitted for the written agreement of the Planning Authority. Exceedance of noise limits shall require additional mitigation measures.

Condition 22

- a) ‘Best Practicable Means’ shall be used to prevent/minimise noise and dust emissions during the construction and decommissioning phases of the

development, through the provision and proper maintenance, use and operation of all machinery to the satisfaction of the Planning Authority.

d) The applicant shall ensure that all works on site are carried out in a manner such that noise and dust emissions do not result in significant impairment of, or significant interference with amenities or the environment beyond the site boundary.

8.2.4 Baseline Noise Monitoring

A detailed noise survey was completed on Tuesday 5th July 2022 for the Permitted Solar Application (PR, 23/60297). in accordance with ISO 1996-2:2017. The survey was completed during daytime (08:00 – 22:00) and night-time (22:00-08:00).

This application for the Proposed Development is still within three years of the data that was used as the baseline for the Permitted Solar Application (PR, 23/60297) and is considered to be representative and suitable for this application.

Sound measurements were carried out utilising the following equipment:

- NtI XL2 Audio Acoustic Hand-held Analyser Sound Level Meter ('SLM').

The sound level meter used for the unattended monitoring at NM2 was a:

- Cirrus Optimus Red SLM. This SLM was equipped with Frequency Analysis software and Logging software.

The SLM was calibrated prior to and following the measurement period using a:

- Bruel and Kjaer sound level calibrator Type 4231.

The SLMs were laboratory calibrated within the previous 24 months of the survey, and the field calibrator was laboratory calibrated within the previous 12 months of the survey as recommended by the manufacturer. The calibration certificates for the SLM and field calibrator utilised for the survey in 2022 are available upon request.

The SLMs were set to measure sound in the A-weighted network and with a fast (F) sampling interval, unless otherwise stated, for broadband parameters. A-weighted fast sampling is utilised to better replicate human hearing response to sound. Tonality (1/3 octave frequencies) was measured unweighted, defined as 'Z-weighting' within the BK software systems, to enable an assessment for tonality.

Wind speed and temperature was measured during the survey using a portable anemometer, a Kestral 2500.

8.2.5 Noise Modelling

Noise modelling was carried out using iNoise Version 2014 software. The Predictor-LimA Software Suite is the complete solution for all environmental noise projects. Noise predictor for industry, roads, railways, aircraft, and wind turbines are all supported. The software is used by acoustic consultants, environmental authorities, heavy industries and educational institutes.

The noise model has been developed for the Proposed Development to incorporate the new noise emission sources and the topography of the local environment. A conservative approach has been utilised using higher ground correction and without weather corrections.

The noise model only assesses site-specific emissions – i.e., it does not incorporate existing ambient sources such as road traffic. Source sound values were populated utilising the in-house MOR Environmental source library, consisting of measured sources from similar facilities and the SourceDB provided with the Predictor software package.

The plant and equipment at the future facility are taken from the layout drawing 05967-DR-150_Substation SLP:

- 2 Transformers (Substations).

The model was run utilising ISO 9613 1 & 2 for the basis of sound transmission from source to receiver.

8.2.5.1 Model Calculations

The Noise Model calculation formula is based on ISO 9613 – 1 & 2. Utilising this standard Predictor calculates the noise level as follows:

$$L|t.per = L_{dw} - C_{m,per} - C_{t,per}$$

Where;

$$L_{dw} = L_W + D_c - A$$

$L_{t,per}$	Long-term average octave (or 1/3-octave) sound pressure level (SPL) during the evaluation period in dB
L_{dw}	Equivalent continuous downwind octave (or 1/3-octave) SPL in dB
$C_{m,per}$	Meteorological correction during the evaluation period in dB
$C_{t,per}$	Correction for the active time of the source during the evaluation period in dB
L_W	Sound power level in dB(A) per octave (or 1/3-octave), re 1 pW
D_c	Directivity correction in dB
A	Attenuation (octave-band) in dB per octave (or 1/3-octave)

The attenuation A is calculated as follows:

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{fol} + A_{site} + A_{hous}$$

A_{div}	Geometrical divergence in dB
A_{atm}	Atmospheric absorption in dB/octave (or 1/3-octave)
A_{gr}	Ground effect in dB/octave (or 1/3-octave)
A_{bar}	Screening in dB/octave (or 1/3-octave)
A_{fol}	Attenuation due to foliage in dB/octave (or 1/3-octave)
A_{site}	Attenuation due to installations on an industrial site in dB/octave (or 1/3-octave)
A_{hous}	Attenuation due to housing in dB

The modelling inputs and outputs are presented in Appendix E-2. In developing the model all operational sources are deemed on or off for the time period, i.e., where a noise is on during the night-time, it is calculated as been on for the full 8-hour period and operating at full duty capacity. In reality, many emissions within the development will operate below duty capacity,

as the power transmission will be related to the power transfer and power transmission (grid requirement dependent). As such this model presents a worst-case scenario for most hours.

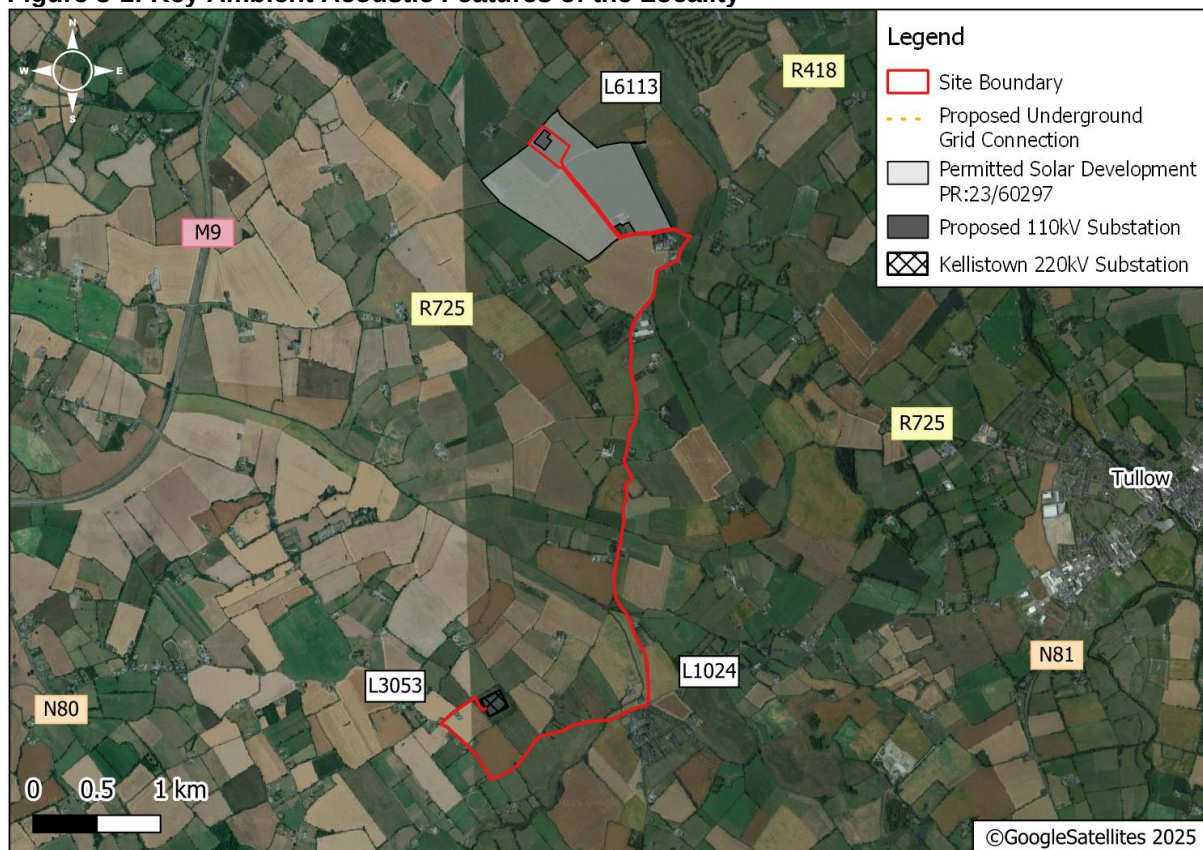
8.3 Receiving Environment

8.3.1 Site Characterisation

The key acoustic features in the locality (refer to Figure 8-1) have been identified as follows:

- Traffic on Regional Roads the R725 (South) and R726 (North) and the L6113 (East) local road;
- Distant traffic from the M9 Motorway (West), R418 (east) and surrounding Local Roads;
- Agricultural machinery and operations to the south of the Site; and,
- Livestock at various locations surrounding the Site.

Figure 8-1: Key Ambient Acoustic Features of the Locality



8.4 Quiet Area Screening

The locality was assessed for 'Quiet Area' status as per SI 549/2018 [96]. Currently the only recognised methodology for this assessment in rural areas is within the Environmental Protection Agency's ('EPA') noise guidance document NG4 [88]. As per Section 4 of the NG4 document, as assessment as to whether this rural area could be classified as 'Quiet Area' was conducted. This assessment is a desk-based review and assesses the likely impact on an area from human (anthropogenic) noise sources, such as urban and industrial areas or major infrastructural routes. The assessment is detailed in Table 8-1.

If all criteria for a 'Quiet Area', as listed in Table 8-1 below, are met, alternative methodologies to evaluate the potential impact are utilised. A 'Quiet Area' may still have high levels of noise,

from other sources, or from local road infrastructure, and additional site monitoring would be required to further characterise the acoustic environment.

Table 8-1: EPA Assessment Criteria for Rural Quiet Area

Quiet Area Criteria	Yes / No	Comment
At least 3km from any urban areas with populations greater than 1,000 persons	Yes	Carlow, ca.5.7km west of the Site, population of 27,351 (CSO, 2022). Tullow, ca.3.2km southeast of the Site, population 5,138 (CSO, 2022)
At least 10km from any urban area with a population greater than 5,000 persons	No	
At least 15km from any urban areas with a population greater than 10,000 persons	No	
At least 3km from any local industry.	No	Other commercial premises located to the south of the Site. Carlow, ca.5.7km west of the Site. Tullow, ca.3.2km southeast of the Site.
At least 10km from any major industry centre.	No	
At least 5km from any National Primary Route.	Yes	N81, ca.4.9km east of the Site.
At least 7.5km from any Motorway or Dual Carriageway.	No	M9, ca.2.4km to the west of the Site.
Finding		Not a Quiet Area. Proximity to local industrial premises, urban areas, and Motorway.

*Sources: CSO, Google Maps and www.myplan.ie

Table 8-1 shows that the area is not a rural 'Quiet Area', as per the metrics issued by the EPA. A baseline noise survey was undertaken to characterise the ambient noise environment. The scope of the assessment was to quantify both the level of existing noise and characterise the acoustic character and source(s) in the vicinity of the Site.

8.5 Noise Sensitive Receptors ('NSRs')

To assess potential noise impacts, local Noise Sensitive Receptors ('NSR's') were identified. NSRs are defined in EPA NG4 as:

'any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.'

The locations of NSR's in the vicinity of the Site are outlined in Table 8-2 and shown in Figure 8-2.

Table 8-2: NSR's in the Vicinity of the Site

NSR ID	Orientation to Site	Easting (ITM)	Northing (ITM)	Notes
NSR01	South	680841	675255	Farmyard located to the south of the Site. (Landowner)
NSR02	East	680993	675889	Dwelling located to the south of the Site. (Landowner)
NSR03	Northeast	680824	676465	Proxy for dwellings located to the Northeast of the Site.
NSR04	North	680376	676908	Dwelling located to the North of the Site.
NSR05	North	679892	676982	Dwelling located to the North of the Site.
NSR06	North	679647	676974	Dwelling located to the North of the Site.
NSR07	Northwest	679058	676259	Dwelling located to the Northwest of the Site.
NSR08	West	679007	675162	Proxy for dwellings located to the west of the Site.

NSR ID	Orientation to Site	Easting (ITM)	Northing (ITM)	Notes
NSR09	Southwest	680293	674923	Proxy for dwellings located to the southwest of the Site.

Figure 8-2: NSR and NM Locations



8.5.1 Ambient Noise Characterisation

The noise monitoring locations shown in Figure 8-2 above are described in Table 8-3 below.

Table 8-3: Noise Monitoring Locations

Monitoring Location ID	Easting	Northing	Description of Locality
NM1	680793	675241	Positioned within the Site at south boundary.
NM2	681000	675840	Positioned within the Site at east boundary.
NM3	680032	675362	Positioned within the Site at west boundary.
NM4	679437	676941	Positioned to the north of the Site.

The closest meteorological synoptic station is Carlow Oak Park, Co. Carlow ca.8km northwest of the Site. The summary of the Met Éireann weather data from this synoptic station on the days of the monitoring event is shown in Table 8-4.

Table 8-4: Met Éireann Summary for Synoptic Weather Station

Date	Rainfall (mm)	Max Temp °C	Min Temp °C	Mean Wind Speed (knots)	Maximum Gusts (if >34 knots)
05/07/2022	0.0	19.4	12.6	6.5	--

The summary results from the noise monitoring event are shown in Tables 8-5 and 8-6. The time duration 'T' for each monitoring event, unless otherwise stated were:

- 30 minutes during the daytime; and,
- 15 minutes during night-time.

Measurements were taken twice at each location. This provides 60 minutes of data per location during daytime periods and 30 minutes of data during night-time periods.

At location NM2 a continuous monitoring was conducted. The use of continuous sound level recording at this location permitted measurements without human presence. Furthermore, the deployment of the continuous sound level meter for the duration of the attended measurements allows for identification of any variations occurring outside of the attended measurements to be identified and reviewed where necessary.

Figures 8-3, 8-4 and 8-5 present the number of occurrences for parameters L_{Aeq} , L_{A90} and L_{AFmax} for the daytime, evening, and night-time periods respectively.

Table 8-5: Ambient Daytime Noise Monitoring Results 5th July 2022

Location ID	Date/Time	L _{Aeq,T} dB	L _{AFmax} dB	L _{AF90,T} dB	Commentary
N1 Day (Run 1)	05/07/2022 10:45	51	74	38	Frequent car passings on the nearby road. Bird song was audible throughout.
N1 Day (Run 2)	05/07/2022 13:08	42	68	36	Frequent car passing on the nearby road. Bird song was audible.
N3 Day (Run 1)	05/07/2022 11:35	46	64	39	Bird song was significantly audible. Gusts of wind were also prevalent.
N3 Day (Run 2)	05/07/2022 13:43	39	53	36	Bird song was the main source of noise.
N4 Day (Run 1)	05/07/2022 12:24	61	77	40	Frequent car passings on the nearby road. A tractor from the site passed by at 12:41, which led to significant noise as it was waiting for an opening in the traffic to exit. Bird song was audible.
N4 Day (Run 2)	05/07/2022 14:47	63	85	42	Traffic on the nearby road was the main source of noise. Bird song was also audible.

Table 8-6: Ambient Night-time Noise Monitoring Results 5th July 2022

Location ID	Date/Time	L _{Aeq,T} dB	L _{AFmax} dB	L _{AF90,T} dB	Commentary
N1 Night (Run 1)	05/07/2022 23:44	41	76	27	A dog was barking at multiple points during the run. Noise from cars passing on the nearby road was also audible.
N1 Night (Run 2)	06/07/2022 00:55	40	60	36	A dog was barking throughout the run. Gusts of wind and also some noise from traffic could be heard.
N3 Night (Run 1)	06/07/2022 00:29	49	87	27	Faint noise from traffic on surrounding main roads. An alarm on a nearby property went off causing elevated noise.
N3 Night (Run 2)	06/07/2022 01:17	38	70	32	Faint noise from cars on the surrounding main road. Gusts of wind were prevalent. Wind speed 0.5-1m/s.
N4 Night (Run 1)	2022-07-05 23:00	56	74	33	Frequent car passings on the nearby road were audible. No other noise detected.
N4 Night (Run 2)	2022-07-05 23:15:00	56	75	32	Frequent car passings on the nearby road were audible. No other noise detected.

Table 8-7: Continuous monitoring location NM2 5th and 6th July 2022

Location ID	Date/Time	Elapsed Time (hh:mm)	L _{Aeq,T} dB	L _{AFmax} dB	L _{AF90,T} dB	Commentary
NM2	05/07/2022 10:00:00 – 19:00 and 06/07/2022 07:00:00 – 10:00	12:00	39	55	32	09:53 – 10:08 and 00:07 – 00:22
	05/07/2022 19:00	04:00	30	53	28	Birdsong was the primary source of noise during the day while distant noise of cars and wind were the main source of noise at night.
	05/07/2022 23:00	08:00	31	48	25	Wind speed 0.5-1m/s.

Figure 8-3: Number of occurrences for parameters L_{Aeq} and L_{A90} for Daytime hours

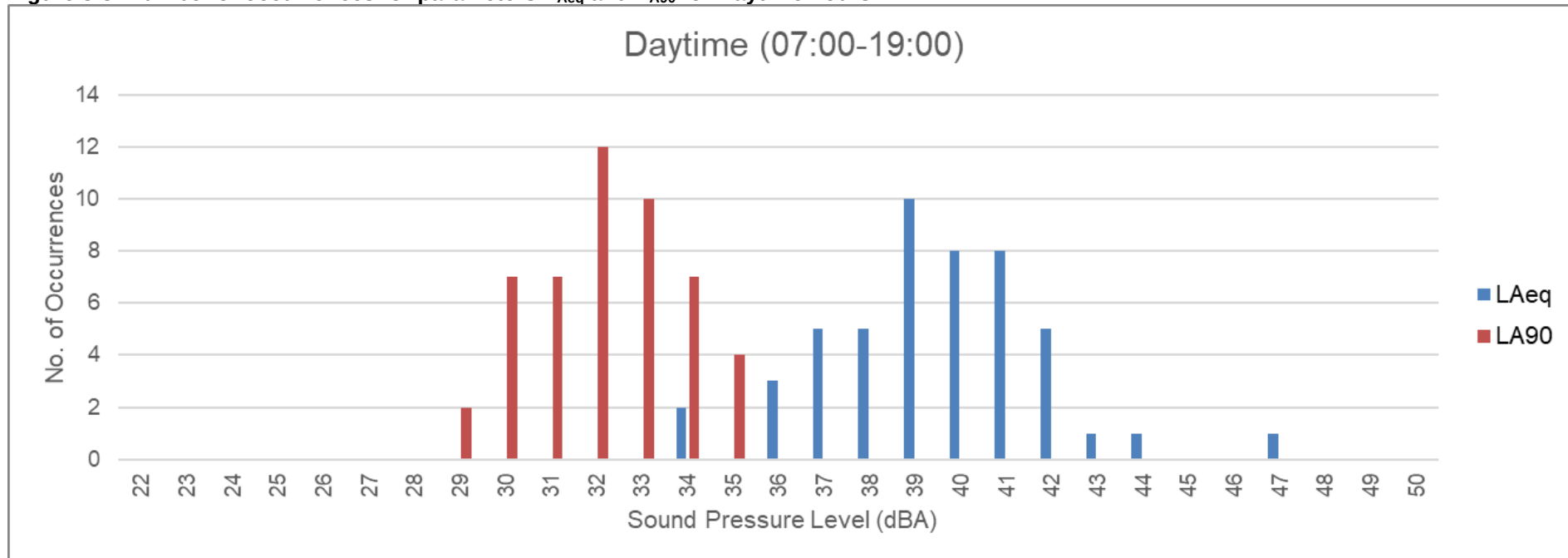


Figure 8-4: Number of occurrences for parameters L_{Aeq} and L_{A90} for Evening hours

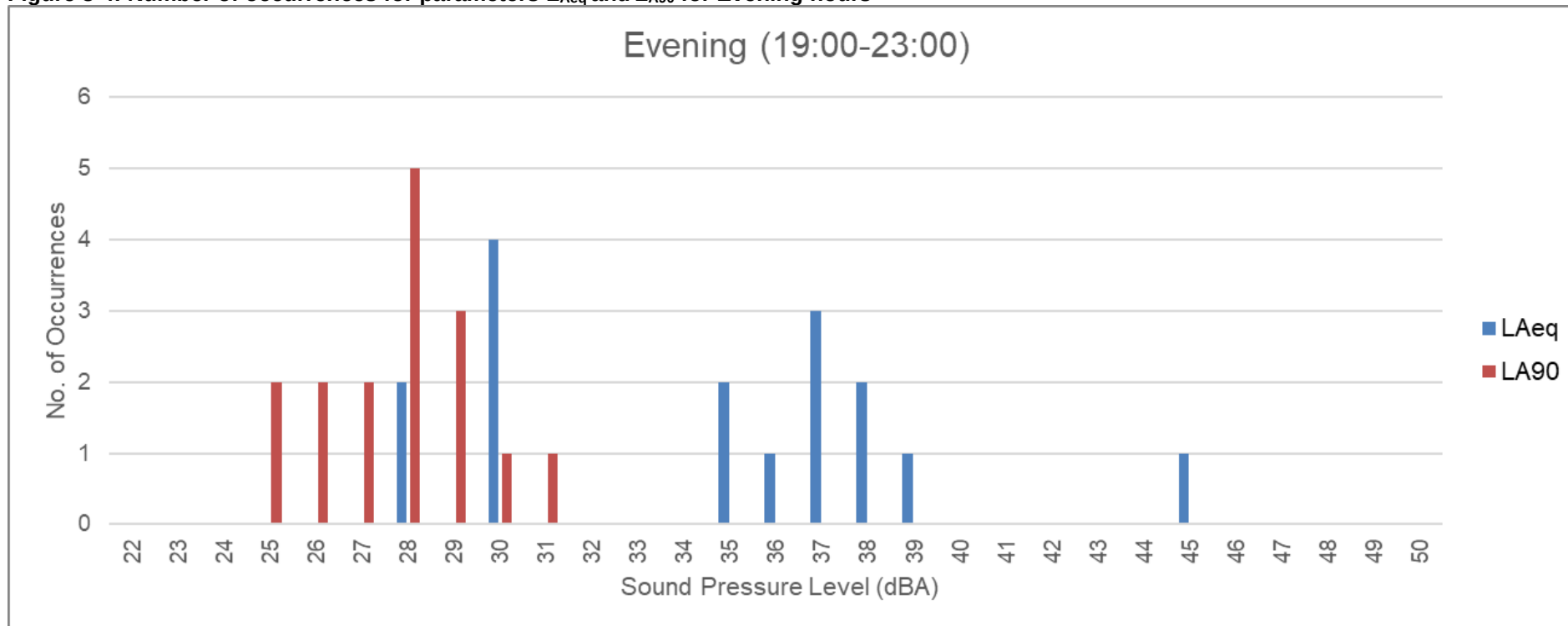
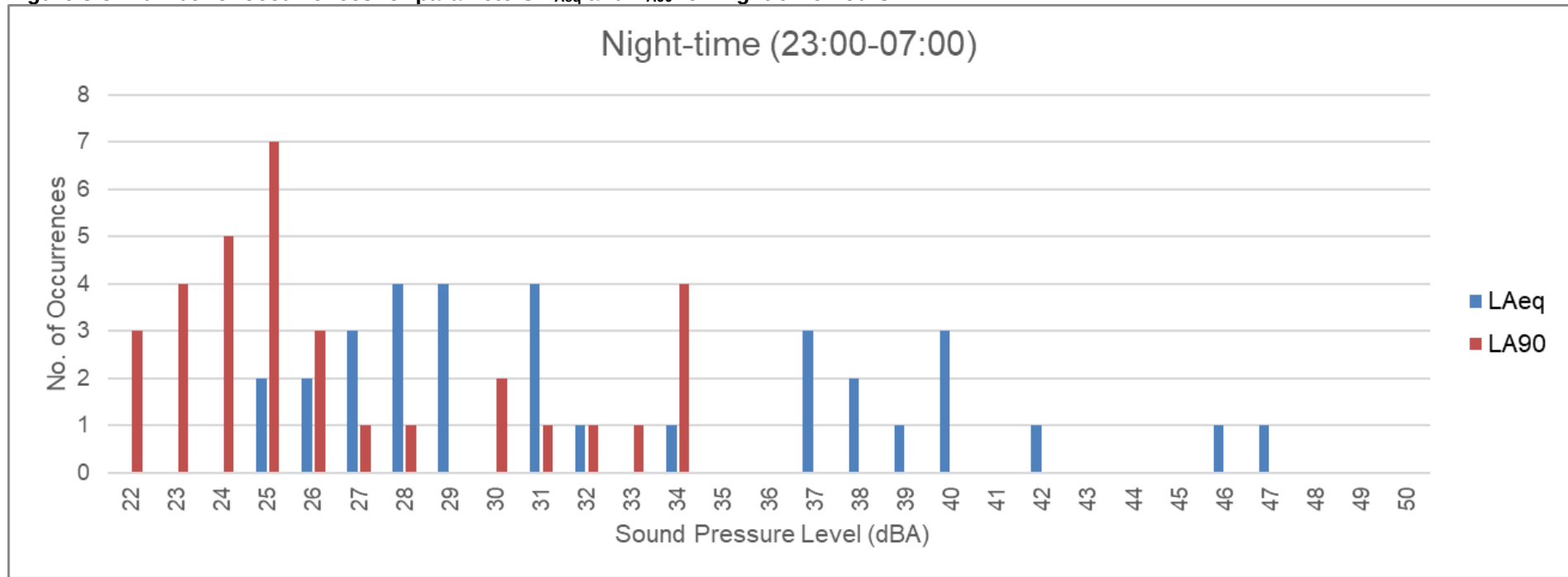


Figure 8-5: Number of occurrences for parameters L_{Aeq} and L_{A90} for Night-time hours



Frequency charts along with images from each of the monitoring locations are included in Appendix E-3.

The ambient noise environment was dominated by traffic movement on the surrounding road network during the day and night-time monitoring. Agricultural related operations and bird call and song during the day were a dominant local featured at many measurement positions.

Table 8-8 details the ambient noise characteristics that can be assigned to the identified NSR's based on the similarities between the ambient noise monitoring locations (NM1 – NM4) and the NSR locations, including proximity to industrial, agricultural and road infrastructure sources of noise.

Table 8-8: NSR Ambient Noise Characteristics

NSR ID	Monitoring ID	Period	L _{Aeq,T} Range (dB)	L _{AF90,T} Range (dB)
NSR01 NSR09	NM1	Day	42-51	36-38
		Night-time	40-41	27-36
NSR02 NSR03	NM2	Day	39	32
		Night-time	31	25
NSR04 NSR05 NSR06	NM4	Day	61-63	40-42
		Night-time	56	32-33
NSR07 NSR08	NM3	Day	39-46	36-39
		Night-time	38-49	27-32
The lowest value for each range will be selected to represent the worst-case scenario.				

8.6 Applicable Noise Criteria

8.6.1 Construction Phase Noise

A review of noise nuisance criteria in Ireland was conducted. For construction stage noise, the limits and methodology within the British Standard BS5228-1, which is designed for the assessment of noise arising from construction and open sites.

This standard identifies a methodology (the ABC method, section E.3.2 of standard) for assigning construction noise limits at NSRs based upon the ambient noise levels. An excerpt detailing the ABC method is shown Table 8-9 below.

Table 8-9: Maximum Permissible Construction Noise Levels (BS5228-1)

Assessment category and threshold value period (L _{Aeq})	Threshold value, in decibels (dB) (L _{Aeq,T})		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23:00-07:00)	45	50	55
Evening and weekends ^{D)}	55	60	65
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75
Note 1 A potential significant effect is indicated if the L _{Aeq,T} noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.			
Note 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total L _{Aeq,T} noise level for the period increases by more than 3dB due to site noise.			

Assessment category and threshold value period (L _{Aeq})	Threshold value, in decibels (dB) (L _{Aeq,T})		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Note 3 Applied to all residential receptors only.			
A)	Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.		
B)	Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.		
C)	Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.		
D)	19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday.		

Arising from the acoustic baseline survey completed by MOR Environmental, refer to Table 8-5 above, the local NSRs would classify as Category A receptors with the exemption of NSR01, under the ABC method above and thereby the following construction limits will apply at NSRs:

- L_{Aeq,1hr} 65dB – Daytime (7am to 7pm Monday to Friday, & 7am to 1pm Saturday);
- L_{Aeq,1hr} 55dB – Evening & Weekends; and,
- L_{Aeq,1hr} 45dB – Night-time (11pm to 7am).

As no evening or night-time construction works are typically required, the criteria for construction stage noise will be assessed against a daytime limit of L_{Aeq,1hr} 65dB.

NSR01 is a workplace and not a residential dwelling, therefore a L_{Aeq,1hr} 75dB limit has been applied at this NSR.

8.6.2 Construction Phase Vibration

Limits of transient vibration, above which cosmetic damage could occur, are given numerically in Table 8-10 below, an extract from BS228-2. Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 8-10, and major damage to a building structure can occur at values greater than four times the tabulate values (definition of the damage categories are presented in BS7385-1-1990 9.9).

Table 8-10: Transient Vibration Guide Values for Cosmetic Damage (BS5228-2)

Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4Hz to 15Hz	15Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4Hz and above	50 mm/s at 15Hz and above
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4Hz increasing to 20mm/s at 15Hz	20 mm/s at 15Hz increasing so 50mm/s at 40Hz and above.

The values presented in Table 8-10 above relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. These guidelines refer to relatively modern buildings and therefore, these values should be reduced

to 50% or less for more sensitive buildings. The threshold for vibration perceptions is at 0.3mm/s from Table B.1 from BS5228-2.

8.6.3 Operational Phase Noise

Although a single figure limit value is a preferred option for noise compliance, an assessment of the likely change from the ambient acoustic environment is typically a more accurate representation for the likely impact from a proposed development. There are two general methodologies for assessing the change in terms of acoustics:

- BS4142:2014; and
- IOA / EIMA.

The IOA/IEMA methodology has been selected for this assessment.

Figure 8-6 below presents the relationship between noise impact and noise effect in generating an understanding of significance from the change to an acoustic environment under the IOA / IEMA methodology.

Figure 8-6: IEMA IOA Table on Relationship between Impact and Noise Effect

MAGNITUDE (Nature of Impact)		DESCRIPTION OF EFFECT (on a specific sensitive receptor)	SIGNIFICANCE (as required within EIA)
Substantial	BENEFICIAL	Receptor perception = Marked change Causes a material change in behaviour and/or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) Less Likely to be Significant
Moderate		Receptor perception = Noticeable improvement Improved noise climate resulting in small changes in behaviour and/or attitude, e.g. turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight		Receptor perception = Just noticeable improvement Noise impact can be heard, but does not result in any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	
Negligible		N/A = No discernible effect on the receptor	Not Significant
Slight	ADVERSE	Receptor perception = Non-intrusive Noise impact can be heard, but does not cause any change in behaviour or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a significant effect) ↕ (Greater justification needed – based on impact magnitude and receptor sensitivities – to justify a non-significant effect) More Likely to be Significant
Moderate		Receptor perception = Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance ⁸¹ . Affects the character of the area such that there is a perceived change in the quality of life.	
Substantial		Receptor perception = Disruptive Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	
Severe		Receptor perception = Physically Harmful Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	

In forming an assessment on the impact, this methodology looks at the following key elements:

- The change from the baseline presented by the Proposed Development;
- Type of noise source;
- Nature of the change; and,
- Other factors.

The guidance further identifies that the impact assessment should consider the following influences:

- Averaging period;
- Time of day;
- Nature of the noise source (intermittency, etc.):
- Frequency of occurrence;
- Spectral characteristics;
- Absolute level of the noise indicator; and
- Influence of the noise indicator used.

The IEMA Guidelines note under section 2.7 regarding perception of acoustic change that:

“Measuring in decibels means that a 3 dB increase is equivalent to a doubling of the sound energy, and a 10 dB increase is a tenfold increase in energy. For broad band sounds which are very similar in all but magnitude, a change or difference in noise level of 1 dB is just perceptible under laboratory conditions, 3 dB is perceptible under most normal conditions, and a 10 dB increase generally appears to be twice as loud. These broad principles may not apply where the change in noise level is due to the introduction of a noise with different frequency and/or temporal characteristics compared to sounds making up the existing noise climate. In which case, changes of less than 1 dB may be perceptible under some circumstances.”

8.7 Sensitive Design Acoustics

As part of the design of the Permitted Solar farm, MOR environmental acoustically modelled various BESS and ancillary plant types, plant layouts, and the use of a barrier in mitigating sound emissions to ensure the Proposed Development fit with the surrounding acoustic environment.

The final layout within the Site, the positioning of a berm to the northern and eastern boundaries, and the inclusion of a 1.5m high acoustic barrier positioned on top of a 1.5m earthen embankment, total height 3m, was the result of the engineering viability and acoustic performance for this Site.

For the Proposed Development, the substation is located further away than the previously granted and over a wider area. Due to the noise sources and layout, the ca.1.5m high berm is extended to the eastern boundary of the SID. The barrier of ca. 1.5m on top of the berm is not considered to be required for the Proposed Development.

Below the acoustic assessment presents the findings from this design work in terms of the effect the construction and operation of the Proposed Development will have and the commitments by the Applicant.

8.8 Impact Assessment

An assessment of the likely impact arising from the Proposed Development on the receiving environment has been conducted. This chapter specifically assesses the construction and the operational stage effects, based on the notable acoustic differences of the two stages and the duration of effect arising from both stages.

The Proposed Development is for 110kV substation and all associated works.

8.8.1 Noise Emission Sources

The sources of noise have been selected based either upon standardised equipment, such as those likely to be used during construction, or from selection of plant currently available on the

open market for the operational stage of works. However, in both cases the effect associated with this assessment was deemed conservative i.e., the actual plant will be either quieter or will not be run for as long as assessed in this chapter.

8.8.1.1 Construction Phase

The Construction Phase consist of the construction of the Proposed Development and the connection to the 220kV Substation. The 110kV grid connection route will consist entirely of underground cables ('UGC') which will be installed in the public road network and private lands

Following TLI report, the different phases for construction are detailed for the Proposed Development and the grid connection route. The phases and their estimated duration are presented in Table 8-11 below.

Table 8-11: Sources of Construction Noise

Phase	Likely Noise Sources
Underground HV Ducting route (Preliminary)	It would be proposed to carry out Preliminary site investigations along the ducting route prior to construction to confirm design assumptions.
Ducting installation methodology	Digging and covering of trenches for cables.
Site Construction	
Horizontal Direction Drilling ('HDD')	Drilling will be the main noise source.

The movement of workers to and from the Site was not assessed within this report. All worker movements will likely peak during the 60 to 90 minutes prior and following the construction day, with associated vehicle movement on the public road network. This temporary additional construction traffic in respect of the overall annual average daily traffic volumes was predicted to be negligible in relation to existing traffic on the surrounding road network and to coincide with general commuter traffic in terms of its acoustic profile.

The Phase HDD will only take place near three locations, near the bridges presented in Figure 8-7 below.

The order of the Construction Phases and the precise work schedule within each phase will be determined by the successful contractor at the tendering stage. This noise assessment was based on the notable noise emission sources anticipated during the construction works and a typical duration and schedule of works which are outlined in Table 8-12.

Table 8-12: Predicted Noise Emissions – Construction Phase

Phase	Plant	BS5228 – 1 Ref.	Sound Pressure at 10m $L_{Aeq,T}$, dB	Combined Sound Pressure, at 10m, $L_{Aeq,T}$ dB
Underground HV Ducting route (Preliminary)	4X4 vehicle			85
	Concrete vibrator	C.2.34	80	
	Wheeled dumper	C.5.20	75	
	Soil compactor	C.4.3	76	
	360 tracked excavator (only rubber tracked machines will be allowed on public roads)	C.2.42 C.2.29	78 79	
Ducting installation methodology	Tracked excavator	C.2.29	76	81
	Dumper or tractor and trailer	C.4.3	79	
Site construction	Excavator operator	C.2.29	79	85
	360 Tracked exactor (13 ton normally, 22 ton for rock breaker)	C.4.3 C.2.14	76 79	
	Tracked dumper or tractor and trailer	C.2.29 C.4.3	79 76	
HDD	Large rotary piling rig	C.3.14	83	83

The construction plant and machinery will change as the project develops, with plant and equipment only operating within any section of the Site for a relatively short period of time. The above construction programme includes the Site structures development and associated cabling transformers and inverters across the Site.

This Noise Impact Assessment has utilised generic sound pressure values from the BS5228-1 as specific plant equipment is currently unknown. This is deemed a worst-case scenario.

8.8.1.2 Operational Phase

The noise sources related to the Operational Phase are related to the two transformers for the 110kV substation. The predicted specific noise levels at each NSR represent a predicted 'worst case scenario' for daytime and night-time where all Site-specific noise emissions onsite would be operating at full duty capacity.

Although specific plant for the Proposed Development will form part of a tender procurement process, technical information has been provided by the Client. The likely noise emissions from the Proposed Development; refer to Table 8-13 below for details.

Table 8-13: Predicted Noise Emissions – Operational Phase

Plant/Equipment Type use for acoustic assessment	Sound Pressure dB(A) at 10m
Transformer Substation	49

The key potential noise sources associated with the Proposed Development were reviewed by a senior MOR Environmental acoustician to assess likely sources of noise emissions during operation. Based on the use of each of the above components and the type of equipment to be utilised, no additional noise sources were identified.

The assessment process identified no likely significant noise emissions, such as fans, temperature control systems or internal high noise plant, within the other buildings and structures proposed for the development.

8.8.2 Construction Phase Noise

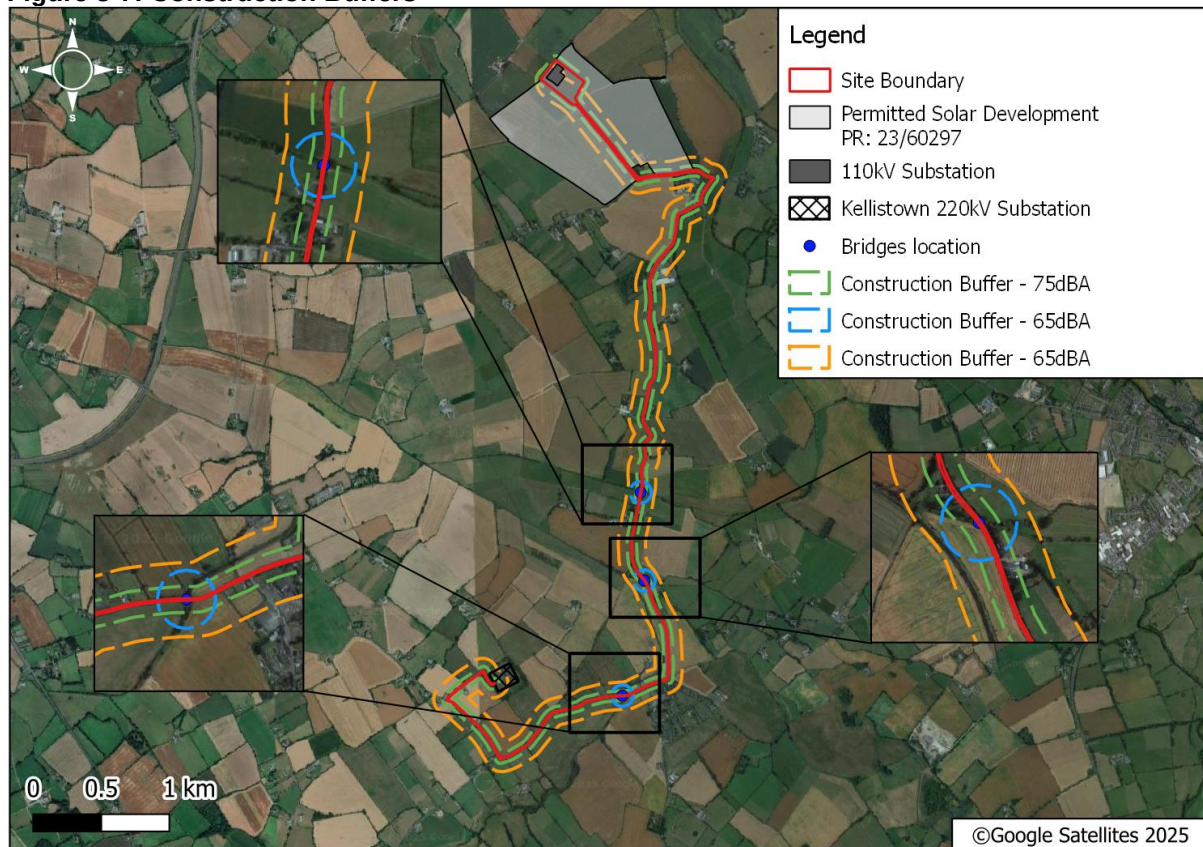
Construction activities during the preliminary works will be conducted along the Grid Connection Route and the HDD phase will be conducted near the three locations, around bridges.

The following standard noise equation, to assess the distance r_2 from a known sound pressure (L_{p2}) and with a known sound pressure limit (L_{p1}) at distance r_1 was used to predict the minimum distance to achieve the construction noise limit (L_{p2}).

$$L_{p2} = L_{p1} - 20 \log_{10} \left(\frac{r_2}{r_1} \right)$$

Based on the 'ABC' method outlined in Table 8-10 above, the distances where the limits of 65dB and 75dB have been calculated and the outer extents of the 65dBA and 75dBA construction phase contours from the underground grid route are presented in Figure 8-7 below.

Figure 8-7: Construction Buffers



Some receptors could experience a higher predicted construction noise due to the distance from the works, prior to mitigation. This assessment assumed all on-site plant is operating at the closest point of the boundary to these receptors for a constant duration 1 hour.

Works, if required due to safety or other concerns, necessitating construction activities outside the 'normal' construction hours, as stated in Section 8.6.1, will be managed to comply with the lower limits, either through working distance to NSRs or undertaking quieter tasks at those hours.

8.8.3 Construction Phase Vibration

HDD is proposed to take place near three locations, near the existing bridges presented in Figure 8-7 above.

The closest receptors from the locations where HDD works are proposed to take place are located more than 50m away from these works, and any potential vibration generated during the HDD works is likely to be imperceptible. Therefore, vibration has been not deemed as a potential effect and is not discussed further.

8.8.4 Operational Phase Noise

Noise Modelling utilising sound levels in Table 8-13 above was performed to assess the $L_{Aeq,T}$ operational noise levels at NSRs. The operational stage noise was assessed from the fixed plant within the Site; the results are shown in Table 8-14 below. The predicted specific noise levels at each NSR represent a predicted 'worst case scenario' for day and night-time where all site-specific operational noise emissions onsite would be operating at full duty capacity.

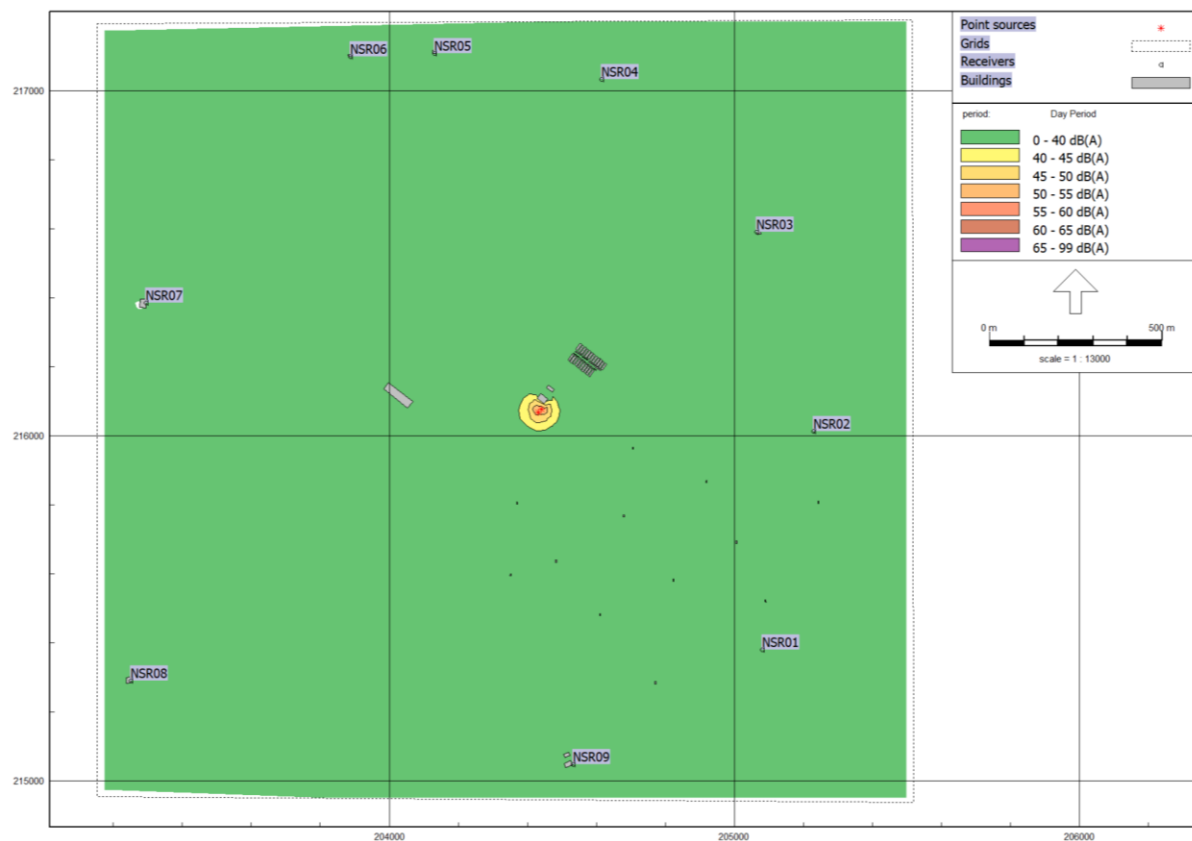
Specific noise calculations were completed for the NSRs at either 1.5m (A) or 4m (B) height. The maximum has been selected to represent the worst-case scenario and presented in Table 8-14 below.

Table 8-14: Day & Night-time Operational Noise Assessment for the Proposed Development

NSR ID	Predicted Site-Specific Sound Pressure Level $L_{Aeq,T}$ dB	
	Daytime	Night-time
NSR01	16	16
NSR02	21	21
NSR03	16	16
NSR04	11	11
NSR05	11	11
NSR06	12	12
NSR07	12	12
NSR08	11	11
NSR09	16	16

Table 8-13 above shows the highest value at the closest NSR at a $L_{Aeq,T}$ 21dB. Figure 8-8 shows the predicted operational stage noise levels for the Proposed Development for daytime (L_{day}).

Figure 8-8: Predicted Daytime Operational Phase Noise at 4m



Utilising the predicted operational noise levels associated with the Proposed Development (refer to Table 8-14 above) an assessment was undertaken to determine the likely effects of the noise on nearby NSRs, if any. A cumulative assessment of the predicted Site specific, as shown in Table 8-14 above, and added to the measured ambient background, as $L_{A90,T}$, was completed, based on the IOA & IEMA guidance. This assessment did not utilise the $L_{Aeq,T}$ values which are typically higher than L_{A90} background due to short term noise events such as passing traffic, animal calls, dog barking and wind induced noise (trees, hedgerows). The predicted change identified during operational noise would be worst-case. The results are shown in Table 8-15 and 8-16 respectively for daytime and night-time periods.

Table 8-15: Predicted Daytime Operational Noise and Calculated Cumulative

NSR	Ambient Background* L _{A90,T} dB	Daytime Limit L _{Aeq,T} dB	Predicted Site Specific L _{Aeq,T} dB	Calculated Cumulative L _{Aeq,T} dB	Predicted Change on Ambient background dB
NSR01	36	55	16	36	0
NSR02	32		21	32	0
NSR03	32		16	32	0
NSR04	40		11	40	0
NSR05	40		11	40	0
NSR06	40		12	40	0
NSR07	36		12	36	0
NSR08	36		11	36	0
NSR09	36		16	36	0

*lowest value selected.

Table 8-15 above presents for the daytime assessment of the noise levels at all NSRs. All NSRs will remain considerably below the typical noise limits for daytime (L_{Aeq,T} 55dB), with a peak site-specific contribution of 21dB at NSR02.

All of the NSRs are predicted not to have a change on measured background noise levels. As per the IOA / IEMA guidelines, the effect was deemed locally negligible.

Predicted night-time impact due to ambient change is presented in Table 8-16 below.

Table 8-16: Predicted Night-time Operational Noise and Calculated Cumulative

NSR	Ambient Background* L _{A90,T} dB	WHO Night-time Target Value dB	Predicted Site Specific L _{Aeq,T} dB	Calculated Cumulative L _{Aeq,T} dB	Predicted Change with WHO Night-time Target Value dB*
NSR01	27	40	16	27	0
NSR02	25		21	26	0
NSR03	25		16	25	0
NSR04	32		11	32	0
NSR05	32		11	32	0
NSR06	32		12	32	0
NSR07	27		12	27	0
NSR08	27		11	27	0
NSR09	27		16	27	0

*As the background noise level are below 35dB, a comparison against the WHO NNG have been considered.

*lowest value selected.

Table 8-16 above presents the night-time assessment. Due to the low ambient background sound levels measured at night, the impact assessment was rated against the World Health Organisation ('WHO') Night Noise Guidelines ('NNG'), to ensure that during these hours impact on health will be protected.

The WHO NNG recommends that the population should not be exposed to night noise levels greater than 40dB of L_{night,outside} during the part of the night when most people are in bed. The highest cumulative (predicted plus ambient background) noise level predicted at NSRs was L_{Aeq,T} 32dB at NSR04, NSR05 and NSR06, remaining significantly below the WHO NNG of 40dB (outside).

All of the NSRs were predicted to be below the night-time limit specified in Section 8.2.3.

8.9 Cumulative Impact and In-combination Effects

8.9.1 Construction Phase

The Proposed Development construction will occur in tandem with the Granted Development (PR 23/60297). The construction of the Proposed Development already considered the construction of a Substation onsite, and therefore no in combination assessment for the construction was warranted. The construction of the Grid Connection Route is presented in Section 8.7.2.

8.9.2 Operational Phase

Noise emissions from the Proposed Development are compared with the Granted Development (without the 38kV substation).

Specific noise calculations (Proposed Development + Granted Development) were completed for the NSRs at either 1.5m (A) or 4m (B) height. The maximum has been selected to represent the worst-case scenario and presented in Table 8-17 below.

Table 8-17: Day & Night-time Operational Noise Assessment for the Proposed Development

NSR ID	Predicted Site-Specific (Proposed Development + Granted Development) Sound Pressure Level $L_{Aeq,T}$ dB	
	Daytime	Night-time
NSR01	39	39
NSR02	43	43
NSR03	43	43
NSR04	39	39
NSR05	36	36
NSR06	37	37
NSR07	36	36
NSR08	32	32
NSR09	37	37

Utilising the predicted operational noise levels associated with the Proposed Development (refer to Table 8-17 above) an assessment was undertaken to determine the likely effects of the noise on nearby NSRs, if any.

A cumulative assessment of the predicted site specific, as shown in Table 8-17 above, and added to the measured ambient background, as $L_{A90,T}$, has been done, based on the IOA & IEMA guidance. The assessment does not utilise the $L_{Aeq,T}$ values which are typically higher than L_{A90} background due to short term noise events such as passing traffic, animal calls, dog barking and wind induced noise (trees, hedgerows). The change identified during operational noise was worst-case. The results are shown in Table 8-18 and 8-19 respectively for daytime and night-time periods.

Table 8-18: Predicted Daytime Operational Noise and Calculated Cumulative

NSR	Ambient Background* $L_{A90,T}$ dB	Daytime Limit $L_{Aeq,T}$ dB	Predicted Site Specific $L_{Aeq,T}$ dB	Calculated Cumulative $L_{Aeq,T}$ dB	Predicted Change on Ambient background dB
NSR01	36	55	39	40	+4
NSR02	32		43	44	+11
NSR03	32		43	43	+11
NSR04	40		39	43	+3
NSR05	40		36	41	+2
NSR06	40		37	42	+2
NSR07	36		36	39	+3

NSR	Ambient Background* L _{A90,T} dB	Daytime Limit L _{Aeq,T} dB	Predicted Site Specific L _{Aeq,T} dB	Calculated Cumulative L _{Aeq,T} dB	Predicted Change on Ambient background dB
NSR08	36		32	37	+2
NSR09	36		37	40	+4

*lowest value selected.

Table 8-18 above presents for the daytime assessment of the noise levels at all NSRs. All NSRs will remain considerably below the typical noise limits for daytime (L_{Aeq,T} 55dB), with a peak site-specific contribution of 43dB at NSR02.

All of the NSRs were predicted not to have a change on measured background noise levels. As per the IOA/IEMA guidelines, the effect was deemed locally negligible.

Predicted night-time impact, due to ambient change is presented in Table 8-19 below.

Table 8-19: Predicted Night-time Operational Noise and Calculated Cumulative

NSR	Existing Ambient Background* L _{A90,T} dB	WHO Night-time Target Value dB	Predicted Site Specific L _{Aeq,T} dB	Calculated Cumulative L _{Aeq,T} dB	Predicted Change with WHO Night-time Target Value dB*
NSR01	27	40	39	39	0
NSR02	25		43	43	+3
NSR03	25		43	43	+3
NSR04	32		39	40	0
NSR05	32		36	38	0
NSR06	32		37	38	0
NSR07	27		36	36	0
NSR08	27		32	33	0
NSR09	27		37	38	0

*As the background noise level are below 35dB, a comparison against the WHO NNG have been considered.

*lowest value selected.

Table 8-19 above presents the night-time assessment. Due to the low ambient background sound levels measured at night, the impact assessment was rated against the WHO NGG to ensure during these hours impact on health will be protected.

The highest cumulative (predicted plus ambient background) noise level predicted at NSRs was L_{Aeq,T} 43dB at NSR002 and NSR03, exceeding 3dB compared to the WHO NNG of 40dB (outside), however the values were predicted to be below the night-time limit established for the granted development (45dB L_{Aeq,T}).

Noise emissions from the Proposed Development, the Granted Development (PL 23/60927) and the additional noise sources from nearby similar developments, including planning reference 20/44 – Wexford Solar Ltd, 21/38 and 22/149 – Elgin Energy Services Ltd, and 23/92 – Neoen Renewables Ireland Ltd have been considered.

The Proposed Development has been assessed in relation to the potential variation in ambient noise levels and found no significant effects. All predicted values at all NSRs were below the limits during daytime and night-time periods.

8.10 Proposed Mitigation Measures

8.10.1 Construction Phase

The Applicant is committed to implementing standard noise mitigation measures throughout the construction phase of the Proposed Development. This will include the development of a

Construction Environmental Management Plan ('CEMP'), where noise mitigation measures, complaints procedures and monitoring programmes will be clearly defined.

Such measures will include:

- Activities and deliveries to the Site to occur only during permitted hours;
- All plant where possible shall be low noise rated;
- Where necessary the use of enclosures and noise screens shall be used to control noise from plant;
- Evaluation of construction methods to ensure the quietest option is utilised within 50m of any NSR;
- Positioning of the Site Compound a minimum of 100m from the closest NSR;
- On-site policy for all plant and equipment, including Site delivery vehicles, to power off rather than to be left with idling engines;
- All plant and vehicles on the Site will be in a fit condition for use, to prevent the addition of noise from maintenance issues.
- Working Method Statements will be developed for the Site Construction Personnel to ensure optimal working procedures are employed, thereby minimising time spent in proximity to NSRs; and,
- A Site Representative will be appointed to receive and respond to noise complaints and enquiries during construction by local residents, the Local Authority and any other regulatory body. Relevant details will be provided to the Local Authority prior to construction, and will be made available to third parties, including local residences.

The proposed design layout for the Proposed Development incorporates the development of screening along the north and northwest boundary. Hedging and enhancement of existing hedgerows will also be added to along the Site boundary.

Utilising the above measures, along with the implementation of a dedicated contractor designed CEMP, will ensure construction works noise will be maintained below a best practice noise nuisance value of $L_{Aeq,1hr}$ of 65dB at local receptors and therefore no impacts will occur.

8.10.2 Operational Phase

Based on the proposed equipment specification and the layout of the Proposed Development, it has been assessed that no noise nuisance impacts will occur at surrounding NSRs and therefore no specific noise mitigation measures will be required.

8.11 Assessment Conclusions

A comprehensive noise impact assessment was undertaken by a MOR Environmental acoustician, who is a full member of the Institute of Acoustics (MIOA).

The assessment included baseline noise monitoring at four locations, which characterised the existing noise environment as ranging from 39dB to 61dB, $L_{Aeq,T}$ and background levels of 32dB to 40dB $L_{A90,T}$.

During the construction phase of the substation, as per any construction project, the potential exists for temporary noise nuisance during specific construction works. Due to the distance of proposed construction works from the NSRs identified and the general methods that will be involved in constructing the solar farm and ancillary infrastructure, standard noise construction noise will not breach noise limits at NSRs. During the grid route connection there is a potential for short-term exceedances of typical construction noise limits, prior to mitigation.

Noise mitigation measures will be implemented during the construction phase that will be in accordance with recognised best practice guidelines for construction sites. These have been

outlined in Section 8.9. Therefore, it can be concluded that noise nuisance will not likely occur during the construction phase of the Proposed Development.

Regarding the Operational Phase of the Proposed Development, based on the design stage acoustics input, the submitted layout and plant selection, there will be no likely noise nuisance during the daytime and night-time operation of the Proposed Development and, as such, specific mitigation measures were not deemed to be warranted.

9 LANDSCAPE AND VISUAL

9.1 Introduction

This Landscape and Visual Impact Assessment ('LVIA') has been prepared in respect of a planning application for a Proposed Development on lands at Friarstown and Grangeford, Co. Carlow. The LVIA report describes the landscape context of the Proposed Development and assesses the likely landscape and visual impacts of the scheme on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

Landscape Impact Assessment ('LIA') relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

Visual Impact Assessment ('VIA') relates to assessing the effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; Visual Obstruction (blocking of a view, be it full, partial, or intermittent) or Visual Intrusion (interruption of a view without blocking).

9.2 Assessment Methodology

This LVIA adopts an approach that is founded in the following best practice guidance documents:

- Landscape Institute and the Institute of Environmental Management and Assessment ('IEMA') publication entitled Guidelines for Landscape and Visual Impact Assessment, 2013 (GLVIA3) [97];
- Environmental Protection Agency ('EPA') publication 'Guidelines on the Information to be contained in Environmental Impact Statements (2022) [10]'; and,
- 'Photography and Photomontage in Landscape and Visual Impact Assessment', Landscape Institute Technical Guidance Note [98].

9.3 Statement of Authority

This LVIA was prepared by Macro Works Ltd of Cherrywood Business Park, Loughlinstown, Dublin 18; a consultancy firm specialising in Landscape and Visual Assessment and associated maps and graphics.

Macro Works' relevant experience includes a broad range of infrastructural, renewable energy, industrial and commercial projects since 1999, including numerous urban, residential, and mixed-use development projects.

9.3.1 Scope of the Assessment

This document uses methodology as prescribed in the previously mentioned GLVIA3, which follows the European Landscape Convention ('ELC') definition of landscape:

'Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000). Thus, GLVIA-2013 covers all landscapes from "high mountains and wild countryside to urban and fringe farmland (rural landscapes), marine and coastal landscapes (seascapes) and the landscapes of villages towns and cities (townscapes)" – whether protected or degraded [99].

GLVIA3 establishes guidelines and not a specific methodology. The preface recognises that:
‘This edition concentrates on principles and processes. It does not provide a detailed or formulaic ‘recipe’ that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand.’

The methodology for this assessment has therefore been developed specifically for this assessment to ensure that it is appropriate and fit for purpose. The LVIA Methodology can be summarised as undertaking the following key tasks:

- Desk study and site visits;
- Defining the Baseline Landscape setting and conditions;
- Identification and Evaluation of key components of the Proposed Development;
- Consideration of Mitigation Measures;
- Assessment of Landscape Effects;
- Assessment of Visual Effects; and,
- Summary Statement of Significance.

9.3.2 Landscape Impact Assessment Criteria

This part of the LVIA provides an assessment of how the introduction of the Proposed Development will affect the physical features and fabric of the landscape, and then how the proposals influence landscape character with reference to published descriptions of character and an understanding of the contemporary character of the landscape as informed through desktop and site studies.

When assessing the potential landscape effects of the development, the value and sensitivity of the landscape receptor is weighed against the magnitude of impact to determine the significance of the landscape effect. Criteria outlined below are used to guide these judgements.

9.3.2.1 Landscape Sensitivity

The sensitivity of the landscape to change is the degree to which a particular setting can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. In accordance with GLVIA3, the sensitivity of a landscape receptor (Landscape Character Area or feature) is derived from combining judgements in relation to its susceptibility to change and its value. The judgement reflects such factors as its quality, value, contribution to landscape character and the degree to which the particular element or characteristic can be replaced or substituted. Landscape Sensitivity is classified using the following criteria set out in Table 9.1.

Table 9-1: Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.

Sensitivity	Description
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair, and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

9.3.2.2 Magnitude or Change – Landscape

The magnitude of change is a product of the scale, extent or degree of change that is likely to be experienced as a result of the Proposed Development and to a lesser extent the duration and reversibility of that effect. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the immediate setting that may have an effect on the landscape character. Table 9.2 outlines criteria used to inform this judgement.

Table 9-2: Magnitude of Landscape Impacts

Magnitude of Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an extensive change of the landscape in terms of character, value, and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to a considerable change of the landscape in terms of character, value, and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to noticeable changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements that would lead to discernible changes in landscape character, and quality.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable leading to no material change to landscape character, and quality.

9.3.3 Visual Impact Assessment Criteria

This part of the LVIA provides an assessment of how the introduction of the Proposed Development will affect views within the landscape. It therefore needs to consider:

- Direct impacts of the Proposed Development upon views through intrusion or obstruction;

- The reaction of viewers who may be affected, e.g. residents, walkers, road users; and
- The overall impact on visual amenity.

It has been deemed appropriate to structure the assessment around a series of representative viewpoint locations. All viewpoints are located within the public domain and are representative of views available from main thoroughfares and pedestrian areas within the vicinity of the Proposed Development. The selected viewpoints are considered to be comprehensive in communicating the variable nature of the visual effects.

When assessing the potential visual effects of the development, the sensitivity of the visual receptor is weighed against the magnitude of the visual impact to determine the significance of the visual effect. Criteria outlined below are used to guide these judgements.

9.3.4 Sensitivity of Visual Receptors

As with landscape sensitivity, the sensitivity of a visual receptor is categorised as Very High, High, Medium, Low, and Negligible. Unlike landscape sensitivity however, the sensitivity of visual receptors has an anthropocentric (human) basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity the viewer is engaged in and whether this heightens their awareness of the surrounding environment.

A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below to establish visual receptor sensitivity at each viewpoint location.

9.3.5 Susceptibility of Visual Receptors to Change

. In accordance with GLVIA3, visual receptors most susceptible to changes in views and visual amenity are:

- *“Residents at home;*
- *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;*
- *Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;*
- *Communities where views contribute to the landscape setting enjoyed by residents in the area; and,*
- *Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened.”*
- *Visual receptors that are less susceptible to changes in views and visual amenity include:*
- *“People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape; and,*
- *People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life.”*

9.3.6 Value attached to Views

. The value attached to a view is determined by considering the following:

- Recognised scenic value of the view (County Development Plan designations, guidebooks, touring maps, postcards etc). These represent a consensus in terms of

which scenic views and routes within an area are strongly valued by the population because in the case of County Development Plans, for example, a public consultation process is required;

- Views from within highly sensitive landscape areas. These are likely to be in the form of Architectural Conservation Areas, which are incorporated within the Development Plan and therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
- Primary views from residential receptors. Even within a dynamic city context, views from residential properties are an important consideration in respect of residential amenity;
- Intensity of use, popularity. This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at a national or regional scale;
- Provision of vast, elevated panoramic views. This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;
- Sense of remoteness and/or tranquillity. Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;
- Degree of perceived naturalness. Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;
- Presence of striking or noteworthy features. A view might be strongly valued because it contains a distinctive and memorable landscape / townscape feature such as a cathedral or castle;
- Historical, cultural and / or spiritual significance. Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection, heightening the sense of their surroundings;
- Rarity or uniqueness of the view. This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;
- Integrity of the landscape character. This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;
- Sense of place. This considers whether there is special sense of wholeness and harmony at the viewing location; and,
- Sense of awe. This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity, and no relative importance is inferred by the order of listing.

It is recognised that a viewer's interpretation and experience of the landscape can have preferential and subjective components. Where relevant, judgements are made on those elements of the landscape that are considered to contribute more prominently and positively to the visual landscape resource as well as those elements that contribute negatively. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

9.3.7 Magnitude of Change – Visual

The magnitude of change is again a product of the scale, extent, or degree of change that is likely to be experienced as a result of the Proposed Development. This is directly influenced by its ‘visual presence / prominence’, as experienced by visual receptors in the landscape. These terms are somewhat quantitative in nature and essentially relate to how noticeable or ‘dominant’ the proposal is within a particular view. Aside from the obvious influence of scale and distance, a development’s visual presence is influenced by the extent and complexity of the view, contextual movement in the landscape, the nature of its backdrop, and its relationship with other focal points or prominent features within the view. It is often, though not always, expressed using one of the following terms: Minimal; Sub-dominant; Co-dominant; Dominant; Highly dominant. Criteria used to inform judgements are provided in Table 9-3.

Table 9-3: Magnitude of Change – Visual

Criteria	Description
Very High	Complete or very substantial change in view, dominant, involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements.
High	A major change in the view that is highly prominent and has a strong influence on the overall view. This may involve the substantial obstruction of existing views or a complete change in character and composition of baseline, e.g. through removal of key elements or the introduction of new features that would heavily influence key elements.
Medium	Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant.
Low	Minor change in baseline, i.e. pre-development view – change would be distinguishable from the surroundings whilst composition and character would be similar to the pre change circumstances.
Negligible	Very slight change in baseline, i.e. pre-development view – change would be barely discernible. Composition and character of view substantially unaltered.

9.3.8 Significance of Effect

The significance of a landscape or visual effect is based on a balance between the sensitivity of the receptor and the magnitude of change, and is categorised as Profound, Substantial, Moderate, Slight, or Imperceptible. Intermediate judgements are also provided to enable an effect to be more accurately described where relevant. ‘No Effect’ may also be recorded as appropriate where the effect is so negligible it is not noteworthy.

The significance category judgement is arrived at using the Significance Matrix at Table 9.4 as a guide. This applies the principle of significance being a function of magnitude weighed against sensitivity, but employs slightly different terminology that avoids the potentially confusing use of the term ‘significant’ (as recommended by GLVIA3 Statement of Clarification 1/13 (Landscape institute, 10th June 2013)).

Indicative criteria descriptions used in relation to the significance of effect category are presented at Table 9-4.

Table 9-4: Impact Significance Matrix

	Sensitivity of Receptor				
Scale/Magnitude	Very High	High	Medium	Low	Negligible
Very High	Profound	Profound-substantial	Substantial	Moderate	Minor
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Note: The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. Judgements indicated in orange are considered to be 'significant impacts' in EIA terms.

Table 9-5: Indicative significance of effect criteria descriptions

	Landscape	Visual
Profound	There are notable changes in landscape characteristics over an extensive area or a very intensive change over a more limited area.	The view is entirely altered, obscured or affected.
Substantial	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the landscape. There are notable changes in landscape characteristics over a substantial area or an intensive change over a more limited area.	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the visual environment. The proposal affects a large proportion of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. There are minor changes over some of the area or moderate changes in a localised area.	An effect that alters the character of the visual environment in a manner that is consistent with existing and emerging trends. The proposal affects an appreciable segment of the overall visual composition, or there is an intrusion in the foreground of a view.
Slight	An effect which causes noticeable changes in the character of the landscape without affecting its sensitivities. There are minor changes over a small proportion of the area or moderate changes in a localised area or changes that are reparable over time.	An effect which causes noticeable changes in the character of the visual environment without affecting its sensitivities. The affected view forms only a small element in the overall visual composition or changes the view in a marginal manner.

	Landscape	Visual
Imperceptible	An effect capable of measurement but without noticeable consequences. There are no noticeable changes to landscape context, character or features.	An effect capable of measurement but without noticeable consequences. Although the development may be visible, it would be difficult to discern resulting in minimal change to views.

It is important that the likely effects of the proposals are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making a planning decision.

As such, whilst the significance matrix and criteria provide a useful guide, the significance of an effect is ultimately determined by the landscape specialist using professional judgement, and also in the context of occasionally using hybrid judgements to account for nuance.

Effects assessed as ‘Substantial’ or greater (shaded cells) are considered to be the most notable in landscape and visual terms, and may be regarded as ‘Significant’, albeit it is important to note that this is not a reflection on their acceptability in planning terms.

9.3.9 Quality and Duration of Effects

In addition to assessing the significance of landscape and visual effects, the quality of the effects is also determined. Within this LVIA, effects are described as negative/adverse, neutral, or positive / beneficial, and the following criteria has been used to guide these judgements.

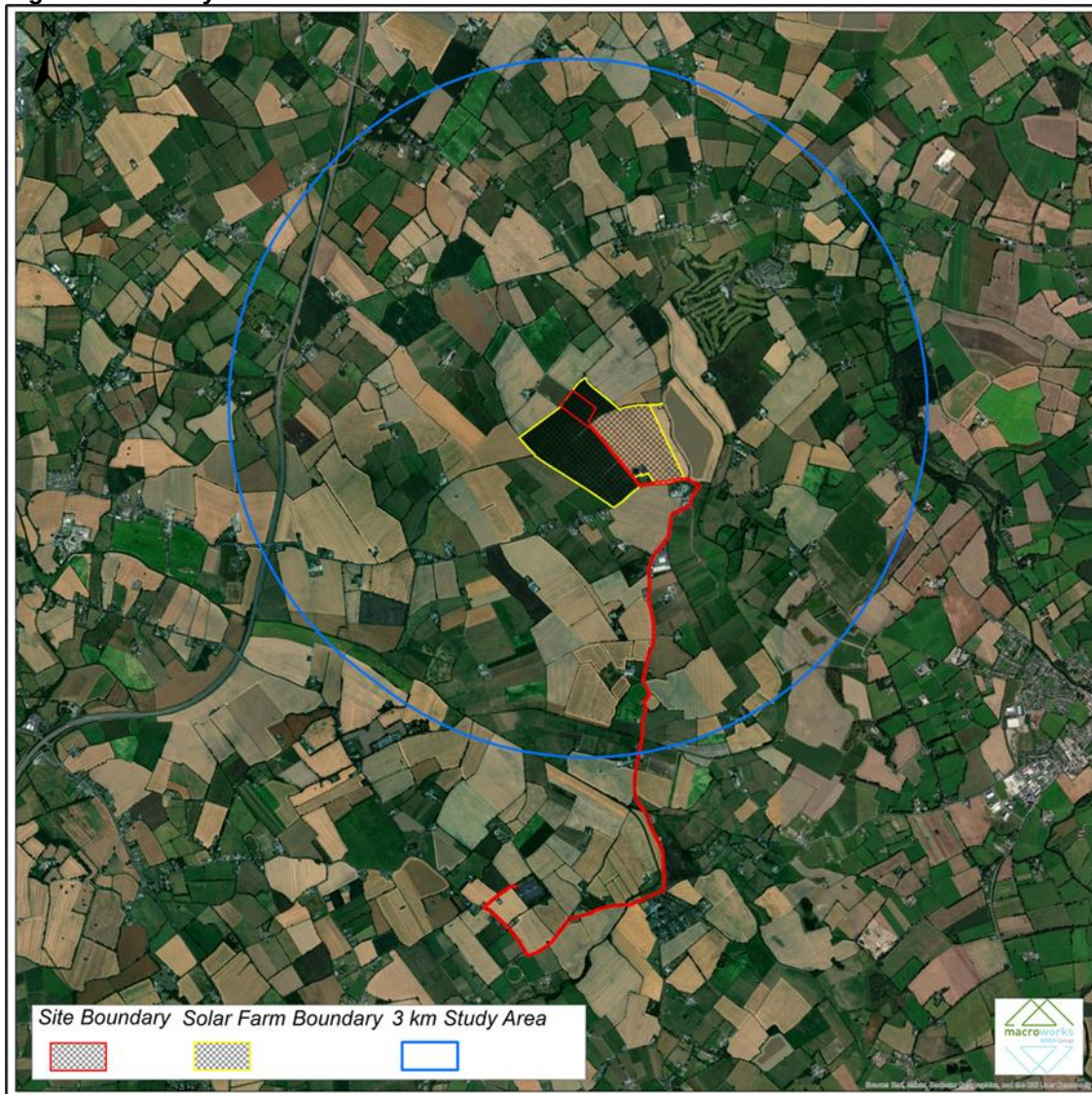
- Positive / beneficial – A change which improves the quality of the environment, enhancing the existing view/landscape;
- Neutral – No effects or effects that are imperceptible, within normal bounds of variation e.g. will neither detract from nor enhance the existing view/landscape;
- Negative / adverse – A change which reduces the quality of the environment, detracting from the existing view/landscape.

In the case of new energy / infrastructure developments within rural and semi-rural settings, the landscape and visual change brought about by an increased scale and intensity of built form is seldom considered to be positive / beneficial. Effects in these contexts are generally considered to be adverse in nature, or neutral, where the effect has little influence on the landscape/views.

9.3.9.1 Extent of Study Area

From similar studies, it is anticipated that the Proposed Development is likely to be difficult to discern beyond approximately 3km due to the scale of the development and heavily vegetated nature of this landscape context and is not likely to give rise to significant landscape or visual impacts beyond approximately 500m-1km. In the interests of a comprehensive appraisal, a 3km radius study area is used in this instance. However, there will be a particular focus on receptors contained within 500m-1km, except where iconic or designated scenic viewpoints exist at greater distances out to 3km (refer to Figure 9.1).

Figure 9-1: Study Area



9.4 Landscape and Visual Policy Context and Designations

9.4.1 Carlow County Development Plan 2022-2028

The new landscape character assessment prepared for incorporation within the current Carlow County Development Plan 2022-2028 initially classifies the landscape into four different Landscape Character Areas ('LCAs'), which are then divided into a further seven geographically specific, landscape character types ('LCTs').

The Proposed Development is situated in the LCA 'central lowlands', which is described in the Landscape Character Assessment as *"primarily rural, with medium to quite large fields defined by well maintained and generally low hedges and occasional to frequent hedgerow trees."*

According to the Landscape Character Assessment, the 'central lowlands' LCA is deemed to be *'moderately sensitive to development'*, and as a result *"it has the capacity to absorb most types of development subject to the implementation of appropriate mitigation measures"*. A land use capacity matrix is included in the Landscape Character Assessment.

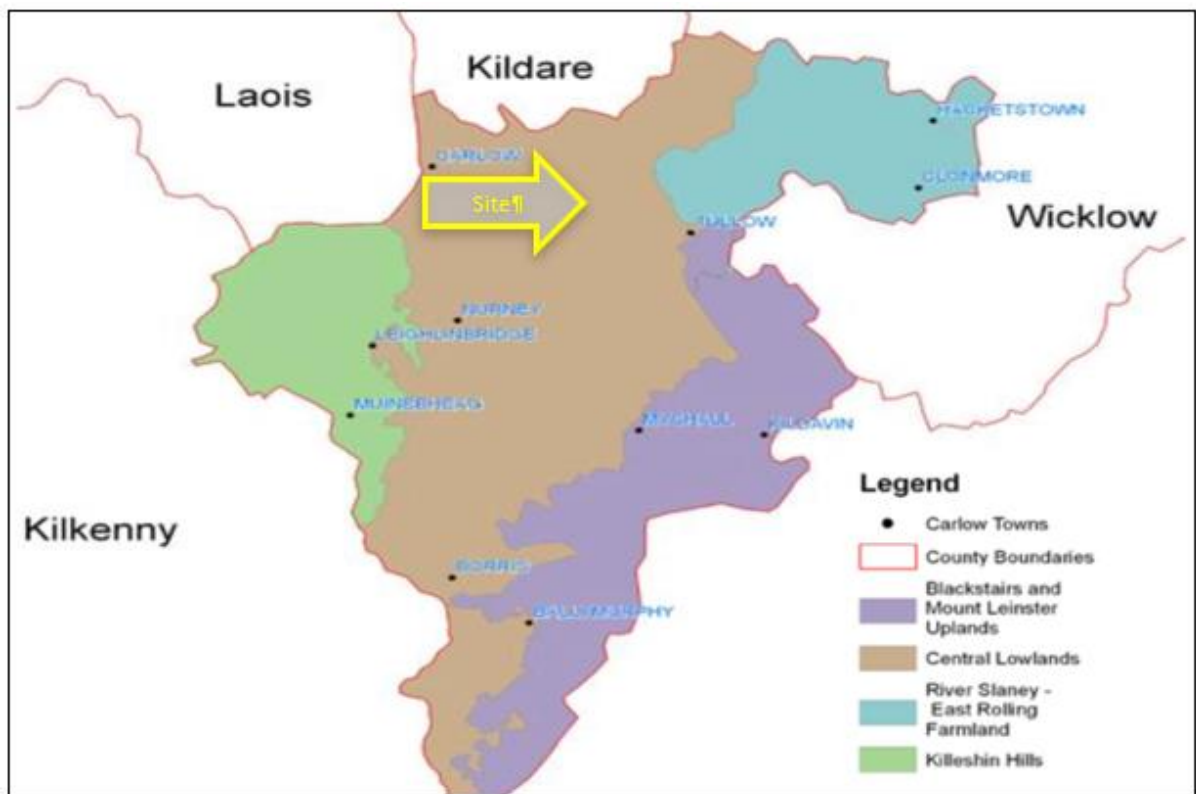
Some key recommendations regarding the landscape character area '*central lowlands*' are given within the assessment, some of which are relevant to the subject development and include:

- *Maintain the existing grain of the landscape with its well-developed pattern of fields, hedgerows, trees, and shelterbelts.*
- *Discourage the replacement of hedgerow boundaries with wire fences.*
- *Encourage the use of native and indigenous planting in new developments to integrate buildings into the surrounding landscape. Compile a list of suitable trees and shrubs for planting in the County.*
- *The use of traditional styles, materials and colours in new developments should be encouraged.*
- *New developments should not be sited in prominent locations such as ridges and areas with open exposed vistas.*

The Landscape Character Assessment also outlines some general policy objectives regarding the 'Central Lowlands' LCA

- *"Conservation, restoration and enhancement of the existing landscape character.*
- *New developments to maintain integrity of landscape character area though careful location, siting and design.*

Figure 9-2: Excerpt from Carlow County Landscape Character Assessment showing approximate location of Proposed Development in relation to principal landscape character areas.



The 'Central Lowlands' LCA is divided into seven landscape character types (LCT). The Proposed Development is sited situated in the 'Farmed Lowland' LCT as is majority of the study area (Figure 9.3 refers). LCT 'Farmed Lowland' is designated a Class 3 'Moderate' sensitivity designation.

Other LCTs within the study area include the 'Narrow River Valley' LCT located approximately 2km east of the site and traversing the eastern periphery of the study area. The 'Narrow River Valley' LCT is designated a Class 5 'Most' sensitivity designation (Refer Figure 9.4).

Figure 9-3: Excerpt from Carlow County Landscape Character Assessment showing approximate location of Proposed Development in relation to Landscape character types.

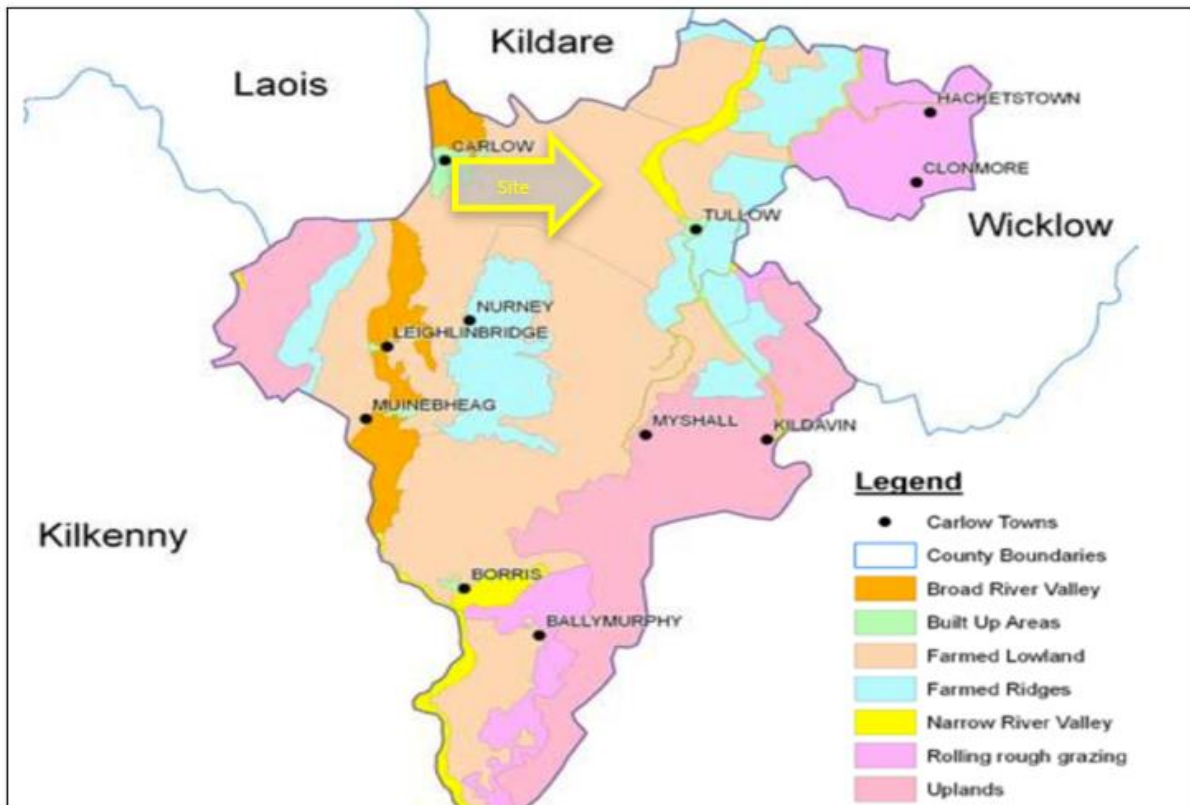


Figure 9-4: Excerpt from Carlow County Landscape Character Assessment, showing approximate location of Proposed Development in relation to landscape sensitivities.

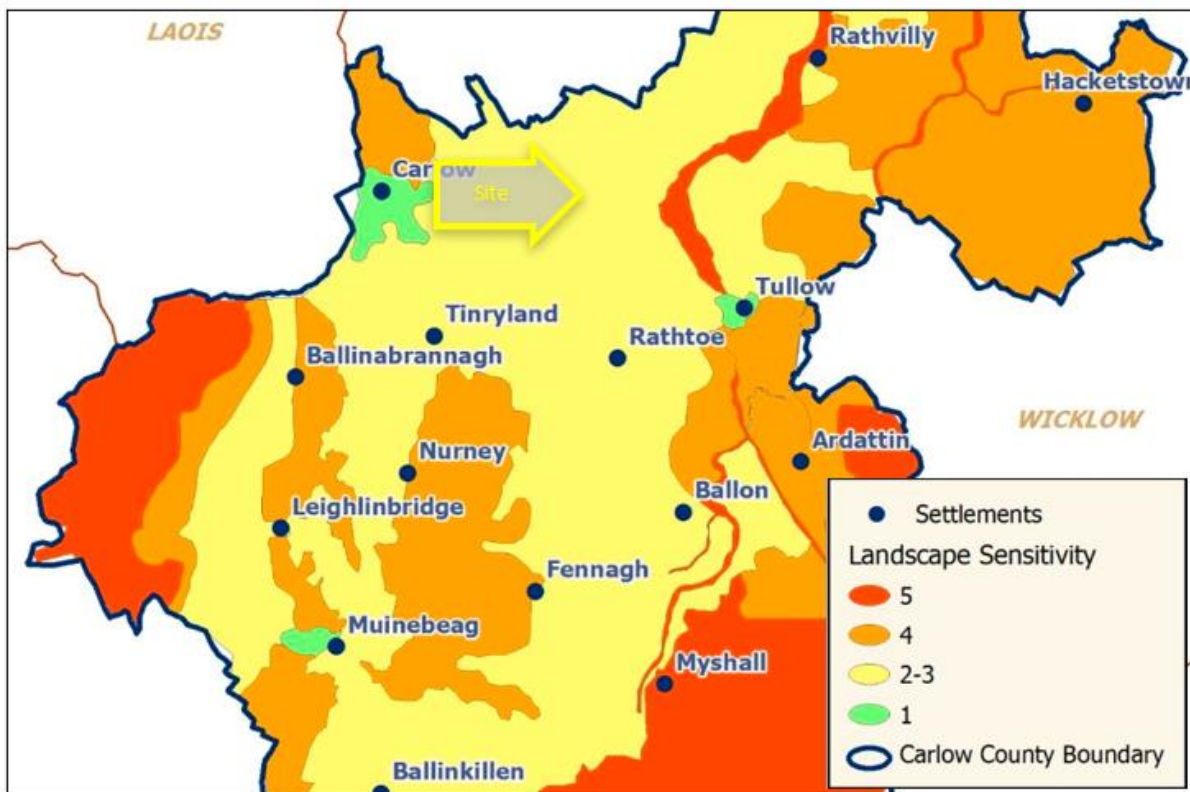


Figure 9-5: Landscape Character Type Sensitivity Matrix

	SENSITIVITY				
	1 Least	2 Decreasing	3 Moderate	4 Increasing	5 Most
Built Up Areas					
Farmed Lowland				*	
Broad River Valley					
Farmed Ridges					
Narrow River Valley					
Rolling Rough Grazing					
Uplands					

Table 1 Assignment of Landscape Sensitivities to Principal Landscape Character Areas and Landscape Types from Locii and Cregan 2011 [Note that Farmed Lowland is classified as Increasing Sensitivity Level 4 south of Borris on account of small scale and proximity and inter-visibility with River Valleys and Uplands]

9.4.2 Landscape and Visual Policy Context and Designations

Chapter 9 of the development plan ‘Landscape and Green Infrastructure’ contains a number of landscape policies, some of which are relevant to the site in question and are included below:

- **‘LA P1: Protect and maintain the overall integrity of the County’s landscape, by recognising its capacity to sustainably integrate and absorb appropriate development, and by ensuring that development protects, retains and, where necessary, enhances the appearance and character of the landscape, and does not unduly damage or detract from those features which contribute to its value, character, distinctiveness and sensitivity e.g. landform, habitats, scenic quality, settlement pattern, historic heritage, amenity, land use and tranquillity;**
- **LA P2: Ensure that development will not have a disproportionate landscape or visual impact in sensitive upland areas of the County (due to siting, layout, design or excessive scale, height, and bulk) and will not significantly interfere with or detract from scenic upland vistas, when viewed from the surrounding environment, including nearby areas, scenic views, and routes, and from settlements;**
- **LA P3: Adopt a presumption against developments which are located on elevated or visually exposed sites or areas with open exposed vistas, and where the landscape cannot accommodate such development with appropriate mitigation;**
- **LA P4: Ensure that developments on steep slopes or ridges will not be conspicuous or have disproportionate landscape or visual impacts when viewed from the surrounding environment, including from nearby areas, scenic views, and routes, and from settlements;**
- **LA P5: Protect and maintain the landscape quality and visual integrity of river valleys and river corridors, and to ensure development in these sensitive landscape areas does not adversely affect or detract from scenic views, including views from bridges, or from distinct linear sections such as open floodplains;**
- **LA P6: Require all developments, having regard to their landscape setting, to be appropriate in siting, layout, design, and scale, in order to ensure any potential adverse or landscape and visual impacts are minimised and/or removed where**

necessary, and that natural site features and characteristics are retained and maintained;

- **LA P7:** *Facilitate, where appropriate, developments that have a functional and locational requirement to be situated on steep or elevated sites (e.g. reservoir, telecommunication masts or wind energy structures) where residual adverse visual impacts are minimised or mitigated;*
- **LA P8:** *Require, where appropriate, Landscape/Visual Impact Assessments to be prepared by suitably qualified professionals, for development proposals which may have significant landscape or visual impacts, and/or which are located within or adjacent to sensitive landscapes;*
- **LA P9:** *Have regard to the potential for screening vegetation when evaluating proposals for development within the uplands;*
- **LA P10:** *Ensure that features which contribute to local landscape character, including historic features and buildings, trees, hedgerows, shelter belts and stone walls, are retained, protected, and enhanced where appropriate, so as to preserve the appearance and local landscape character of an area, whilst supporting sustainable landscape change and development. Development proposals necessitating the removal of such features will be discouraged; and,*
- **LA P11:** *Protect and preserve the established appearance and aesthetic attributes of views and prospects that contribute to the inherent quality of the County's landscape, including views, prospects and scenic routes listed in Tables 9.3 and 9.4, and particularly views to and from mountains, hills, river valleys and river corridors, and views of historical or cultural value (including buildings and townscapes) and views of natural beauty.'*

9.4.3 Views of Recognised Scenic Value

Views of recognised scenic value are primarily indicated within the current development plan in the context of scenic views/routes designations, but they might also be indicated on touring maps, guidebooks, roadside rest stops or on post cards that represent the area.

9.4.3.1 Carlow County Development Plan 2022-2028

The Carlow CDP identifies a number of designated scenic views and routes within the county, some of which are located within the 3km study area and listed below;

- **Scenic View 19** – *Duckett's Grove (orientation: southeast), heritage site;*
- **Scenic View 20** – *Duckett's Grove (orientation: northeast), spreading central plain and forest in distance;*
- **Scenic View 21** – *Duckett's Grove (Approach to site from west), heritage site;*
- **Scenic View 5** – *Vista 260-320, panoramic view of Killeshin Hills;*

Of the Scenic designations that are listed above SV20 and S21 are deemed not relevant due to susceptible views being oriented in the opposite direction to the proposed substation. SV19 is focused on Ducketts Grove in the near distance; however, may afford distant views of the Proposed Development and is therefore considered relevant to this assessment. SV5 affords panoramic views of Killeshin Hills, which are located in the distance in the opposite direction, however similarly to SV19, the Proposed Development may be visible in the distance.

9.5 Existing Environment

9.5.1 Landscape Baseline

The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape brought about by the Proposed Development will be assessed.

A description of the landscape context of the Site and wider study area is provided below under the headings of landform and drainage, vegetation and land use, centres of population and houses, transport routes and public amenities and facilities. Although this description forms part of the landscape baseline, many of the landscape elements identified also relate to visual receptors i.e., places and transport routes from which viewers can potentially see the Proposed Development.

9.5.1.1 Landscape Context

Landform and Drainage

The Site and its immediate surroundings consist of a broad, gently rolling landform with elevations ranging from 85 to 90m AOD. In terms of drainage, the Site has a mild gradient that slopes southwards. Due to the rolling topography, water drains in various directions across the surrounding landscape. Several rivers and streams run through the study area as outlined in section 1.5 of this Environmental Report.

Figure 9-6: Landscape Context and the Immediate Study Area



Vegetation and Land Use

In terms of land use, the Site itself and wider study area form a small component of a patchwork of agricultural farmland bound by a network of geometric hedgerows. These hedgerows are generally maintained at a medium height and interspersed with mature trees.

In the wider study area, small blocks of woodland occur in the northern extents of the study area which are generally remnant of old demesnes. Extensive corridors of riparian planting flank the River Slaney to the east of the Proposed Development and to a less prominent scale on the River Aghalona. Within the wider study area, small woodland areas are located in the northern part, often remnants of former demesnes. Extensive riparian planting is present along the River Slaney to the east of the Proposed Development, with a lesser extent of such planting along the River Aghalona. Killerig Golf Club, located approximately 1km to the northeast of the Site, represents one of the more designed landscapes within the study area featuring sweeping formations of mature trees.

Transport Routes

With regard to transport corridors, the M9 motorway forms the most notable transport corridor within the study area, traversing the western periphery in a north-south direction coming within 2.5km west of the Site at its nearest point. Oriented in an east-west direction, the R725 regional road runs just under 700m to the south of the Site at its nearest point, whilst the R726

regional road (which is also oriented in an east-west direction) runs approximately 1km to the north of the Site at its nearest point. The R418 regional road intersects the R726 at the settlement of Killerig to the northwest of the Site and is approximately 2km to the east of the Proposed Development at its nearest point. A network of local roads also traverses the central study area and the nearest of these is 600m to the east of the Site at its nearest point.

Centres of Population and Houses

The most notable centre of population in relation to the Proposed Development is Killerig, which is a small cross-road settlement situated approximately 1.5km northeast of the Proposed Development. Several other cross-road settlements and clusters of dwellings are also located within the outer periphery of the study area. A number of farmsteads are dispersed throughout the study area, the nearest of which is situated along the northern boundary of the Site.

Heritage and Public Amenities/ Facilities

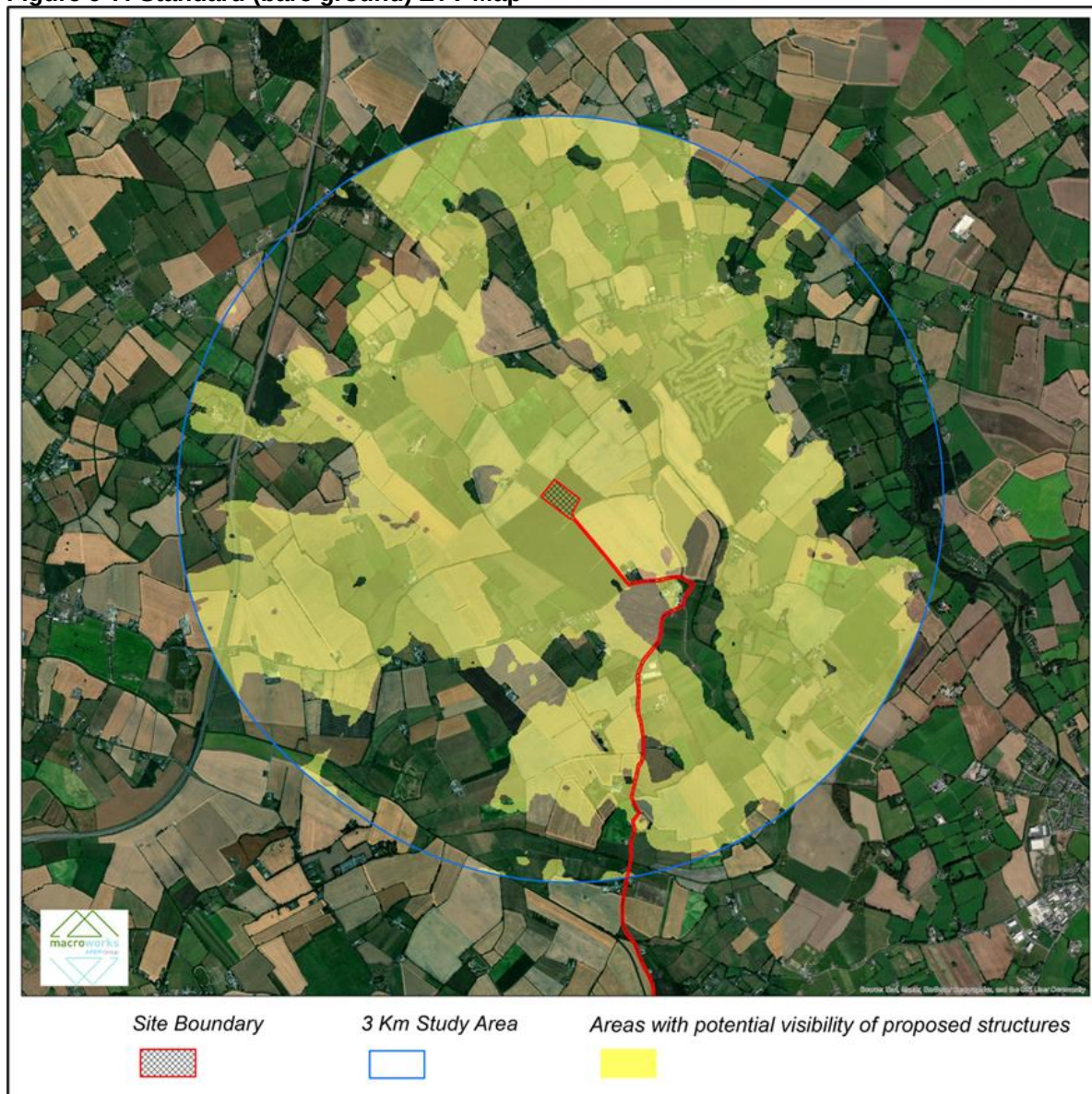
In terms of heritage and amenity features, Duckett's Grove, ruins of a 19th Century Great House and former estate is situated 2.5km north of the Site at its nearest point. The gardens and surrounds of Duckett's Grove are currently used as a public park. The study area is not highly associated with outdoor recreation. Nonetheless, Killerig Golf Course is located approximately 1 km east of the Site at its nearest point.

9.5.2 Visual Baseline

Only those parts of the receiving environment that potentially afford views of the Proposed Development are of concern to this section of the assessment. A computer-generated Zone of Theoretical Visibility ('ZTV') map has been prepared to illustrate where the Proposed Development is potentially visible from.

The ZTV map is based solely on terrain data (bare ground visibility), and ignores features such as trees, hedges, or buildings, which may screen views. Given the complex vegetation patterns within this landscape, the main value of this form of ZTV mapping is to determine those parts of the landscape from which the Proposed Development will definitely not be visible, due to terrain screening within the study area.

Figure 9-7: Standard (bare ground) ZTV Map



The following key points are illustrated by the 'bare ground' ZTV map (see Figure 9-7 above):

- As illustrated by the ZTV pattern above, there is potential for visibility across roughly two-thirds of the study area. These areas of theoretical visibility are concentrated within the immediate vicinity of the Site, with visibility extending towards the southeast, west, and the northeast quadrant of the study area;
- However, as is characteristic of a rolling landform, these zones of theoretical visibility are often interrupted by extensive areas with no potential for visibility. The higher topography typically serves as the boundary between areas with and without visibility;
- The areas with no potential for visibility are most pronounced towards the eastern/northeastern extents, where intervening landforms completely block any views of the proposed substation. The southwest and northwest also feature substantial areas where the topography effectively screens any potential views of the proposed substation;
- Scenic View 5 and 19 are located within ZTV and will therefore have theoretical potential to experience view of the proposed substation; and,

- Similarly, Ducketts Grove in the northern extents of the study area will experience potential for visibility. As will majority of the village of Killerig.

The most important point to make in respect of this 'bare-ground' ZTV map is that it is theoretical. Whilst the Proposed Development comprise some larger structures, some of which rise to a maximum height of up to 19.5m, comprising of Telecoms Poles and Lightning Masts which are slender features that will have a limited visual presence even when viewed from a near distance.

9.5.3 Cumulative Baseline

In addition to the permitted developments within the extent of the Site, there are other permitted solar farms in the vicinity of the proposed Grangeford Solar Farm as outlined below in Table 9-6.

Table 9-6: Cumulative Baseline: Solar PV in the Vicinity

Planning Ref.	Applicant	Year	Distance from the Site	Planning Status
20/44	Johnstown Solar Farm	2020	Bennekerry Carlow 2.2km northwest of the Site	Granted with conditions
21/38	Ardnehue Solar Farm	2022	Ardnehue And Friarstown Directly North	Granted with conditions
22/149	Friarstown Solar and Storage Park	2023	Friarstown Directly North	Granted with conditions
23/92	Neoen Renewables Ireland Limited	2023	Friarstown, Carlow. Adjacent to northwestern section of the Site.	Granted with conditions

9.5.4 Identification of Viewshed Reference Points as a Basis for Assessment

Viewshed Reference Points ('VRP's') are the locations used to study the visual impacts of a proposal in detail. It is not warranted to include each and every location that provides a view of a development as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the Proposed Development. Instead, the selected viewpoints are intended to reflect a range of different receptor types, distances, and angles. The visual impact of a Proposed Development is assessed by Macro Works using up to 6 no. categories of receptor type as listed below:

- Key Views (from features of national or international importance);
- Designated Scenic Routes and Views;
- Local Community views;
- Centres of Population;
- Major Routes; and,
- Amenity and heritage features.

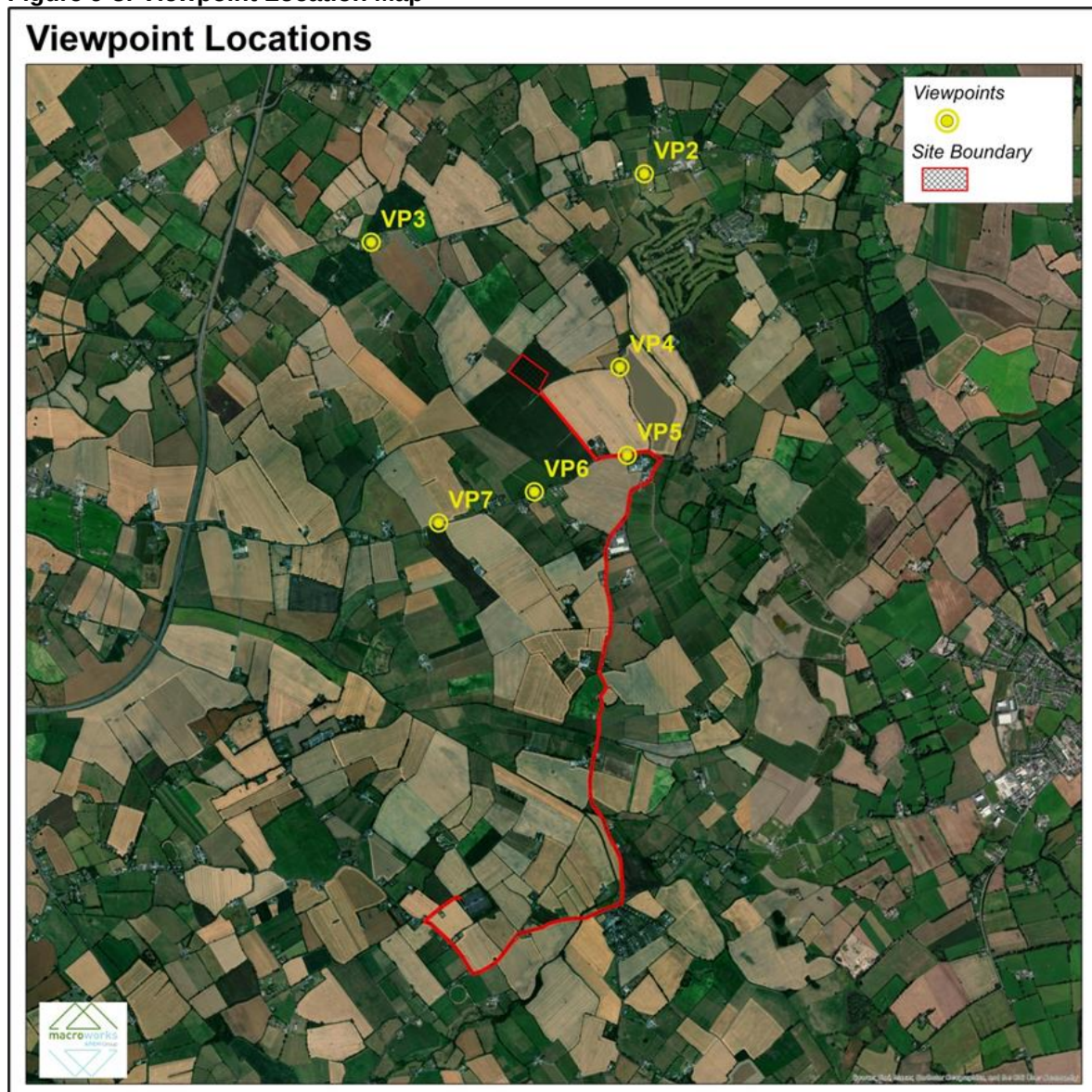
VRP's might be relevant to more than one category, and this makes them even more valid for inclusion in the assessment. The receptors that are intended to be represented by a particular VRP are listed at the beginning of each viewpoint appraisal. The Viewshed Reference Points selected in this instance are set out in the Table 9-7 and Figure 9-8 below.

Table 9-7: Outline Description of Selected Viewshed Reference Points

VP	Location	Representative of	Direction of view
VP1	Local road L50301, west of Duckett's Grove, Rainestown	LCV, DSR, AH	SE
VP2	R726 regional road, Killerrig	DSR, LCV, MR	SW

VP	Location	Representative of	Direction of view
VP3	Regional road R726, Ardnehue	LCV, MR	SE
VP4	Local road, Friarstown	LCV	SW
VP5	R725 regional road south-east of Site, Grangeford Old	LCV, MR	N
VP6	Regional road R725, Grangeford Old, adjacent to former Post Office	LCV, MR	SW
VP7	Regional road R725, Aghwater	LCV, MR	NE

Figure 9-8: Viewpoint Location Map



9.5.5 Mitigation Measures

The main mitigation by avoidance measure employed in this instance is the siting of the Proposed Development in a well-contained rural area within the boundary of the permitted development in which it is directly related to. As such, it will not introduce an unfamiliar or incongruous form of development in this context of this setting, rather a slight intensification of an existing activity.

The Site is contained within a robust landscape, where the surrounding terrain and hedgerows provide screening, ensuring that the proposed substation will not be prominently visible within the broader landscape. Retention of existing hedgerow boundaries around the Site helps maintain the existing field pattern, prevents a sense of ambivalence and aids visual screening. The Proposed Development is also well offset from the nearest surrounding visual receptors and benefits from a notable degree of screening provided by surrounding rolling terrain and dense layers of intervening hedgerow vegetation.

The Proposed Development is an ancillary feature to the permitted development and will benefit from the permitted landscaping mitigation plan from the permitted solar development, which includes additional hedgerow planting and retention, protection and enhancement of all existing hedgerows within the permitted solar site.

Furthermore, a berm using surplus soils will be created the northern boundary adjacent to the BESS and extending to encompass the proposed 110kV substation. This berm will serve as an important visual and acoustic screening measure, helping to reduce the visibility of the infrastructure from nearby receptors and minimizing potential noise impacts.

Designed to blend with the natural topography, the berm will also support the overall landscape integration of the development. Considering the proposed substation is discreetly set back from surrounding visual receptors, additional landscape mitigation measures are not deemed necessary. Furthermore, in many circumstances the permitted new and enhanced vegetation, in addition to the permitted solar panels will screen the lower parts of the Proposed Development.

9.6 Impact Assessment

9.6.1 Do nothing scenario

The ‘*do-nothing*’ impact refers to the non-implementation of the Proposed Development. The primary effect of this would be that the impacts and effects identified would not directly occur. In this regard the following issues are relevant. The Site would remain in its current form and would likely be subject to further electrical infrastructure development applications due to its location within the boundary of the permitted solar development.

9.6.2 Assessment of Receptor Sensitivity – Landscape

Landscape value and sensitivity are considered in relation to a number of factors highlighted in the Guidelines for Landscape and Visual Impact Assessment 2013, which are set out below and discussed relative to the Site and wider study area.

The immediate study area is a robust rural landscape comprised of gently rolling terrain cloaked in pastoral farmland and geometric networks of hedgerows. The Site does not fall within any designated areas of particular landscape or visual significance, nor is it considered rare or distinctive at the local, regional, or national level. It is primarily recognised as a working rural landscape, valued primarily for productive and subsistence reasons rather than for scenic or aesthetic qualities.

In terms of landscape values, the Site and immediate surrounds has a pleasant, pastoral aesthetic complimented by characteristics associated with a rural area.

According to the Carlow County Development Plan, the Proposed Development is situated within the Landscape Character Area (‘LCA’) ‘Central Lowlands’. This area is described in the

Landscape Character Assessment as being ‘moderately sensitive to development’, meaning it has the capacity to accommodate most types of development, providing appropriate mitigation measures are implemented. This suggests a generally neutral stance towards appropriately sited development in the area. In terms of landscape sensitivity within the study area, the ‘Narrow River Valley’ Landscape Character Type (‘LCT’), which references the River Slaney corridor approximately 2km east of Site and runs along the eastern edge of the study area, is designated as Class 5—‘Most’ sensitive. However, it is important to note that the sensitive features within this LCT, such as river corridors are well offset from the immediate study area. Regarding scenic designations, there are several within the wider study area. Three of these relate to views of Duckett’s Grove estate, while another (Scenic View 5) affords ‘panoramic views of the Killeeshin Hills’. The susceptible views linked to the scenic designations around Duckett’s Grove are focused on features within the immediate vicinity, whereas the views identified for Scenic View 5 are directed towards distant scenes of the hills, both away from the agricultural land where the Proposed Development is located. Whilst the study area presents with a pleasant pastoral aesthetic and some views of distant elevated areas are afforded, it is not considered that the surrounding landscape is highly scenic.

Landscape Sensitivity Summary

Overall, it is considered that this is a typical low rolling rural landscape that is not exceptionally rare or distinctive. Although a moderate degree of visual amenity occurs within the wider study area, this is not considered relevant to the Site or central study area

On balance of these reasons, the landscape sensitivity is deemed to be **Medium-Low**.

9.6.3 Assessment of Receptor Sensitivity – Visual

The study area generally presents as a typical rural landscape, albeit with some localised areas of scenic amenity, associated with the norther portion of the study area where panoramic views over the wider landscape and views of some locally sensitive features are afforded. This is further recognised within the Carlow CDP through several designated scenic routes in recognition of its scenic qualities. These views are consequently deemed to be of ‘High-medium’ sensitivity.

Views of the working agricultural landscape are generally pleasant in terms of its rolling pastoral aesthetic and ‘green’, settled working character. The network of hedgerows and vegetation throughout it contributes to some sense of naturalness and combined with its rolling topography, generates a sense of containment in many locations. However, whilst a pleasant pastoral aesthetic is apparent throughout some parts of the study area, as noted above, the surrounding local and wider landscape is also influenced by an array of anthropogenic features such as major transport routes, urban settlements, and industrial development. Overall, the sensitivity of visual receptors within the typical working landscape context are typically assigned a Medium-low receptor sensitivity.

Key differentials in terms of visual receptor sensitivity relate to the occupation of the visual receptor and whether views of the surrounding landscape are an inherent part of the experience. Static residential receptors are considered generally more susceptible to changes in views over those where views are experienced transiently by those travelling through the landscape, particularly on major transport routes where road infrastructure and traffic volume draw from visual amenity. Likewise, receptors located in closer proximity to the Site are considered more susceptible to changes in views over those where views are experienced at a distance.

On the basis of the site-specific factors outlined above and in accordance with the general visual receptor sensitivity considerations contained in the methodology Section 9.3.3, visual receptor sensitivity judgement are provided for each representative viewpoint in the table below in section 9.6.7 below.

9.6.4 Magnitude of Landscape Effects – Construction Stage

During the construction phase, there will be a far higher intensity of activity at the Site than during the operational phase. This will consist of heavy vehicle movement to and from the Site as well as construction machinery within the Site. Indeed, whilst there will be an increase in HGV traffic along the surrounding local roads. Construction stage impact will also be generated by the introduction of temporary site lighting and the temporary storage of construction materials and excavated ground. The construction of the larger elements within the Site will also require some larger machinery, which will likely be visible above the intervening surrounding hedgerow networks in the near surrounds of the Site. Construction phase impacts on the landscape are considered to be ‘temporary’ and are likely to last between 9-12 months. A summary of construction activities within the Site is included below:

- HGVs transporting materials to and from the Site;
- Movement of heavy earth-moving machinery on-site;
- Temporary storage of excavated materials and construction materials on-site;
- Gradual emergence of the Proposed Development, and associated works;
- Security hoarding and site lighting;
- Areas of soil stripping to facilitate the incoming buildings; and,
- Trees and hedgerows to be retained will be protected in accordance with British Standard BS5837: 2012 ‘Trees in Relation to Design, Demolition and Constriction.

The most notable physical landscape effects generated by the construction of the proposed substation relate to the excavation of localised areas to facilitate the incoming building foundations. However, these effects will be heavily localised and the Proposed Development will not require large scale excavations that will heavily modify the terrain of the Site and surrounding area. In terms of perceptual construction stage landscape effects, the Proposed Development will generate a modest increase in the intensity of activity in the surrounding local landscape, however, these effects will be heavily diminished beyond the immediate site context.

In terms of the grid connection, there will be some underground trenching dug to accommodate the proposed grid connection. Indeed, the land cover of the Site will only be interrupted as necessary to excavate the grid connection route and any impacts from land disturbance and vegetation loss at the Site will be very localised.

Furthermore, construction-related activity and its effect on landscape character will be ‘temporary’ in duration. For these reasons, the magnitude of landscape impacts during the construction stage is deemed to be Medium-Low within the immediate surrounds of the Site, however, this quickly reduces to Low and Low-negligible and Negligible beyond the immediate site context where visibility of construction activity is likely to be partially, and in some cases, entirely screened.

In combination with the Medium-low landscape sensitivity designation outlined above, the significance of construction stage impacts is deemed to be Slight within the immediate surrounds of the Site, however, this quickly reduces to Slight-imperceptible and Imperceptible within the wider study area where visibility of construction stage activities will be very limited and in the majority of instances, entirely screened. The quality of the construction stage effects will be Negative.

9.6.5 Magnitude of Visual Effects – Construction Stage

During construction, the main visual impacts will arise from frequent heavy vehicle movements and worker vehicles travelling to and from the Site and using the Site entrance. In addition, there will be construction machinery onsite, which will rise above intervening vegetation and

buildings. There will also be stockpiles of stripped topsoil and construction materials awaiting use. The Proposed Development will not remove any existing vegetation during the construction stage.

Aside from the local roads located in the immediate vicinity of the Site, where there is potential for partial views of the development, a large part of this ‘temporary’ activity within the Site will remain screened and partially screened from view the surrounding mature layers of intervening vegetation. Furthermore, construction-related activity is temporary in nature and will cease once the development becomes fully operational. Thus, construction stage impacts are likely to result in a visual effect of Medium-low and Low in the immediate surroundings of the Site.

Coupled with the Medium-low visual receptor sensitivities in the immediate surrounds of the Site, the construction stage visual impacts in the immediate vicinity of the Site are deemed to range between Moderate-slight and Slight but will reduce considerably beyond 500m-1000m from the Site, where the Proposed Development will be afforded a much more notable degree of screening in the form of layers of stacked intervening hedgerow vegetation. The quality of these effects is deemed to be Negative. As a result, it is not considered that the Proposed Development will generate significant construction stage visual effects.

9.6.6 Magnitude of Landscape Effects – Operational Stage

With regard to the landscape character of the Site and surrounding study area, it presents as a relatively typical modified pastoral landscape. Indeed, whilst a pleasant pastoral aesthetic is noted in some locally elevated localised areas, this is a working landscape that is influenced by anthropogenic built features like major routes and existing electrical infrastructure development.

It should be noted that while the Proposed Development will generate some effects on the character of the immediate and local landscape context. These effects relate to the intensification in the quantum of built development. Whilst electrical infrastructure developments are not uncommon in the rural landscape, the forms and built components of the project will strongly contrast with the more organic forms of the surrounding vegetation and the verdant tones and textures of this pastoral context. Nonetheless, the Proposed Development is well offset from surrounding landscape and visual receptors, set well back from the surrounding field boundaries, which diminishes the perceived effect of the Proposed Development on the character of the surrounding landscape.

It is not considered that there will be any operational stage landscape effects for the grid connection.

On balance of the reasons outlined above, the magnitude of landscape impact is deemed Low.

With reference to the significance matrix above, the **Medium-low** landscape sensitivity judgement attributed to the study area, coupled with a **Medium-Low** magnitude of landscape impact at the Site scale and its immediate vicinity (<500m) is considered to result in an overall significance of **Slight**, with the significance of landscape effect reducing beyond 500m from the Site to Slight-imperceptible and Imperceptible. The quality of effect is deemed Negative.

9.6.7 Magnitude of Visual Effects – Operational Stage

The assessment of visual impacts at each of the selected viewpoints is aided by photomontages of the Proposed Development. Please refer to Appendix F.

Photomontages are a ‘photo-real’ depiction of the scheme within the view, utilising a rendered three-dimensional model of the development, which has been geo-referenced to allow accurate placement and scale. For each viewpoint, the following images have been produced:

1. Existing view;

2. Outline view with cumulative (yellow outline showing the extent of the development overlaid on the photograph);
3. Montage View; and,
4. Montage View with Mitigation Established.

Viewshed Reference Point		Viewing distance	Direction of View
VP1	Local road L50301, west of Duckett's Grove, Rainestown:	3.0km	SE
Representative of:	- Local community view - Designated scenic routes and view - Amenity and heritage feature		
Receptor Sensitivity	High-Medium		
Existing View	This viewpoint is adjoining Duckett's Grove House. It is broad view sweeping over an arable field of crops. There is a large farmstead in the near middle ground and then a band of stacked woodland and hedgerow vegetation, which limits onward views, except for a distant ridgeline that rises up above the treeline in the background.		
Visual Impact of proposed solar farm before mitigation	The Proposed Development will not be visible from here due to intervening terrain and vegetation screening. Thus, the magnitude of visual impact is Negligible by default.		
Visual Impact following mitigation establishment	Mitigation will not be visible from here.		
Summary	Based on the assessment criteria and matrices outlined at Section 1.1.3 the significance of residual visual impact is summarised below.		
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
Pre-mitigation	High medium	Negligible	Imperceptible
Residual	High medium	Negligible	Imperceptible

Viewshed Reference Point		Viewing distance	Direction of View
VP2	R726 regional road, Killerrig	1.8km	SW
Representative of:	- Local Community view - Designated scenic routes and view - Major route		
Receptor Sensitivity	High – Medium		
Existing View	As a result of locally elevated terrain, this channelled, glimpse view is afforded to the southwest from a field gate on a busy regional road. Beyond the mature roadside vegetation lies a small field of rough grazing in the foreground. The landform falls away from the viewpoint to reveal a long distance view over a pastoral landscape towards a distant low ridge in the background.		
Visual Impact of proposed solar farm before mitigation	The Proposed Development will not be visible from here due to intervening terrain and vegetation screening. Thus, the magnitude of visual impact is Negligible by default.		
Visual Impact following mitigation establishment	Mitigation will not be visible from here.		
Summary	Based on the assessment criteria and matrices outlined at Section 1.1.3 the significance of residual visual impact is summarised below.		
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
Pre-mitigation	High medium	Negligible	Imperceptible
Residual	High medium	Negligible	Imperceptible

Viewshed Reference Point		Viewing distance	Direction of View
VP3	Regional road R726, Ardnehue	1.6 km	SE
Representative of:	- Local Community views - Major Routes		

Viewshed Reference Point		Viewing distance	Direction of View
VP3	Regional road R726, Ardnehue	1.6 km	SE
Receptor Sensitivity	Medium-Low		
Existing View	This is a relatively open view over a gently undulating landscape. There is a sense of space within the view created by a level of transparency provided by gaps in the treelines, over low hedgerows and through the post and wire fence in the foreground. The foreground and middle ground of the view are occupied by a large field in pasture and a rural / residential property. In the background of the view there is a large agricultural building to the south and glimpses of a distant elevated terrain		
Visual Impact of proposed solar farm before mitigation	The tops of several vertical elements from the Proposed Development are faintly visible in the distance, above the intervening rolling terrain and layered vegetation. However, the majority of the proposed substation is fully screened from this location. Slender, linear features, such as power poles and overhead lines, are frequently present within the context of this view, with many dissecting this view. Any views of the Proposed Development from this location are barely discernible and do not detract from any sense of rural amenity. Thus, the magnitude of visual impact is Negligible		
Visual Impact following mitigation establishment	Mitigation will not be visible from here.		
Summary	Based on the assessment criteria and matrices outlined at Section 1.1.3 the significance of residual visual impact is summarised below.		
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
Pre-mitigation	Medium-Low	Negligible	Imperceptible
Residual	Medium-Low	Negligible	Imperceptible

Viewshed Reference Point		Viewing distance	Direction of View
VP4	Local road, Friarstown	0.6 km	SW
Representative of:	Local Community views		

Viewshed Reference Point		Viewing distance	Direction of View
VP4	Local road, Friarstown	0.6 km	SW
Receptor Sensitivity	Medium-Low		
Existing View	This view along a narrow lane to the east of the Site is channelled by clipped roadside hedgerows in the foreground. A large dwelling rises in the foreground, and is contained by low-clipped hedgerow vegetation, which heavily truncates the view from this gateway. A fleeting view is afforded along the access land towards pastoral field situated beyond the neighbouring residential landholding.		
Visual Impact of proposed solar farm before mitigation	Whilst the proposed substation will be completely screened by the hedgerow in the foreground from this local road context, there is some potential for views to be afforded from the neighbouring residential dwelling. Nonetheless, as highlighted in the wireframe, the substation will be offset from this dwelling. If viewed from the neighbouring residential land holding, the proposed substation will not present in a highly prominent manner and will likely be viewed in the context of surrounding open pasture. Overall, the Proposed Development will increase the intensity of built development in this view but will not block or heavily obstruct any sensitive viewing aspects. Thus, the magnitude of visual impact is Low .		
Visual Impact following mitigation establishment	Mitigation will not be visible from here.		
Summary	Based on the assessment criteria and matrices outlined at Section 1.1.3 the significance of residual visual impact is summarised below.		
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
Pre-mitigation	Medium-Low	Low	Slight
Residual	Medium-Low	Low	Slight

Viewshed Reference Point		Viewing distance	Direction of View
VP5	R725 regional road south-east of Site, Grangeford Old	0.9 km	N
Representative of:	- Local Community views - Major Routes		
Receptor Sensitivity	Medium-Low		

Viewshed Reference Point		Viewing distance	Direction of View
VP5	R725 regional road south-east of Site, Grangeford Old	0.9 km	N
Existing View	This is a gateway view that affords a brief uphill vista to the northwest across a pastoral field towards a subtle nearby ridge. Lining the ridge to the left of the gateway opening is a substantial farmstead with large agricultural buildings surrounded by a stand of mature trees.		
Visual Impact of proposed solar farm before mitigation	The proposed substation will be completely screened by the rolling topography in the foreground. Thus, the magnitude of visual impact is Negligible by default.		
Visual Impact following mitigation establishment	Mitigation will not be visible from here.		
Summary	Based on the assessment criteria and matrices outlined at Section 1.1.3 the significance of residual visual impact is summarised below.		
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
Pre-mitigation	Medium-Low	Negligible	Imperceptible
Residual	Medium-Low	Negligible	Imperceptible

Viewshed Reference Point		Viewing distance	Direction of View
VP6	Regional road R725, Grangeford Old, adjacent to former Post Office:	0.8 km	SW
Representative of:	- Local Community views - Major Route		
Receptor Sensitivity	Medium-low		
Existing View	This open view to the north is afforded from the gap in the roadside hedge created by an agricultural field gate. Large arable fields, separated by low clipped hedgerows, occupy the fore-to-middle ground. Having descended slightly in the foreground, the terrain rises gently in the middle-ground towards a low ridge that is dotted with deciduous trees		

Viewshed Reference Point		Viewing distance	Direction of View
VP6	Regional road R725, Grangeford Old, adjacent to former Post Office:	0.8 km	SW
	and some large agricultural buildings. In the background can be seen the foothills of the distant Wicklow Mountains.		
Visual Impact of proposed solar farm before mitigation	Faint views of the proposed substation appear on the horizon line behind the Grangeford solar development. The building and its vertical features present as a familiar backdrop for the Grangeford solar farm. Within the context of this view, the permitted solar panels are the more prominent feature, occupying most of the middle ground. The proposed substation is clearly associated with the solar development and does not appear out of place within the surrounding landscape. The substation occupies a much smaller footprint than the solar farm and presents with a brief visual envelope. Nonetheless, the proposed substation includes a more notable proportion of tall linear elements that rise above the buildings, similar in nature and scale to the surrounding power poles. However, many of these taller features have a limited visual presence due to their slender structure. As such, the magnitude of visual impact generated by the proposed substation is deemed to be no greater than Low .		
Visual Impact following mitigation establishment	Mitigation will not be visible from here.		
Summary	Based on the assessment criteria and matrices outlined at Section 1.1.3 the significance of residual visual impact is summarised below.		
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
Pre-mitigation	Medium-low	Low	Slight
Residual	Medium-low	Low	Slight

Viewshed Reference Point		Viewing distance	Direction of View
VP7	Regional road R725, Aghwater:	1.3 km	NE
Representative of:	- Local community view - Major Routes		
Receptor Sensitivity	Medium		

Viewshed Reference Point		Viewing distance	Direction of View
VP7	Regional road R725, Aghwater:	1.3 km	NE
Existing View	This is a relatively broad vista from a slightly elevated section of the R725. It takes in large cropping fields in the gently descending fore-to-middle ground. Thereafter, low-clipped hedgerows and tree lines tend to be come stacked in perspective to reveal less of the fields between. The southwestern extents of the Wicklow Mountains form a distant backdrop to the view.		
Visual Impact of proposed solar farm before mitigation	There is potential for faint views of the proposed substation through the gaps in the intervening hedgerow vegetation behind the permitted Grangeford solar farm. However, the solar farm will be considerably more prominent from this location. Any views will be barely discernible and will have a limited effect on the visual amenity of this rural scene. Thus, the magnitude of visual impact is Low-negligible .		
Visual Impact following mitigation establishment	Mitigation will not be visible from here.		
Summary	Based on the assessment criteria and matrices outlined at Section 1.1.3 the significance of residual visual impact is summarised below.		
	Visual Receptor Sensitivity	Visual Impact Magnitude	Significance of Visual Impact
Pre-mitigation	Medium	Low -negligible	Imperceptible
Residual	Medium	Low-negligible	Imperceptible

9.7 Cumulative

Whilst there are currently no other constructed electrical developments within the study area, the proposed substation is located within the Site boundary of the permitted Grangeford solar development (Planning Ref: 23/60297).

Majority of the cumulative visual assessment is undertaken in Section 9.6.7 in the Magnitude of Visual Impacts, where the proposed substation is assessed in relation to the permitted Grangeford solar development. With regards to landscape impacts, the proposed substation will present as an evidently related activity alongside the permitted Grangeford solar farm. This will modestly increase the intensity of electrical infrastructure / power generation developments within the receiving landscape, most notably in relation to the vertical elements from the proposed substation. However given its location within the Site boundary of a permitted solar development, it is considered to be an appropriate scale and nature of change and will therefore not generate any notable cumulative effects

9.8 Assessment Conclusions

In terms of landscape impacts, the Proposed Development is contained within a working rural landscape that is already influenced by existing anthropogenic activities. Indeed, the

proposed substation compound and associated vertical features are located within a heavily contained part of the Site well offset from nearby receptors. This considerably diminishes the likelihood of generating any notable effects on the perceived character of the surrounding landscape.

The robust working nature of the landscape is reinforced by the Carlow County Development Plan 2022-2028 where the host LCA 'Central Lowlands' is described as having the "capacity to accommodate most types of development, subject to the implementation of appropriate mitigation measures." Furthermore, there are no areas above a 'Class 2-3' landscape sensitivity within the immediate surrounds of the Site.

Overall, the significance of operational phase landscape effects is deemed no greater than Slight within the Site and will reduce to Slight-imperceptible and Imperceptible beyond the immediate Site context, where it will be heavily screened by the layers of intervening vegetation and terrain. The quality of effect is deemed Negative, and the duration of effect is classified as permanent.

Visual effects were assessed at 7 viewpoints throughout the study area, representing various viewing distances, angles and receptor types. The sensitivity of visual receptor judgements varied between 'High-medium' for two receptors which were observed from designated scenic routes and 'Medium-low' for the remaining five, representative of nearby local community receptors. Overall, the highest significance of visual effect is deemed to be a 'Slight' (VP4), whilst the quality of the effect is deemed to be 'negative' and the duration of effect as 'permanent'. Although from the viewpoint the proposed substation is completely screened, there is potential for views from the neighbouring residential dwelling.

Nevertheless, the substation is well offset from the dwelling and if there were potential views the proposed substation would not present in a highly prominent manner, nor would it block or obstruct any sensitive viewing aspects.

On balance of the reasons outlined above, it is not considered that the Proposed Development is an inappropriate form of development in the context of this robust rural landscape where there is existing precedent for electrical infrastructure. The Proposed Development does not conflict with any landscape and visual-related policy in the current Carlow County Development Plan.

9.8.1 Overall Significance of Impact

Based on the landscape and visual impact judgements provided throughout this LVIA, the Proposed Development is not considered to give rise to any significant residual impacts. Instead, both landscape and visual impacts are not considered to exceed 'Slight' significance, even in the immediate context of the Site. In the context of this development, it is considered that these low-level residual impacts represent an acceptable impact on the receiving landscape.

10 CULTURAL HERITAGE

This Chapter provides a description and evaluation of the potential, likely and significant impacts of the Proposed Development on archaeological, architectural, and cultural heritage resource of the Proposed Development.

This aim of this assessment is to evaluate the baseline cultural heritage environment at the Site and the likely adverse effects, if any, that the Proposed Development may have on the environment and to provide mitigation measures as may be necessary.

This assessment was prepared by Dr. Maurice F Hurey (Dlitt, MA, FSA, MIAI) Consultant Archaeologists with the assistance of Mr. Vincent Price (BA, Hdip.,) to accompany a SID application for the Proposed Development.

10.1 Introduction

The Proposed Development will consist of the construction of a 110kV electrical substation and a 110kV underground cable connection as outlined in chapter 5 of this Environmental Report.

The 110kV substation will be designed to connect the Permitted Development to the national grid. An UGC will connect the proposed substation to the Kellistown Substation. The proposed underground cable route will exit the proposed 110kV substation and run in a southerly direction within the Permitted Development along existing internal access tracks and exit directly onto the R725 (Plates 10-1 to 10-4). The UGC will then follow the R725 in an easterly direction for c. 550m before turning on the local road (Plate 10-5). The UGC will continue in a southerly direction to the existing ESB 220kV Kellistown Substation.

A single Recorded Monument (CW008-020, burial ground) is located within the Permitted Development (Figure 10-2) at the southern part of the Site where the UGC is proposed to run to the west. The monument is classified as a 'burial ground'. The Site is named 'Grangeford Rath' on historic Ordnance Survey map (Figure 10-7) but is also labelled Graveyard/Burial Ground on the map. The monument is defined by a circular ditch within which an enclosing low stone wall defined the circular burial ground. The graveyard is disused and infrequently visited as attested by a blanket covered in ivy within the tree plated enclosure.

The 'monument' is scheduled for inclusion in the next review of the Record of Monument and Places and therefore has legal protection under the National Monument Acts. The Archaeological Survey of Ireland states there is 'no visible trace of any structure' and apart from the tomb stones and enclosing wall no structure is apparent.

A geophysical survey of the entire site of the permitted solar farm was undertaken in April 2023/April 2024 (John Nichols, Licence 23R0166), wherein five areas produced convincing results indicating the likely location of archaeological sites (Figure 10-10). The full geophysical reports were included in the material submitted in the Archaeological Impact Assessment. Archaeological testing was subsequently carried out in 2024 (24E0421. Maurice F Hurley) and full details were included in the material submitted in the Archaeological Impact Assessment.

Figure 10-1: Site Location



Figure 10-2: Proposed Site Layout

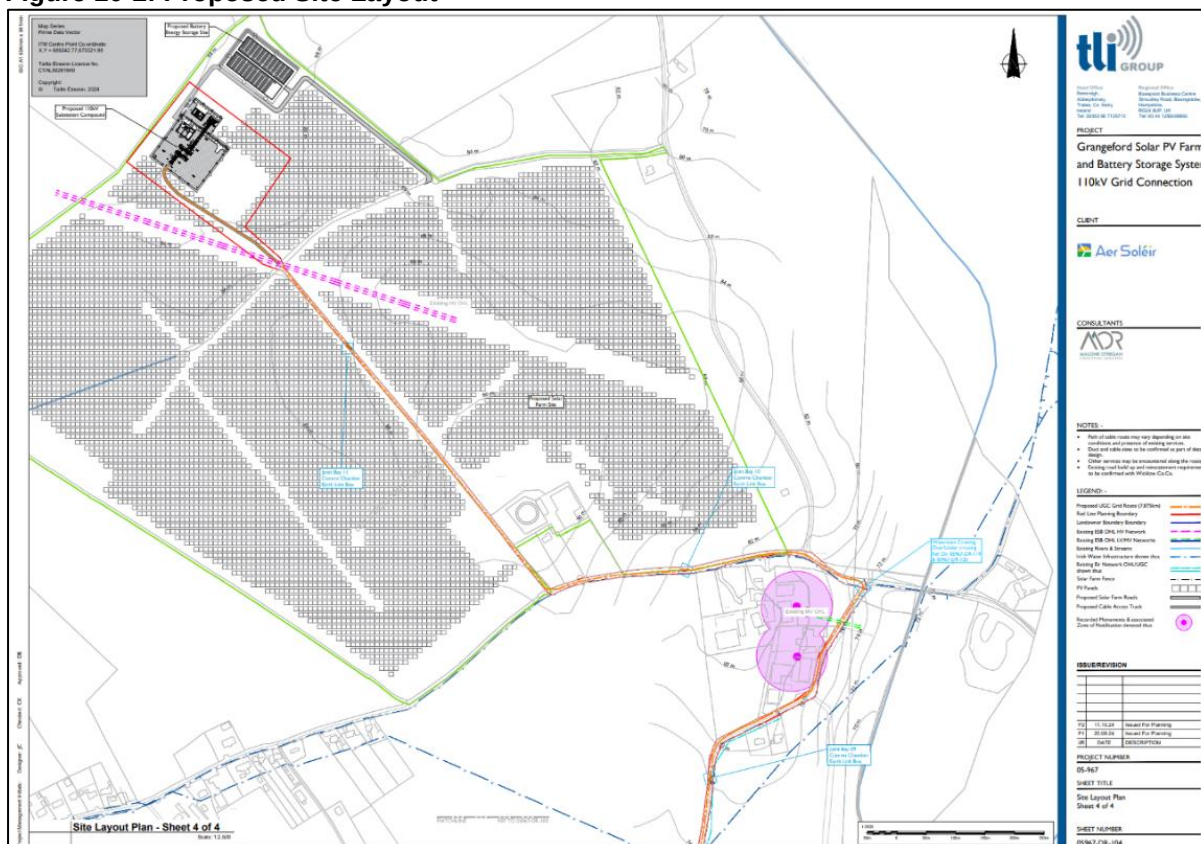


Figure 10-3: Route of proposed underground cable.

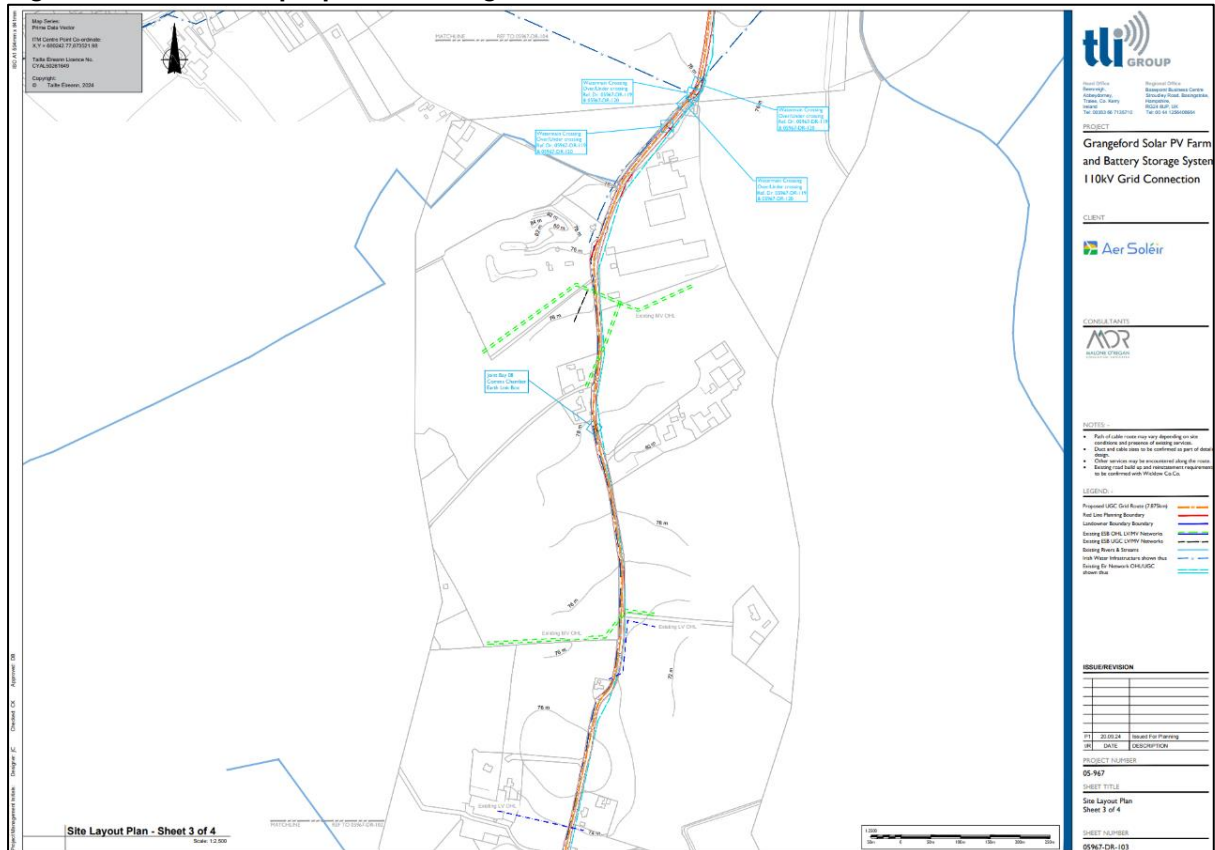


Figure 10-4: Route of proposed underground cable

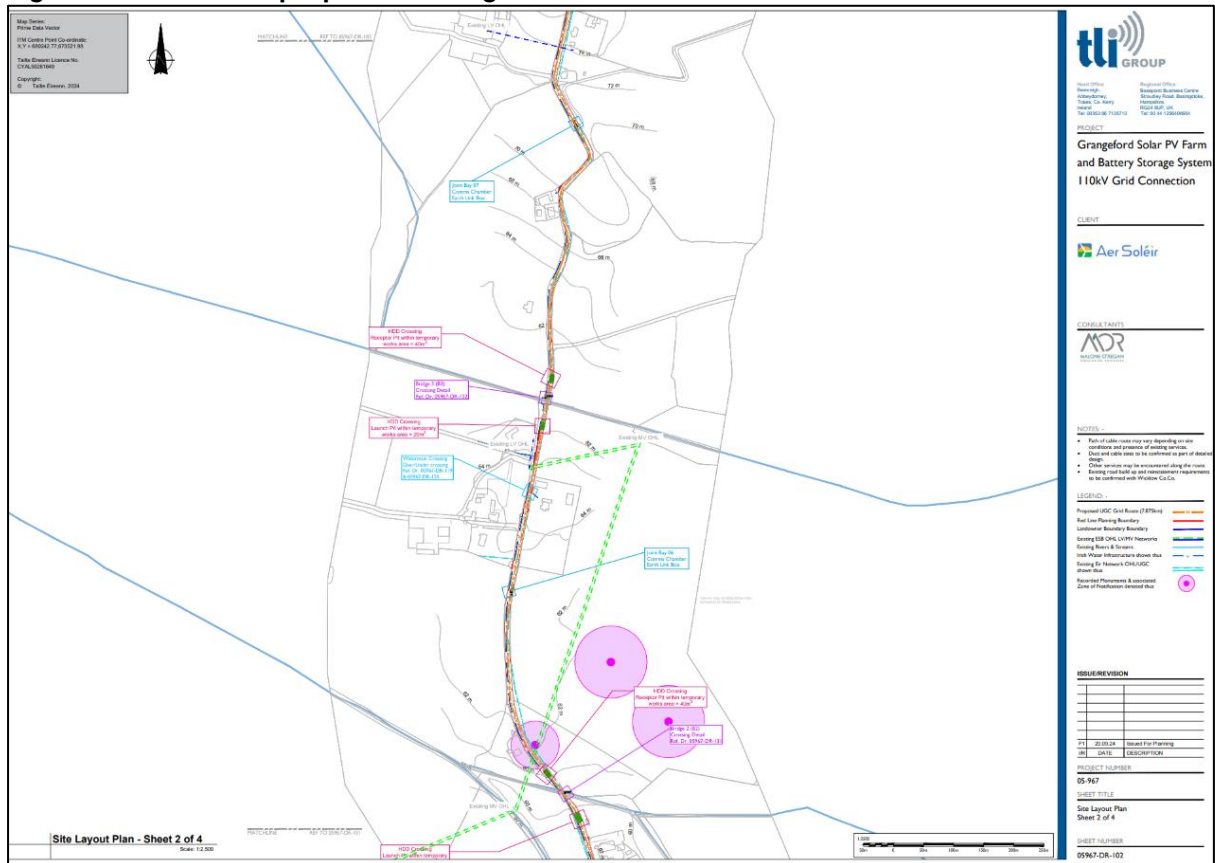
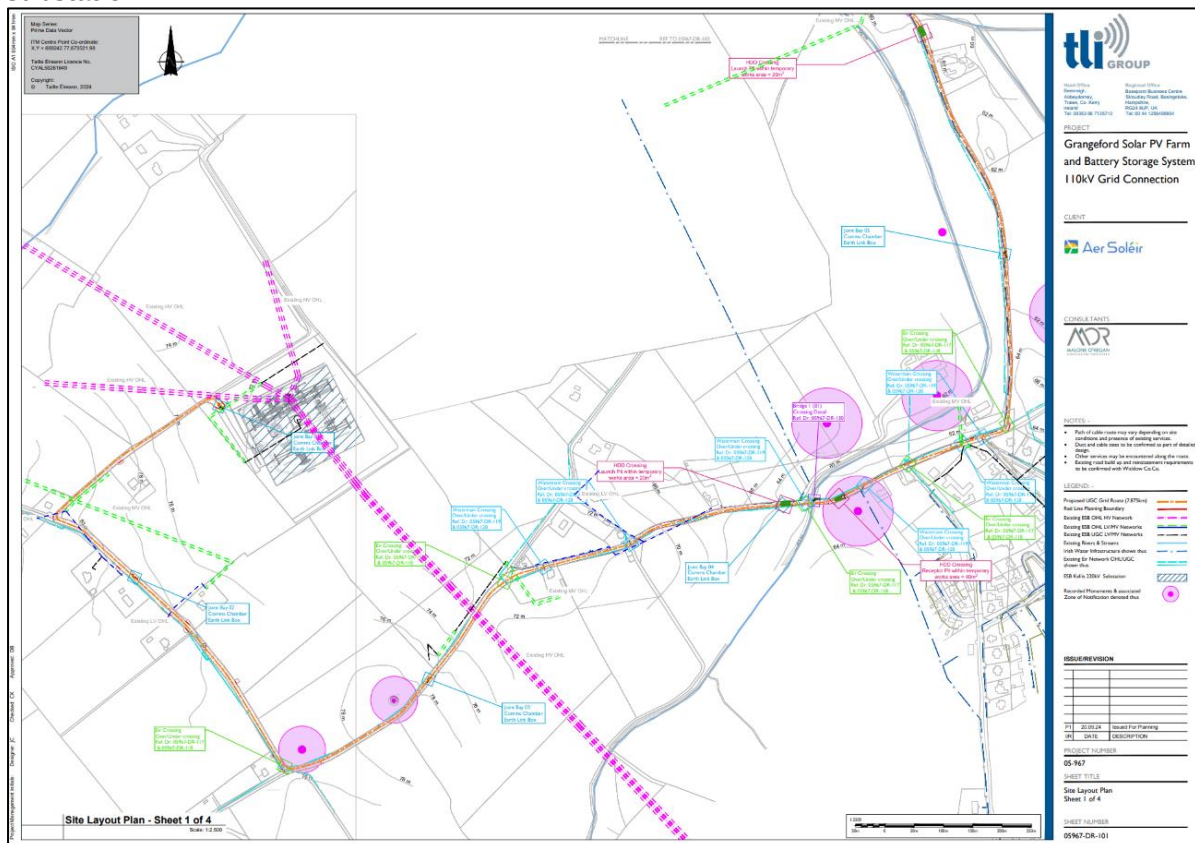


Figure 10-5: Route of underground cable, where it connects with the existing Kellistown substation



Eight monuments are in the vicinity of the route; three adjoin or are close to the roadside; CW013-007-moated site (Rath Healy), c.30m south of the roadway but probably closer judging from the OS maps, CW013-003-barrow and CW-013-120-ring ditch. Three monuments lie north of the Burren River, CW013-081-enclosure at 182m distant and CW013-005-enclosure at c. 119m to the west and 85m to the north of the route, a redundant record CW013-122.

10.2 Methodology

This study was produced to assess the archaeological and cultural heritage resource of the Site in the context of the archaeological and historical environment of the area.

The study was informed by site inspection and was based on the results of documentary and cartographic research and an examination of available aerial photographs. Consulted sources include:

- EIA Preparation Guidelines, May 2022 [10];
- National Monuments Act, 1930 [100];
- The Planning and Development Acts, 2000 (as amended) [101];
- Heritage Act, 1995 (as amended) [102];
- Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) [9];
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Report [10];
- Frameworks and Principles for the Protection of the Archaeological Heritage, (formerly) Department of Arts, Heritage, Gaeltacht, and Islands [103];

- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 [104] and the Local Government (Planning and Development) Act 2000 [101];
- Cartographic review including all editions of the Ordnance Survey maps and aerial photographs;
- The Record of Monument and Places (RMP). These files are based on the pre-existing Sites & Monument Record (SMR) and information from completed county archaeological inventories. As such it records known upstanding archaeological monuments, their location (in cases of destroyed monuments) and the position of possible sites identified as cropmarks on vertical aerial photographs [105];
- The topographical files of the National Museum of Ireland;
- Published and unpublished documentary sources for the area including unpublished field survey and references on archaeological testing and excavation in the vicinity; and,
- The study is also informed by geophysical survey undertaken by John Nichols (Licence 23R0116 Target Geophysics Ltd.) that involved the survey of the entire area of the Permitted Development which includes the land where the proposed 110kV substation is intended. Archaeological testing (Licence 24E0421 Maurice F Hurley, Consultant Archaeologist) within the Permitted Development also informs this report. The geophysical survey for the Permitted Development is included in full as Appendix G.

10.2.1 Legislation and Guidelines in Ireland

The principal legislative measures protecting cultural heritage assets are:

- National Monument (Amendments) Acts 1930 [100] to 2004 [106];
- Heritage Act 1995 [102];
- Relevant provisions of the National Cultural Institutions Act 1997 [107];
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 [104]; and,
- Planning and Development Act 2000 [101].

Moreover, policies for both the archaeological and architectural heritage are relayed in a series of specific published guidelines. This chapter was prepared having regard to the following guidelines:

- Guidelines on the information to be contained in Environmental Impact Statements [10], and Draft Revised Guidelines [9];
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, (Environmental Protection Agency, 2003) and Draft Revised Advice Notes (2015);
- Framework & Principles for the Protection of the Archaeological Heritage [103];
- Policy & Guidelines on Archaeological Excavation [108]; and,
- Architectural Heritage Protection-Guidelines for Planning Authorities [109].

10.3 Desktop Study

The desktop study provided an overview of the cultural heritage features of the Proposed Development and study area and used the following sources.

10.3.1 Record of Monuments and Places ('RMP')

This record was established under Section 12 (1) of the National Monuments (Amendment) Act 1994. It lists all monuments and places believed to be of archaeological importance in the County. The numbering system consists of two parts: the first part is the county code (CW for Carlow) followed by the Ordnance Survey map number (six inch to the mile scale); the second part is the number of a circle surrounding the site on the RMP map, e.g., CW008-020 refers to circle 020 on OS sheet 08 for County Carlow. The area within the circle is referred to as the Zone of Archaeological Potential (ZAP) or zone of notification for that site. Its diameter can vary depending on the size and shape of the site, but it averages out at approximately 120m. The RMP for County Carlow was published in 1993.

10.3.2 Sites and Monuments Record Database of the ASI

The purpose of the Archaeological Survey of Ireland ('ASI') is to compile a baseline inventory of the known archaeological monuments in the State. It contains details of all monuments and places or sites known to the ASI which pre-date AD 1700, and a selection of monuments which post-date 1700. The large record archive and databases resulting from the survey are continually updated. This database, complete with maps, is available for consultation via the NMS website at www.archaeology.ie.

10.3.3 Archaeological Inventory

The inventories for each county are follow-ons by the Archaeological Survey of Ireland, to the RMPs. They give a written description of each archaeological site in the county. The archaeological inventory for County Carlow was published in 1993 (compilers A. Brindley & A. Killeather).

10.3.4 The topographic files of the NMI

The topographical files were searched for the townlands in the study area. No stray finds are recorded where the proposed substation or UGC are planned.

A Bronze Bracelet (Museum No. 2004-260) was found in the townland of Grangeford, at a distance of ca. 500m to the east of the UGC.

10.3.5 Carlow County Development Plan (2022-2028)

The Carlow County Development Plan 2022-2028 outlines Carlow County Council's objectives with regard to the preservation of the archaeological, architectural, and cultural heritage of the County. The plan also outlines the Council's objectives regarding the protection of the archaeological heritage, including the protection of monuments listed in the Sites and Monuments Record and Record of Monuments and Places, by preservation in situ, or in exceptional cases, preservation by record.

The policies of the council in relation to Archaeology include.

AH. Policy 1. *Secure the preservation (either in situ or by record) of all archaeological monuments included in the Record of Monuments and Places (RMP) and their settings, and of all sites and features of significant archaeological or historical interest, including potential and previously unknown sites or features, in consultation with the National Monuments Service in the Department of Housing, Local Government and Heritage.*

AH Policy 3. *Protect, conserve, and enhance the archaeological heritage of the County, and to manage development in a manner that avoids adverse impacts on sites, monuments, features, or objects of significant archaeological or historical interest, including areas and sites of archaeological potential. There will be a presumption in favour of the 'preservation in situ' of archaeological heritage in accordance with the 'Framework and Principles for the Protection of Archaeological Heritage (DAGHI 1999) or any superseding national policy document.*

AH Policy 4. *Ensure that any development proposal that may, by reason of location, scale, nature, layout, or design, have potential implications for archaeological heritage (including areas and sites of archaeological potential), shall be subject to an archaeological assessment. The archaeological assessment will seek to ensure that the development proposal can be sited and designed to avoid impacting on archaeological heritage. Any archaeological excavation shall be carried out in accordance with best practice outlined by the NMS, the National Museum of Ireland, and the Institute of Archaeologists of Ireland. In all such cases the Planning Authority shall consult with the National Monuments Service in the Department of Housing, Local Government and Heritage.*

AH Policy 5. *Have regard to the Record of Monuments (RMP) and Places, the Urban Archaeology Survey and archaeological sites identified subsequent to the publication of the RMP when assessing planning applications for development. No development shall be permitted in the vicinity of a recorded feature, where it detracts from the setting of the feature, or which is injurious to its cultural or education.*

AH Policy 6 *Protect the Zones of Archaeological Potential (Zones of Archaeological Notification) located within both urban and rural areas as identified in the Record of Monuments and Places (RMP).*

AH. Policy 7. *Protect and conserve historic burial grounds within the County, including through the avoidance of extensions to them that would have an inappropriate level of impact on sub-surface archaeological remains or on their setting and amenity, and encourage their management and maintenance in accordance with best practice conservation principles, including ‘Guidance for the Care, Conservation and Recording of Historic Graveyards’ (The Heritage Council 2011) and ‘Ireland’s Historic Churches and Graveyards’ (The Heritage Council), and in consultation with the National Monuments Service in the Department of Housing, Local Government and Heritage.*

AH. Policy 8. *Promote public awareness of the archaeological heritage of the County, and encourage where appropriate and practicable, the provision of appropriately designed and located signage, interpretative material, and public access (including disabled access) for archaeological sites under the direct ownership, guardianship, or control of the Council and/or the state.*

AH. Policy 9. *Support community initiatives and projects regarding the preservation, presentation and access to archaeological heritage and underwater cultural heritage, provided such are compatible with appropriate conservation policies and standards, having regard to the guidance and advice of the Department of Housing, Local Government and Heritage.*

AH. Policy 10. *Support the incorporation of recorded monuments into designated open spaces and public amenity spaces, provided this is done in a manner compatible with the protection and proper management and conservation of the monument in question. Accordingly, where such incorporation takes place an appropriate and enforceable permanent management and conservation plan will be required.*

10.3.6 National Inventory of Architectural Heritage (‘NIAH’)

The National Inventory of Architectural Heritage was set up under the Convention for the Protection of the Architectural Heritage of Europe or the Granada Convention of 1985. It was established on a statutory basis under Section 2 of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 [104]. The work of the NIAH involves identifying and recording the architectural heritage of Ireland, from 1700 to the present day, in a systematic and consistent manner. It is divided into two parts: The Building Survey and Historic Garden Survey (www.buildingsofireland.ie). The main function of both is to identify and evaluate the State’s architectural heritage in a uniform and consistent manner, so as to aid to its protection and conservation.

The National Inventory of Architectural Heritage carried out a survey of the buildings of County Carlow between 2006 and 2011. Under Section 53 of the Planning and Development Act 2000, all structures considered of regional, national, or international Importance within the survey are recommended for inclusion in the Record of Protected Structures by the Minister for Arts Heritage and the Gaeltacht. If this is not adopted by the local authority, the reasons must be communicated to the Department. The Building and Historic Garden Survey for County Carlow is available online. No buildings or gardens included in the Inventory are located within the Site.

10.3.7 Database of Irish Excavation Reports

This website provides a database of summary accounts of archaeological excavations and investigations in Ireland undertaken between 1970 and 2015. Until 2010, these accounts were also published in book form.

10.3.8 Field Study

The study was informed by the field inspections undertaken on the 11th of November 2022 and July 2023, to assess the possibility of unrecorded archaeological sites being present within and adjacent to the Permitted Development.

10.3.9 Geophysical survey and Test Trenching

Geophysical Survey

This study was also informed by geophysical survey undertaken by John Nichols (Licence 23R0116 Target Geophysics Ltd.) for the Permitted Development. The survey was undertaken in two separate phases which includes the land for the proposed 110kV substation.

Phase 1

A geophysical survey was undertaken at the Site in April 2023 by John Nicholls MSc, Detection License 23R0166. A total of 25.25ha of high-resolution recorded magnetometry was completed in three areas examining all lands that were accessible for a survey at that time. This geophysical survey formed part of the Cultural Heritage Assessment submitted as part of the Environmental Report – Vol 1 dated the 11th December 2023 (Ref No.: 23/60297).

Phase 2

This geophysical survey was conducted in three areas within the boundary of the Proposed Development, completing a total of 55.47ha of high-resolution recorded magnetometry, examining all Phase 2 lands that could be accessed given ground conditions at the time of the fieldwork. Please refer to the Geophysical Investigation Report in Appendix G for full details.

All geophysical surveying was carried out under license from the National Monuments Service, Department of Housing, Local Government & Heritage, with the following aims:

- To identify geophysical anomalies of possible archaeological origin within the investigation areas;
- Accurately locate these anomalies and present the findings in graphical format; and,
- Describe the anomalies and discuss their likely provenance in a written report.

Test Trenching

Archaeological testing (Licence 24E0421 Maurice F Hurley, Consultant Archaeologist) within the Permitted Development was undertaken in April 2024 and also informs this report. The testing strategy took cognisance of the findings of the geophysical survey and the submission made by the Development Applications Unit, Dept. of Housing Local Government and Heritage on the Permitted Development (dated 25th January 2024).

10.4 The Receiving Environment

The proposed 110kV substation is located with the Permitted Development in the townlands of Grangeford Old (southern part of the site) and Friarstown (northern part of the site), County Carlow. From this location the proposed cable route will follow existing farm roadways and then run on the margins of existing public roads, skirting the village of Rathtoe to the Kellistown 220kV substation.

The landscape in this area is characterised by level agricultural land, mostly well drained from which internal field fences have frequently been removed. In particular the area of the Permitted Development in Grangeford Old is laid out in a single undivided unit through which farm roads have been laid out. The land has been subject to extensive and regular cultivation for cereal crop and the farm has been the venue of the National Ploughing Champions and the World Ploughing Contest in 2006.

The cable route runs on local roads through level to gently undulating agricultural land, mostly in cereal production. The land flanking the Burren River is particularly low-lying and the first edition Ordnance Survey map (Figure 10-7 and 10-8) records the area as marshy.

In the latter half of the nineteenth century the area was drained when the meandering course of the Burren River was recut as a straight channel and at that time the road was realigned to the east of the river channel (see Figure 10-8 and 10-9). It is noteworthy that the newly realigned road (Figure 10-8) curved around a mound shown (but not named) on the first edition Ordnance Survey map. The site, RMP CW008-039, was subsequently quarried and today no surface trace remains apparent (Plate 10-6). Similarly, a large barrow, RMP CW013-003 (Plate 10-9, 10-10 and 10-11), stands close to the L1025 which curved around the monument.

The area of the substation is flat and the test trenches excavated in the vicinity (Licence 24E0421) indicate that the area is maintained in agricultural usage by an extensive network of ceramic drainage pipes. There were no anomalies likely to represent features relating to archaeology on the geophysical survey nor the archaeological trenches excavated in the vicinity.

The proposed UGC will exit the proposed 110kV substation and run in a southerly direction within the Permitted Development along existing farm roads (Plate 10-2) and exit directly onto the R725 (Plate 10-4).

The UGC will then follow the R725 in an easterly direction for ca. 550m before turning on the local road. The UGC will continue in a southerly direction to the existing ESB 220kV Kellistown Substation.

In this course the UGC will pass close to a single Recorded Monument (CW008-020, burial ground), at a distance of c. 28m from the southern boundary wall of the burial ground running along an existing access track (Plate 10-3). The site is named 'Grangeford Rath' on historic Ordnance Survey map (Figure 10-6) but is also labelled Graveyard/Burial Ground on the map.

The monument is defined by a circular ditch within which an enclosing low stone wall defined the circular burial ground. The graveyard is disused and infrequently visited as attested by a blanket covered in ivy within the tree plated enclosure.

The 'monument' is scheduled for inclusion in the next review of the Record of Monument and Places and therefore has legal protection under the National Monument Acts. The Archaeological Survey of Ireland states there is 'no visible trace of any structure' and apart from the tomb stones and enclosing wall no structure is apparent.

Geophysical survey of the Permitted Development was undertaken in two phases in 2023 and 2024 (John Nichols, Licence 23R0166). While many anomalies were identified in the geophysical survey, the most strongly represented features of archaeological potential were a group of five/six circular features on the northern side of the farmyard; the area containing these features was excluded from all elements of the solar farm. The road will run at a distance of c. 38m from the nearest element of the circular features.

In the area to the east of Recorded Monument CW088-020, a further area of 61m x 80m was also excluded to preserve in situ a semi-circular ditched feature identified in the geophysical survey and confirmed by the archaeological testing (Licence 24E0421. Maurice F Hurley), See Figure 10-11 and Plate 3, as well as to enhance the protection afforded to the setting of the Recorded Monument. The nearest point of the circular features is c. 25m to the west of the proposed UGC.

On exiting the internal farm road, the proposed UGC will then follow the R725 in an easterly direction for c. 550m before turning on the local road (Figure 10-2). The UGC will continue in a southerly direction to the existing ESB 220kV Kellistown Substation. The cable will be installed in a cable trench running along the margins of the public roads.

Several monuments lie in close proximity to the roadway where the proposed UGC route is proposed (Figure 10-2 to 10-5 and 10-13 to 10-14). Only some of the monuments have surface expression today; a large barrow-mound (RMP CW013-003) being a particularly noteworthy feature on the landscape (Plates 10-9, 10-10 and 10-11). Other monuments were recorded on the first edition of the Ordnance Survey map (Figure 10-6 – 10-9) but some have subsequently been levelled, for example a barrow (RMP CW008-039, Plate 10-6). Other monuments have been identified in recent years from aerial photographs, e.g. (RMPCW008-052001), enclosure (RMP CW008-040), enclosures (CW013-008, CW013-085 and CW013-005) and a ring ditch (CW013-120).

Figure 10-6: First edition Ordnance Survey Map (1829-41) showing the Recorded Monument in the vicinity of the proposed 110kV substation and underground cable

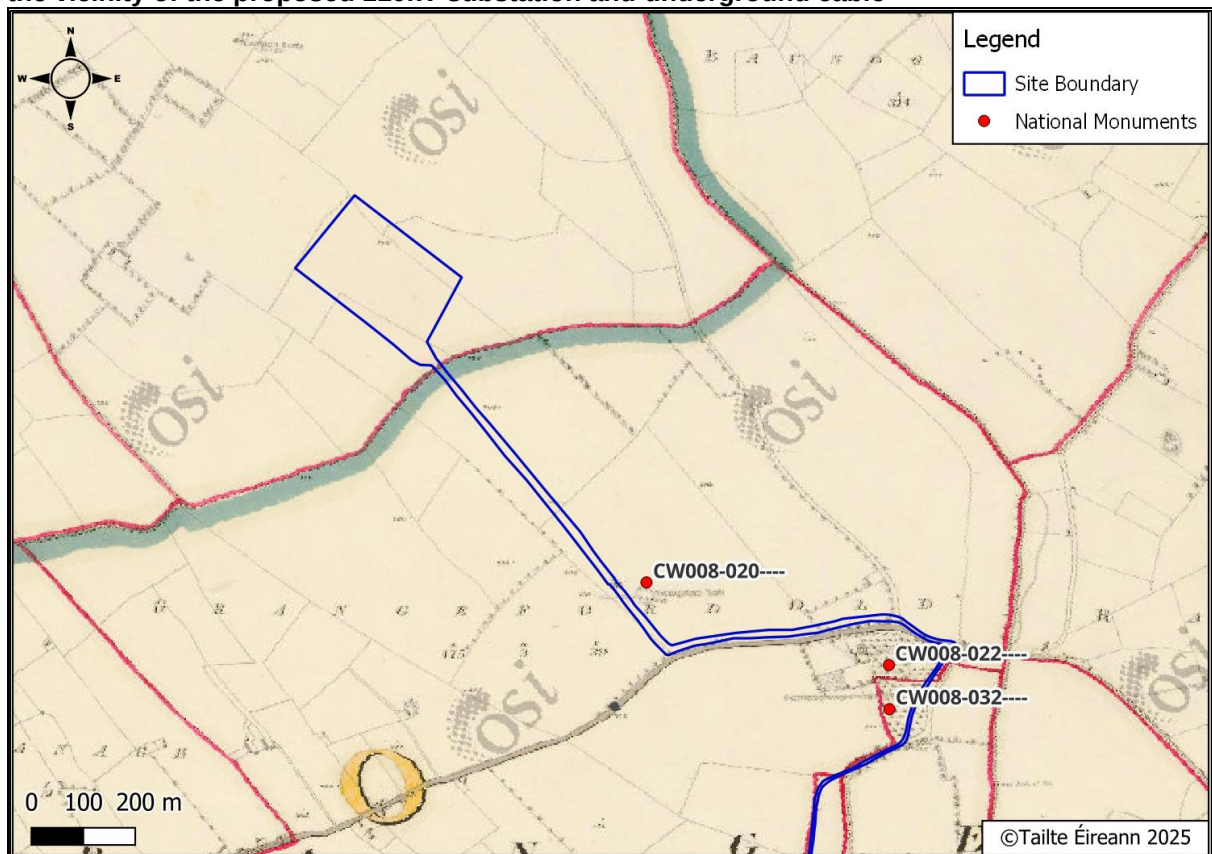


Figure 10-7: First edition Ordnance Survey Map (1829-41) showing the Recorded Monument in the vicinity of the proposed underground cable

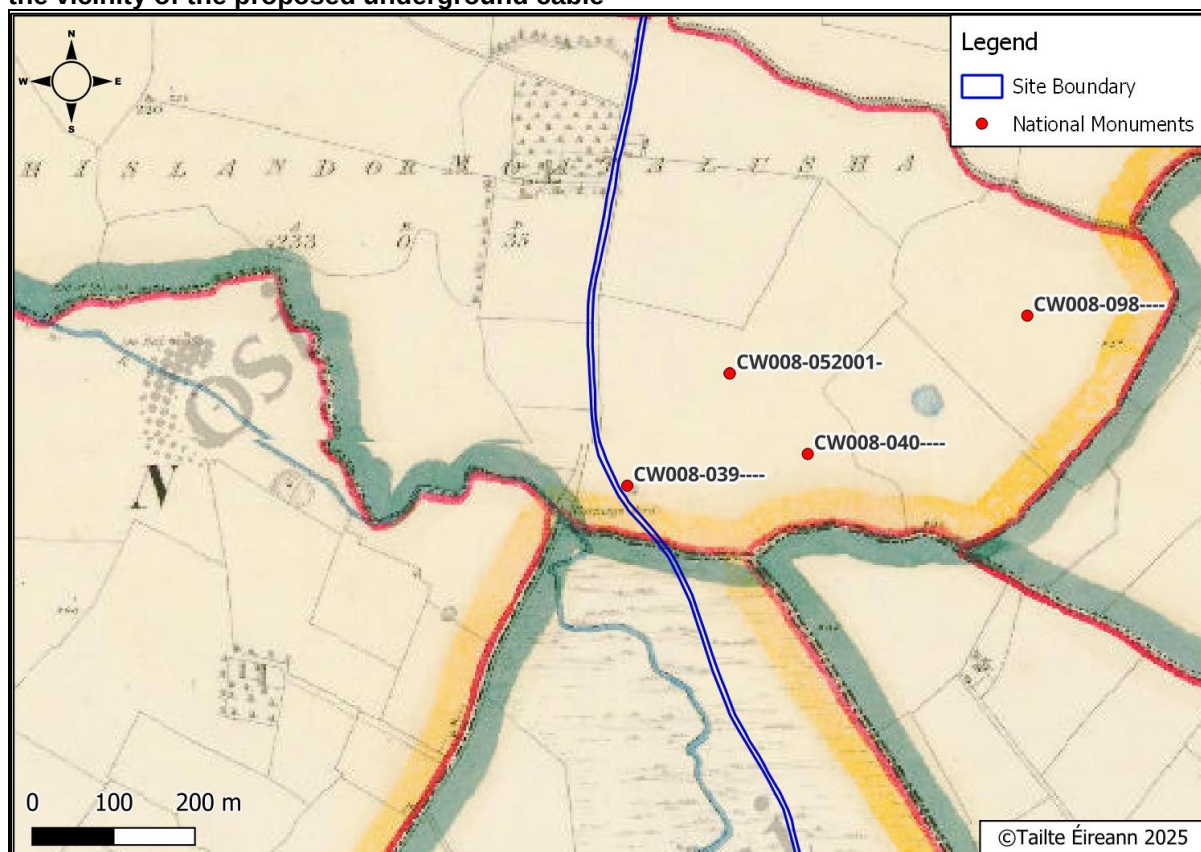


Figure 10-8: First edition Ordnance Survey Map (1829-41) showing the Recorded Monument in the vicinity of the proposed underground cable

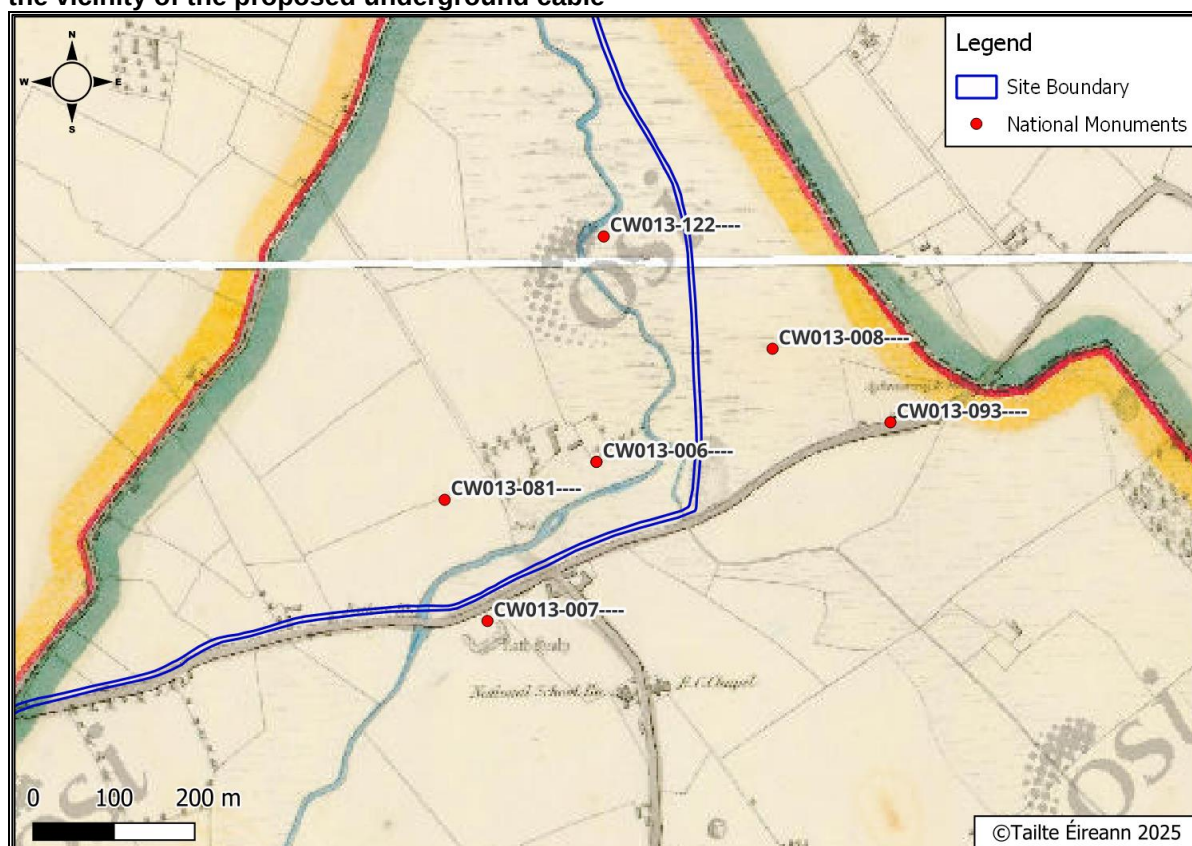


Figure 10-9: First edition Ordnance Survey Map (1829-41) showing the Recorded Monument in the vicinity of the proposed underground cable

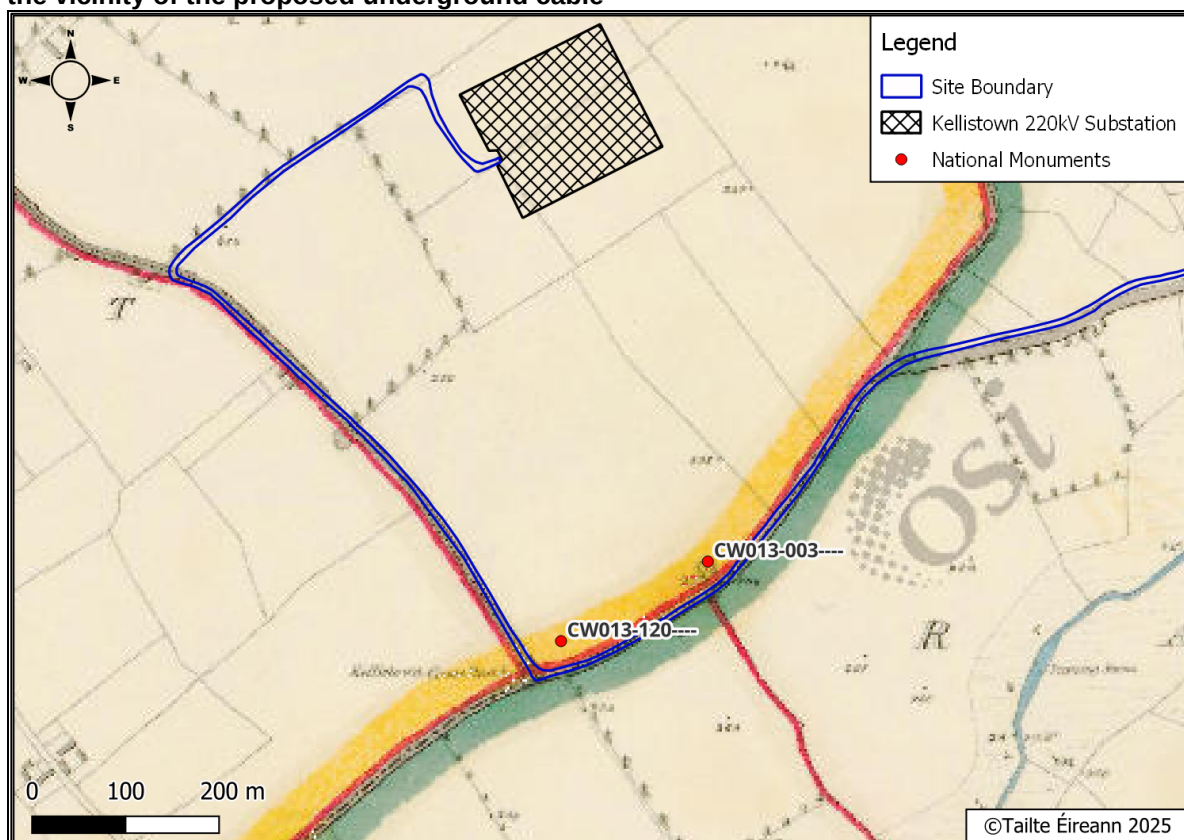


Figure 10-10: Geophysical Survey Results

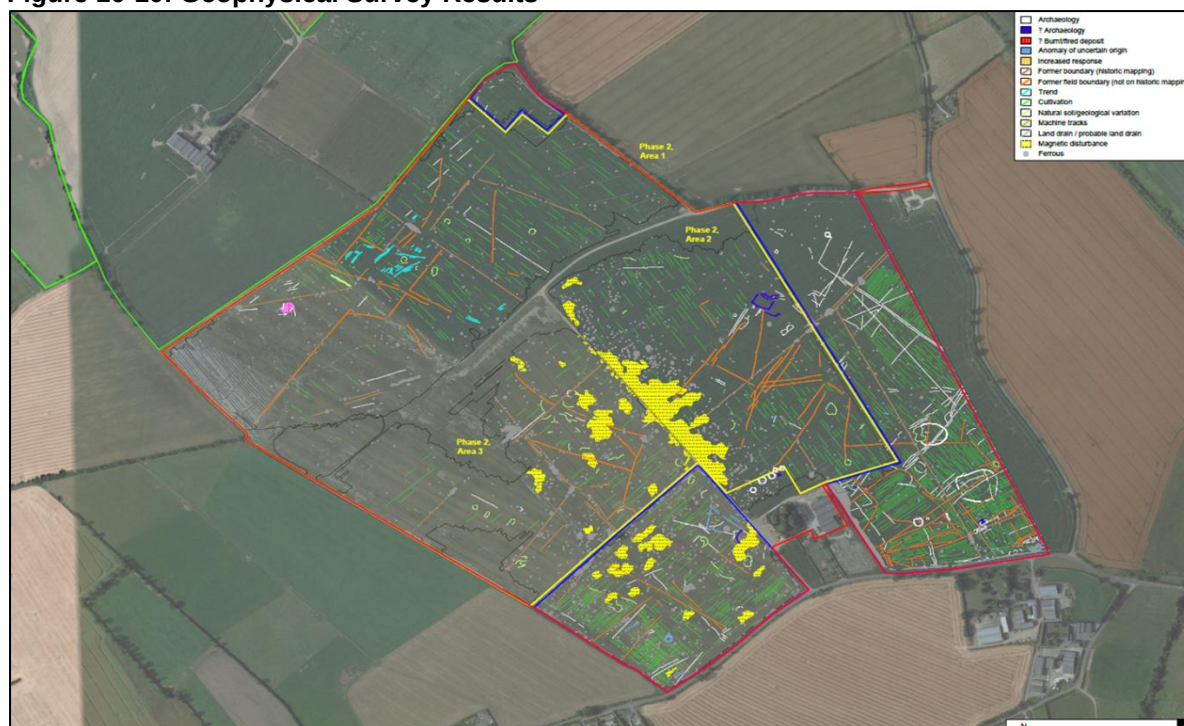
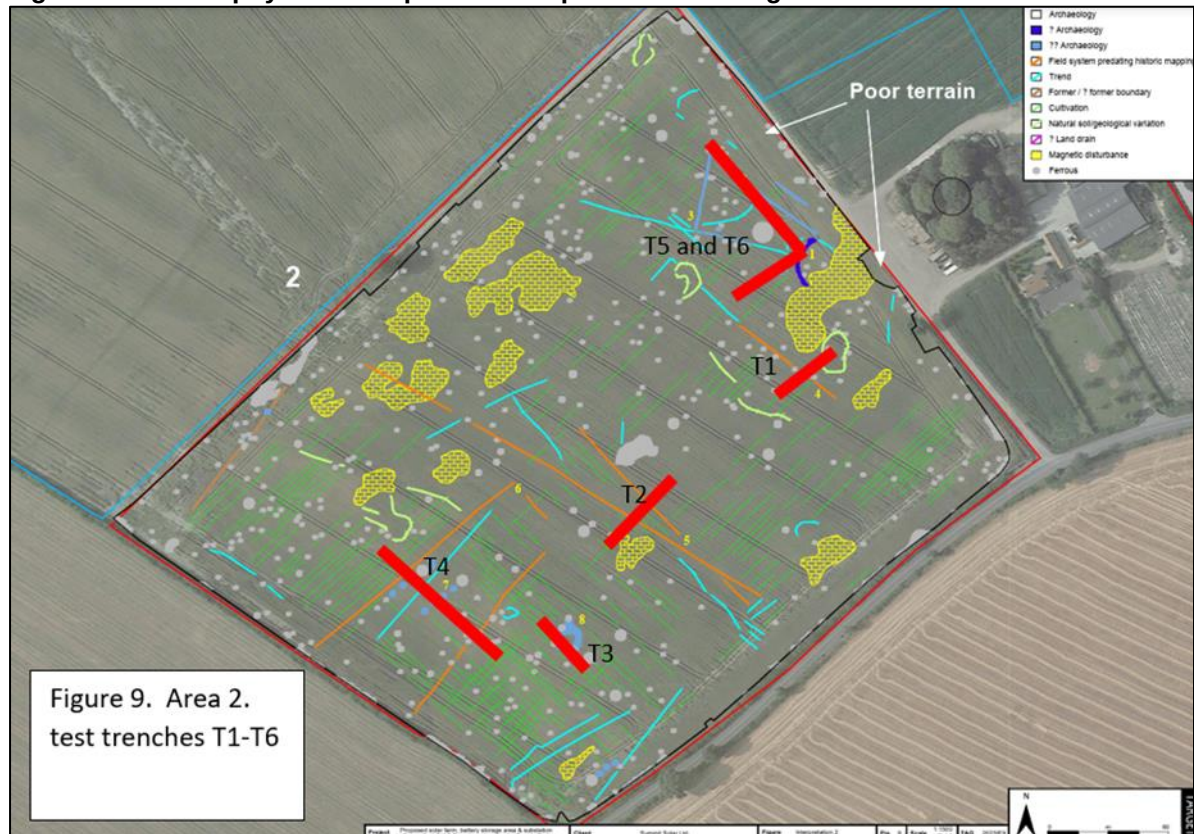


Figure 10-11: Geophysical interpretative map and archaeological test trenches



Detail of the cable route (yellow) in proximity to Recorded Monument CW008-020-burial ground overlaid on the geophysical interpretative map and archaeological test trenches (red) Trench 5 and Trench 6 revealed evidence for a circular enclosure (dark blue arc on this map).

Following the route from the where it joins the R725 on exiting the permitted solar farm, the sites of two lie within farmyards (Plate 10-5). Both monuments are marked on the 1839 Ordnance Survey maps; a castle (RMPCW008-032) and burial ground (RMP CW008-022) on the southern site of the R725. Both monuments have no surface expression today.

Further south on the local road connecting the R735 and L1025, a barrow/mound-barrow (CW008-039) lies adjacent to the roadway. This barrow is shown on the first edition Ordnance Survey map as a circular feature, but it is not named. The barrow is shown and named 'Tumulus' on the second edition Ordnance Survey map of early twentieth century date. It was subsequently quarried and today the field is level at this location (Plate 10-6).

Several monuments have been identified as crop-marks on aerial photographs but today have no surface expression, two monuments known only from aerial photographs are located to the east of the roadway (Plates 10-7 and 10-8), namely a moated site (RMPCW008-052001) and enclosure (RMP CW008-040), see Figure 10-7.

Other monuments known only from aerial photographs, having no surface expression on the route of the UGC include enclosures (CW013-008, CW013-085 and CW013-005) and a ring ditch (CW013-120) lying close to the L1025, near the point where the UGC route turns northwards to approach the Kellistown substation (Figure 10-2 and 10-9).

A moated site (RMP CW013-007) lying on the southern site of the L1025 although with no surface visibility today is depicted and named as 'Rath Healy' on the first edition map (Figure 10-8). The monument is shown as c. half of a rectangular enclosure. The depicted feature suggests that the rectangular enclosure, when complete, would have extended closer to the L1025; a rectangular cropmark can be seen an aerial image taken in 1995 (Figure 10-12) extending as far the southern fence of the L1025.

Another monument standing close to the route of the UGC on the L1025 is a large barrow-mound barrow (H 3m; base diam. 16m) with steep sides (RMP CW013-003), see Plates 10-9, 10-10 and 10-11. The field fence of the road runs close to the base of the mound and the road appears to have been deliberately laid to circumscribe the edge of the monument.

Figure 10-12: Aerial photograph taken in 1995, where the cropmark suggest that the Rath Healy Moated site (RMP CW013-007) extended to the southern side of the L1025 road



Plate 10-1: The site of the permitted 38kV substation to which a 110kV substation is now proposed. (photo September 2022)



Plate 10-2: Looking S with RMP CW008-020-burial ground in the trees in the background. The chosen route for the proposed cable trench will follow an existing farm road within the permitted solar farm.



Plate 10-3: Looking E. The cable route will follow an existing laneway and hard standing (where the machinery is parked). RMP CW008-020-burial ground is located in the trees (background) and the ring-ditch identified in the geophysical survey and the test trenches is in the ploughed land in the foreground.



Plate 10-4: The entrance roadway and part of the hard standing on the southwestern side of the Monument CW008-020; the cable route will follow this route to the public road (R725).



Plate 10-5: Looking SE where existing farmyards occupy the site of RMP CW008-022-burial ground and CW008-32 castle. The monuments have no surface expression.



Plate 10-6: Location of RMP CW008-039-barrow-mound with no surface expression today, but is recorded on the OS maps (see Figures 10-11) close to the eastern side of the road.



Plate 10-7: Plate 10 7: Looking E/SE over the location of RMP CW008-040 enclosure. The monument has no surface expression and is known only from aerial photographs and lies c. 242m from the cable route



Plate 10-8: Plate 8. Looking E to the site of RMP CW008-052001-moated site at a distance of c. 165m from the route of the cable and has no surface expression.



Plate 10-9: Looking SW from L1025. RMP CW013-003-barrow/mound barrow is located on the northern side of the roadside fence



Plate 10-10: Looking NE from the roadway. RMP CW013-003-barrow/mound barrow. Located on the northern side of the roadside fence



Plate 10-11: Looking SE at RMP CW013-003, barrow-mound photographed at a distance of c, 262m from the road running N-S towards the existing Kellistown substation. A rig-ditch RMP CW013-120 with no surface expression lies to just left of the photo in the corner of the field



10.5 General History of the area

County Carlow is bounded by County Kildare to the north, County Wicklow to the northeast with Counties Kilkenny and Wexford lying to the southwest and southeast respectively. The River Barrow forms the boundary between Counties Carlow and Kilkenny. West of this lies the fertile limestone land of the Barrow Valley and to the east the Blackstairs Mountains and Mount Leinster.

South Carlow contains some evidence for human settlement from almost every period of prehistory. Evidence for the Neolithic and Bronze Age is particularly strong around the lower valley of the River Slaney but does not extend northwards into south or west Carlow. The earliest evidence for Neolithic clearances dates to c.4000 B.C. There is very little excavated evidence for settlements of this period, which demonstrates the fragile nature of the evidence. A limited assemblage of flint tools, which assisted settlers in forest clearance, has been recovered. Contact with south Wales and Cornwall has been suggested as a likely source of the early settlers south of the Slaney estuary. Megalithic tombs occur throughout County Carlow. The numerous large granite boulders facilitated the creation of spectacular Portal Tombs (Dolmens) such as at Brownshill dating to the early Neolithic period. Brownshill is located c. 8km to the northwest of the site under review.

Early Bronze Age artifacts have also been found in this area with a smaller number of known Bronze Age cist and urn burials. Cinerary urns were usually intended to contain the burial remains rather than accompany them, although urns have also been discovered within stone lined cist graves. One of the most extensive early Bronze Age cemeteries excavated in Ireland was dug at Ballon Hill. Cist graves and urn burials are rarely found on the hills and mountains and tend to occur at lower altitudes, especially, but not exclusively in sand and gravel moraines. In the townland of Baunogenasraid, located 1.5km to the west of the UGC route, the prehistoric burial ground dating to the Neolithic and classified as the 'Linkardstown burial'

(CW008-031002) is located; the site contained a sod mound covering a cist that contained an inhumation beside a necked vessel, and small perforated toggle-like object and a bone pin. The mound continued in use into the Bronze Age as represented by at least eleven unprotected burials (CW031-001) in oval pits, five cremations and six inhumations; three of which were crouched. A bowl food vessel, flint knife and flint scrapper were also recovered in the course of the excavation of that site in the early 1970's (Brindley & Kilfeather 1993). an aerial photograph taken in 1989 has shown evidence of a fosse-like feature (CW008-031003) surrounding the mound. The fosse is believed to date to the earlier Neolithic phase of the site.

Other characteristic monuments from the Bronze Age include rock art, *fulachta fiadha* and possibly standing stones. Seven examples of Rock Art are known from County Carlow. They occur on earth-fast boulders and rock outcrops. The motifs mainly consist of cropmarks, ringed and straight lines (Brindley & Kilfeather, 1993, 15). The nearest known example of rock art to the site under review is located 25km to the south. Standing stones occur throughout the county, one in the townland of Glenoe (CW008-016001) had an urn (CW008-016002) and bone pin found at its base in c. 1900, these are located c. 720 to the west of the UGC route

Early Christian period ringforts or raths occur throughout county Carlow. The lowlands surrounding the area under review contains a particularly sparse scattering of ringforts while the greatest numbers occur in the west and south of the county. Concentrations of ringforts occur to the west of the area under review. It is noteworthy that a large number of the ringforts in this area are cashels or stone revetted earthworks.

The monument adjacent to the UGC (RMP CW008-020, *burial ground*) is named on the historic Ordnance Survey maps as *Grangeford Rath*. The circular enclosure corresponds to the proportions of a medium to large univallate ringfort and surrounding ditch has the morphology of a ringfort ditch. The raised interior used as a 'burial ground' is not characteristic of a ringfort, however, the raising of the ground may be derived from the long period of use of the site as a burial ground. The stone revetment wall on the inner face of the ditch defining the burial place is not characteristic of a stone-walled ringfort or cashel and is more likely to be a 19th century element added to define the burial ground. The reuse of ringforts as burial places is unusual, but not unparalleled but of course larger ringforts are not morphologically distinct from the smaller range of Early Christian monastic site; the latter were frequently adapted as burial places in later historic times.

Perhaps of even greater relevance are the large number of destroyed earthworks. All of the earthworks recorded in South County Carlow were extant when the first edition of the Ordnance Survey map was compiled in 1839 but have now disappeared without trace. This should alert us to the possibility of the discovery of long since destroyed sites with no surface trace, which may still contain sub-surface remains. Ringforts were generally not built on the upper slopes of hills and their distribution tends to correspond to areas suitable for modern agriculture and farmsteads. The location of the monument (CW008-020) on the highest ground within a relatively flat landscape is characteristic of chosen locations for ringforts.

A number of previously unknown monuments, with no surface expression, came to light in 2018 visible as cropmark on aerial photographs as the result of the drought conditions of that summer. Several of these sites are in the vicinity of the roadways where the UGC route is proposes, e.g. CW008-052001 moated site, CW008-040 enclosure, CW013-008 enclosure, CW013-005 enclosure, CW013-081 enclosure, CW013-120 ring-ditch.

Several major early Christian Monastic sites occur in the valleys of the River Barrow, River Slaney, and their tributaries. Two graveyards in the townland of Grangeford Old (CW 008-020 and CW 008-022), may be Early Christian Monastic foundations, but there is little specific evidence for this in either case.

Mottes and Baileys and medieval moated sites are a very numerous monument types in Co. Carlow, but they are less dense than in County Wexford. Medieval moated sites are a very numerous monument type in southeast Ireland, but the largest concentration occur in a central band of County Wexford existing from the lower River Barrow to the coast in equal density

both east and west of the River Slaney. The monuments are much more thinly scattered in north Wexford and in Counties Carlow and Kilkenny (Barry 45-46, 1977). Of the moated site in the vicinity of the UGC, one has no surface expression RMPCW008-052001 (Plate 10-8) and the other although also with surface expression today was partially intact when the first edition Ordnance Survey map was drawn in the first half of the nineteenth century (Figure 10-11), where it was depicted as c. half of a rectangular feature and named 'Rath Healy'. The site is also recorded with similar proportions on later editions of the Ordnance Survey maps. While there is no surface trace of the monument today, a rectangular cropmark can be seen an aerial image taken in 1995 (Figure 10-12) extending as far the southern fence of the L1025.

10.5.1 Archaeological of the Site and Surrounding Area

One Recorded Monuments is located within the development Site, standing close to the southern site boundary (Figure 10-13). Many sites stand in the wider vicinity.

Figure 10-13: Nationally Protected Monuments northern section of the Site

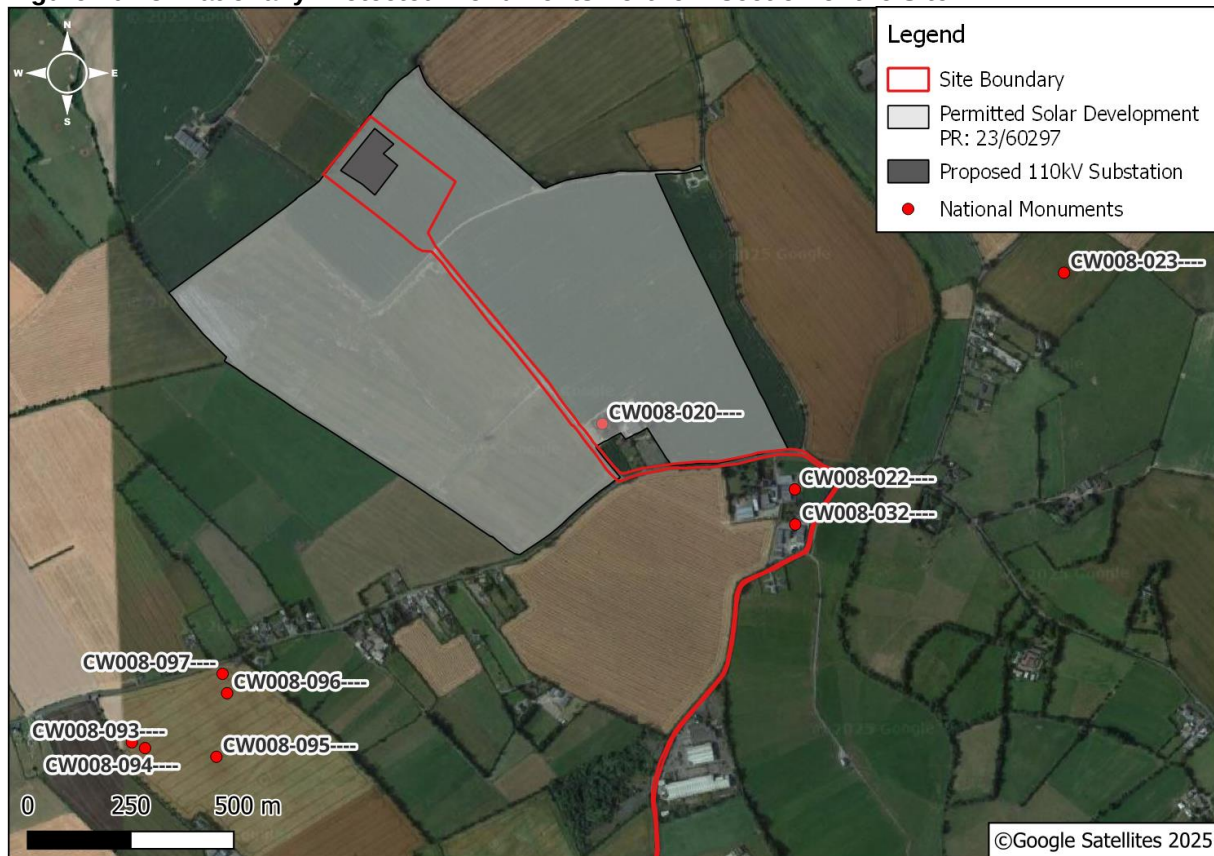
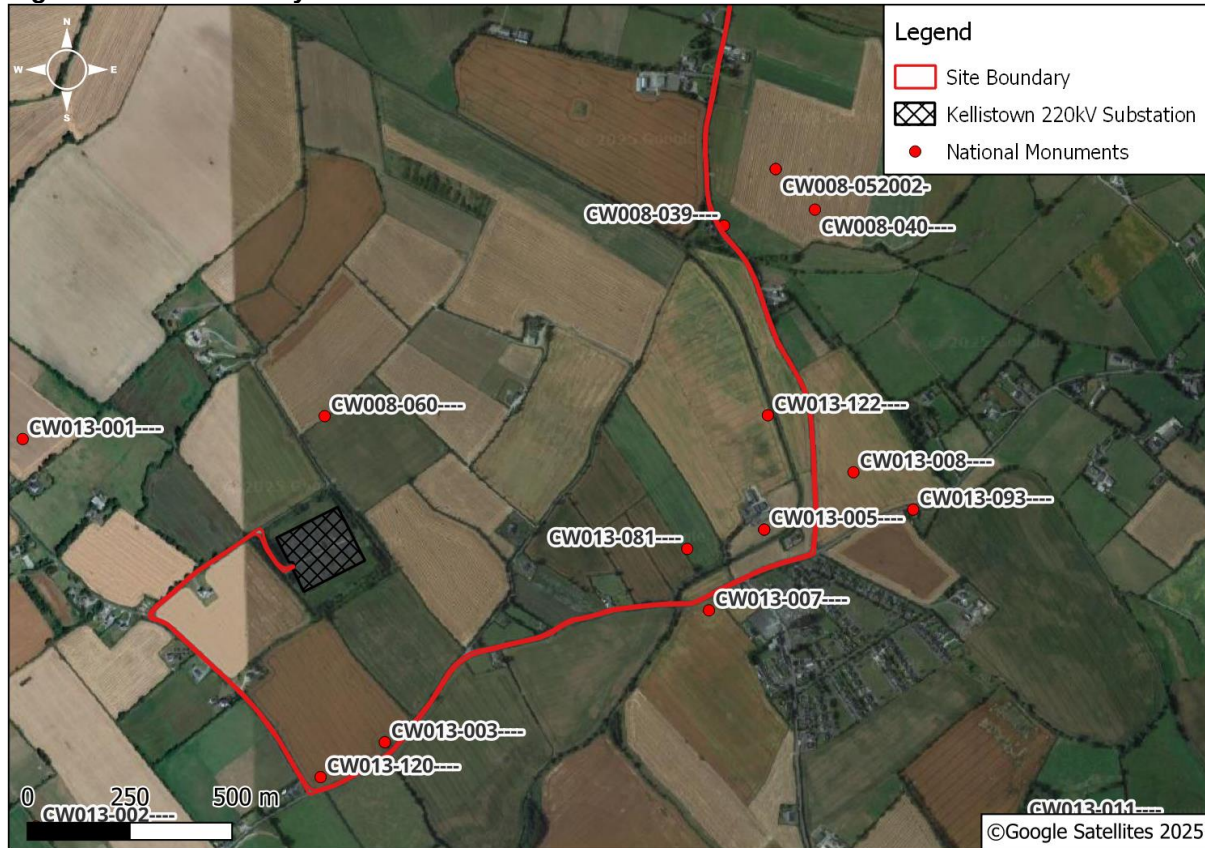


Figure 10-14: Nationally Protected Monuments southern section of the Site



The nearest known monuments are listed in the table below. The RMP number, monument classification, townland name and approximate distance boundary. A brief description of each site is also presented.

Table 10-1: Monuments within close proximity to the Proposed Development

Monument ID	Classification	Townland	Distance from the Proposed Development	Description as per National Monument Service [105]
CW008-020	Burial Ground	GrangeFord Old, Co. Carlow	c. 560m from proposed Substation, c. 25m from proposed UGC route.	Circular area (D c. 40m) enclosed by fence and planted with trees. No visible trace of any structure. According to local information, burials from GrangeFord Old (CW008-022----) were moved here, see below
CW008-022	Burial Ground	GrangeFord Old Co. Carlow	c. 86m from the proposed UGC route.	Marked 'Site of Graveyard' on 1839 'OS 6-inch' map and shown as rectangular enclosed area. No visible surface trace, but site remembered locally.
CW008-032	Castle	GrangeFord Co. Carlow	c. 39m from the proposed UGC	Marked 'Site of' on 1837 'OS 6-inch' map. No visible trace. In front 1 yard of farm. Photograph in private possession shows portion of curving wall, possibly part of tower, prior to demolition. Wall appears to be insubstantial for defended structure
CW008-039	Barrow	Inchisland or Moataluasa, Co. Carlow	Adjacent to roadway of proposed UGC route (see Plate 6)	Shown on 1939 'OS 6-inch' map as circular mound, quarried away from NE-E-SW (original max. diam. C. 25m). No visible surface traces
CW008-040	Enclosure	Inchisland or Moataluasa, Co. Carlow	c. 242m from proposed UGC (See Plate 8)	Identified on aerial photographs (CUCAP AYL 29, 30) show approximately circular area surrounded by cropmark of narrow fosse
CW008-052001	Moated site	Inchisland or Moataluasa, Co. Carlow	c. 165m from proposed UGC route (see Plate 7)	Identified on aerial photographs (CUCAP AYL 29, 30). No visible surface traces. Probably a moated site
CW013-008	Enclosure	Rathtoe, Co. Carlow	c. 92m from the proposed UGC	Identified from aerial photographs as faint cropmark of two concentric
CW013-005	Enclosure	Rathtoe, Co. Carlow	ca. 119m the west and 85m to the north of the proposed UGC route	Identified from aerial photographs as faint cropmark of fosse enclosing small circular area
CW013-081	Enclosure	Rathtoe, Co. Carlow	c. 182m from the proposed UGC	Identified from aerial photographs (CUCAP BDO 53) as cropmark of fosse defining arc of large circle

Monument ID	Classification	Townland	Distance from the Proposed Development	Description as per National Monument Service [105]
CW013-007	Moated site	Rathtoe, Co. Carlow	c.30m south of the roadway but probably closer judging from the OS maps (Plate 4D) and aerial photograph (see Plate 7)	Identified on 1839 'OS 6-inch' map shows S and adjacent portions of W and E sides of rectangular enclosure defined by bank. S side now visible as very low ridge (L c. 50m; H c. 0.1m).
CW013-003	Barrow	Rathtoe, Co. Carlow	Adjacent to road (Plates 9, 10-11)	Mound (H 3m; base diam. 16m) with steep sides and small, rounded summit. Historic Monument No. HM00327
CW013-120	Ring ditch	Rathtoe, Co. Carlow	Adjacent to road	Known from aerial photograph (GB90.BX.08, 13 July 1990) shows cropmark of a ring-ditch
CW013-093	Burial Ground	Rathtoe, Co. Carlow	c. 235m from the proposed UGC route	Discovered when digging a trench to lay an electrical cable to the front of a dwelling in 2001 (Excavation Licence 02E0198). The remains of a female aged between 21 and 40 years were located in a shallow trench. It was subsequently learned that other skeletons had been uncovered during the construction of the dwelling but were unreported.

A Bronze Bracelet (Museum No. 2004-260) was found in the townland of Grangeford, at a distance of ca. 500m to the east of the UGC

10.5.2 Buildings & Structures of Architectural Merit

There are no features of architectural merit listed in the *National Inventory of Architecture Heritage* ('NIAH') within or close the site of the proposed 110kV substation.

Two buildings are listed in the NIAH in the village of Rathtoe, namely the former Rathtoe National School, (NIAH Reg No. 10301302) and St Patrick's Catholic Church (NIAH Reg No. 1031301); both buildings stand c 170m from the proposed UGC.

10.6 Characteristics and Potential Impacts of the Proposed Development

10.6.1 Potential Impacts

Proposals such as the development under review can have both direct and indirect impacts on the archaeological heritage of the site and area. Direct impacts tend to be mainly physical impacts resulting from the construction process and this is equally pertinent to both the substation and UGC. Indirect impacts tend to be mainly visual and in the case of this proposal apply only to the substation as the cable route will be underground and the surface leaving no surface trace.

Direct impacts on the archaeological heritage are permanent as archaeology is a non-renewable resource. Visual impacts are confined to the life of the development and are therefore reversible in the longer term.

10.6.2 Direct Impacts

The largest likely impacts on the existing ground surface will be from the construction of the 110kV substation and the excavation of the trench for the UGC.

The proposal has been designed to avoid direct impact on the known Recorded Monuments and all of the features identified in the archaeological geophysical survey and testing which was carried out on the site of the permitted solar farm.

10.6.3 Indirect Impacts

Indirect Impacts tend to be mainly visual. The 110kV substation is at sufficient distance from upstanding archaeological monuments to ensure issues of visual impact do not arise. The only known Recorded Monument (RMP CW008-020, burial ground) close to the Proposed Development is already engulfed by trees and surrounded by farm infrastructure therefore visual impact from the proposal will not be significant.

The potential archaeological features identified in the geophysical survey and test trenches are below ground and have no surface expression; therefore, issues of visual impact do not arise. The proposed UGC will have no visual impact as it will be underground.

10.6.4 Proposed Mitigation Measures

10.6.4.1 110kV Substation

The development has been designed to avoid impact on all known archaeological monuments and features.

Nonetheless, in line with the Permitted Development, and taking a precautionary approach, archaeological monitoring of significant top-soil stripping will be carried out during Proposed Development works. This approach will mitigate any potential risks to previously unknown archaeological features.

10.6.4.2 Under Ground Cable

Several Recorded Monument lie close to the proposed UGC, in particular RMP CW008-020-burial ground, CW008-039 barrow, CW013-007 moated site and CW013-003 barrow-mound barrow; having either upstanding physical remains or being depicted on historic maps and therefore their existence is without doubt and for this reason it is recommended that groundwork associated with the UGC within close proximity to these monuments be monitored by an archaeologist.

Particular caution is recommended in the vicinity of CW008-039 mound in the townland of Inchisland / Moatuluasa, CW013-007 moated site in the townland of Rathtoe and CW013-003 barrow-mound barrow in Kellistown East and proposed UGC should be routed on the opposite side of the roadway from these monuments, if practical and feasible with respect to other variables.

10.7 Decommissioning

It is not envisaged that any specific archaeological issues will arise at decommissioning phase

10.8 Monitoring

The known archaeological monuments within the Site will be afforded protection by the methodologies outlined above (Mitigation) the discovery of hitherto unknown archaeological features within the site boundary and, in the wider vicinity should alert us to the possibility that even beneath level fields buried archaeological material may be present and such features would, if present, may be subject to impact in the construction phase of development.

The risk of inadvertent impact on hitherto unknown buried archaeological material has already been largely mitigated by geophysical survey. Archaeological testing of identified anomalies and selective archaeological testing of the Site in advance of construction is considered appropriate.

This was conditioned as part of the permitted PV Development (Ref No.2123, ABP PL01.309987). It is recommended that a condition reflecting the suggested mitigation may form part of any grant of this Proposed Development.

10.9 Residual Impacts

There will be no residual impacts on the cultural heritage of the Proposed Development or surrounding area.

10.10 Reinstatement

Not applicable

10.11 Difficulties Encountered in Compiling this Information.

No difficulties were encountered during the assessment process.

10.12 Assessment Conclusion

The Proposed Development has been subject to a detailed archaeological assessment and has been designed to avoid all known Recorded Monuments and features identified through prior geophysical survey and testing within the area of the Permitted Development.

To ensure the protection of known archaeological monuments in close proximity to the proposed UGC works—particularly CW008-020, CW008-039, CW013-007, and CW013-003—it is recommended that groundworks in close proximity be subject to archaeological monitoring. Where feasible, the UGC should be routed on the side of the road opposite these features to minimise potential risk.

Overall, with the incorporation of appropriate mitigation measures, the Proposed Development is unlikely to result in significant adverse impacts on the archaeological heritage of the area.

11 MATERIAL ASSETS – TRAFFIC

This chapter documents the findings of a Traffic Impact Assessment that was undertaken to determine whether there would be any potential impacts associated with the Proposed Development on the existing road network that would warrant further consideration.

A Construction Traffic Management Plan (CTMP) has been prepared by Meinhardt on behalf of the applicant in support of the Proposed Development. The purpose of this CTMP is to ensure construction works are scheduled and carried out in a correct manner that will reduce the negative impact on the existing transport network over the construction period, whilst maintaining roadway safety and the amenity of the surrounding area.

It will be the responsibility of the appointed contractor to further update this CTMP prior to the commencement of the construction phase. The contractor will be required to agree the contents of the CTMP with both Carlow County Council (CCC) and An Garda Síochána before the commencement of works on site. The appointed contractor will fully implement and maintain the CTMP throughout the construction phase. Please refer to Appendix H for full CTMP.

Furthermore, in advance of construction commencing the appointed contractor will use the findings outlined in this chapter to further update the CTMP. The CTMP will be termed a “Living Document”, such that any changes to the construction programme, operations or unforeseen issues will be incorporated into the CTMP throughout the project as deemed necessary by the contractor or relevant authorities.

In the event that planning consent is granted for the Proposed Development, the CTMP will be updated prior to commencement of development to address the requirements of any relevant planning conditions, including any additional mitigation measures, which are conditioned and will be submitted to the planning authority for written approval.

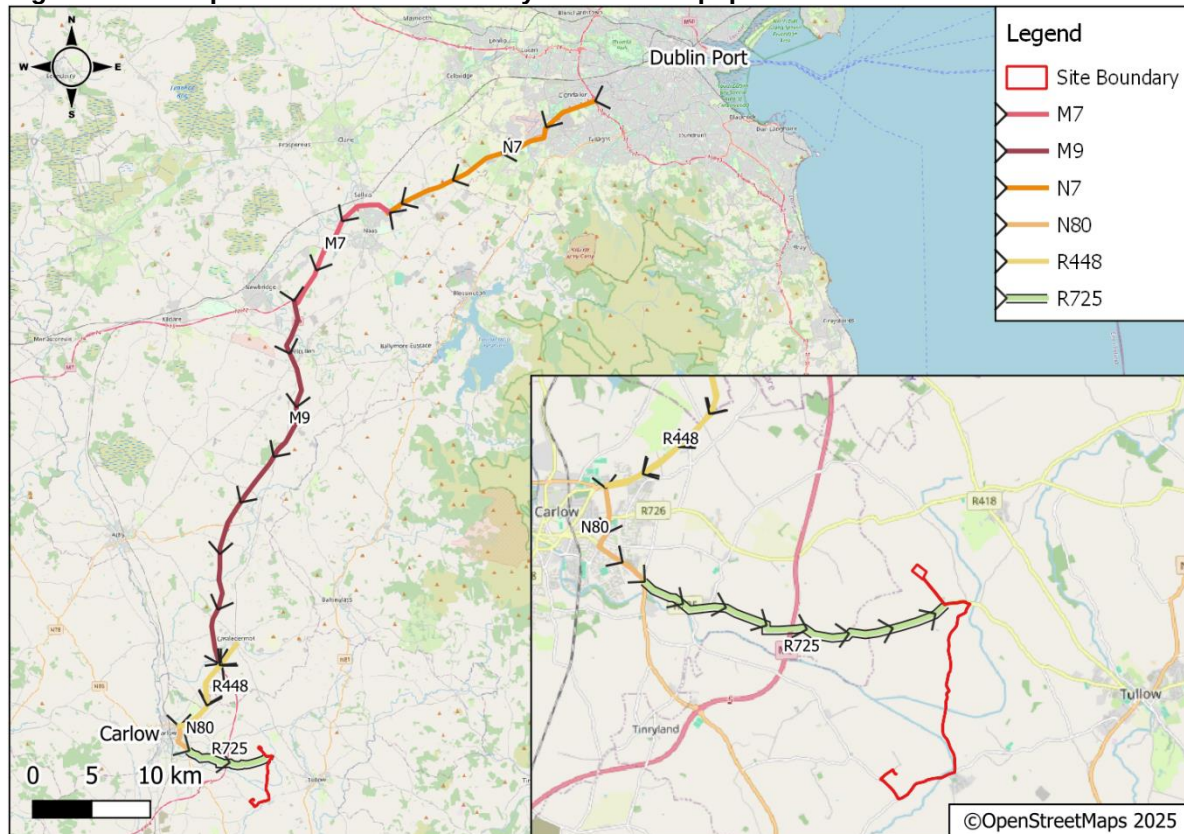
11.1 Road Network

11.1.1 Existing Road Network

The proposed haul route for key plant and equipment will be from the Dublin Port. The existing road network within the vicinity of the Proposed Development is presented in Figure 12-1 and described in the following text:

- M9:** The M9 is a motorway linking the M7 between Naas and Newbridge near Kilcullen to Waterford. The motorway is a separated 2+2 dual carriageway road, with a 2m wide hard shoulder running in each direction and a top speed limit of 120km/h.
- R448:** The R448 is a regional road which provides all construction and operational phase access to the Site. It is the designation given to the former N9 national primary road when it was bypassed by the M9 Motorway. The road is a single carriageway with two lanes throughout. It is a rural road, approximately 5m wide.
- R418:** The R418 is a regional road which provides all construction and operational phase access to the Site. The R418 runs north-south from the R448 at Kilcullen to Athy, County Kildare and then to the N81 in Tullow, County Carlow. The road is a single carriageway with two lanes throughout. It is a rural road, approximately 5m wide.
- R725:** The R725 is a regional road which provides all construction access and operational phase access to the Site. From its junction with the N80 on the western outskirts of Carlow Town it takes an easterly route to its junction with the N81 in Tullow. The road is a single carriageway with two lanes throughout. It is a rural road, approximately 5m wide.
- L6113:** The L6113 is a local road. This will serve an alternative entrance only to be used occasionally for light goods vehicles. All HGV's will use the main commercial entrance.

Figure 11-1: Proposed Haul Route for Key Plant and Equipment from the Dublin Port to the Site



11.1.2 Future Road Network

There are currently no proposed road network improvements in the vicinity of the Proposed Development.

11.1.3 Collisions

At the time of writing this report, the Road Safety Authority ('RSA') are reviewing their road traffic collision ('RTC') data sharing policies and procedures [110]. The RSA have stated on their website that RTC data cannot be shared until their review is complete [110]. As such, information on local accident history cannot be publicly accessed.

11.2 Existing Traffic Generation

Formal traffic counts have not been carried out on the roads in question, however, from an in depth desk study completed by Meinhardt it was noted that the L6113, the L3053 and the L30535 are all relatively lightly trafficked, with more moderate levels of traffic experienced on both the R725 and the L3046

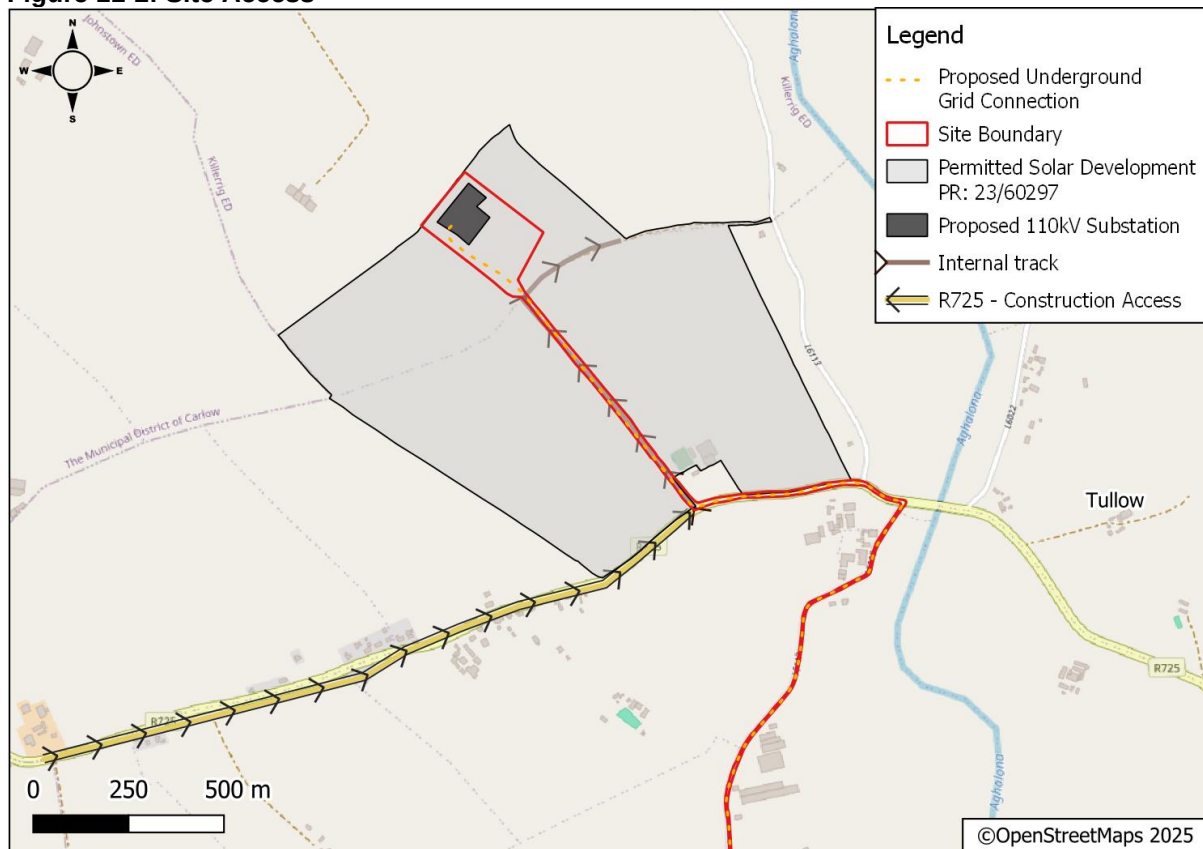
It should also be note that the existing Site is a busy agricultural site operated by Nolan Farming and therefore generates ongoing traffic with peaks occurring around harvest season.

11.3 Site Access and Egress

The Site is currently accessed via the existing commercial site entrance on the R725, that currently provides access for Nolan Farming, an on-going farming business. This existing access and egress was granted as part of the Permitted Development. It should also be noted that neither TII or the municipal district engineer had any objection to the permitted PV development.

This access will be utilised during both construction and to service the Proposed Development once operational. The entrance has been designed to accommodate the vehicles that will be entering and exiting the Site.

Figure 11-2: Site Access



Construction Phase

The Site is currently accessed via the existing commercial site entrance on the R725. This road runs west to east and is situated along the southern section of the Site. The existing entrance is wide and well serviced and will be readily capable of taking all the vehicle movements during the construction phase of the 110kV substation.

It should also be noted that the existing commercial entrance on the R725 was successfully used while hosting the World Ploughing Contest in 2006, accommodating large numbers of farming equipment and spectator vehicles.

A temporary construction access via the L6113 was authorised as part of the permitted PV development (Ref No. 16325 and Ref No.2123). For this Proposed Application, it is proposed that the L6113 will also serve as an alternative egress

This existing access and egress were granted as part of the Permitted Development (PR:23/60297).

Construction Phase Egress

It is proposed that the construction vehicles will follow the previously permitted one-way system to traverse the Proposed Development, thereby ensuring all construction phase egress will be via an existing site access point on the L6113, that also provides a secondary access to Nolan Farming. This is situated along the eastern section of the Site. This proposed one way system will negate the need for construction traffic to exit the Proposed Development directly onto the R725 as previously requested by the Council.

Plate 11-1: Site Access Photo 1



Plate 11-2: Site Access Photo 2



Plate 11-3: Site Access Photo 3



Internal Access

The Site will be accessed from the secure temporary compound in the Nolan farmyard via a network of pre-existing hardcore tracks extending to all areas of the Site and will be the principal means of all internal access. This was granted as part of the Permitted Development.

Operational Phase Access and Egress

All operational phase access and egress will be via an existing commercial site entrance on the R725. This was granted as part of the Permitted Development.

11.4 Sightlines

All site access and egress sightlines are in accordance with all sightline visibility requirements, as set out by the TII Design Manual for Roads and Bridges.

R725

The R725 runs west to east and is, on average, 5m wide. The speed limit on the local road is 80km/h. The existing Nolan farming entrance has been improved to an industrial standard, therefore, ca. 150m sightlines will be achieved in each direction at the proposed access which will be set back 2.4m from the edge of the public road to the point of the nearside edge of the public road. For vehicles entering the Site the forward visibility in both directions is in excess of 150m.

This existing site access off the R725 road (to the existing Nolan Farming premises) is well established and is serviced by large vehicles entering and exiting on to the Regional road.

L6113

For vehicles departing the Site on the L6113, ca. 90m sightlines will be achieved in each direction at the proposed access which will be set back 2.4m from the edge of the public road to the point of the nearside edge of the public road.

11.5 Proposed Development Traffic

Construction traffic and the construction programme has been calculated based on similar scale developments. Substantial changes in the actual build programme and / or number of vehicular movements, if any were to arise following the appointment of a construction contractor, will be communicated to Carlow County Council in advance of construction.

The proposed HGV haul route will be utilised for plant and equipment coming from Dublin Port. It is anticipated that other materials will be sourced locally where possible and appropriate and, as such, delivery of these local materials will simply utilise the local road network.

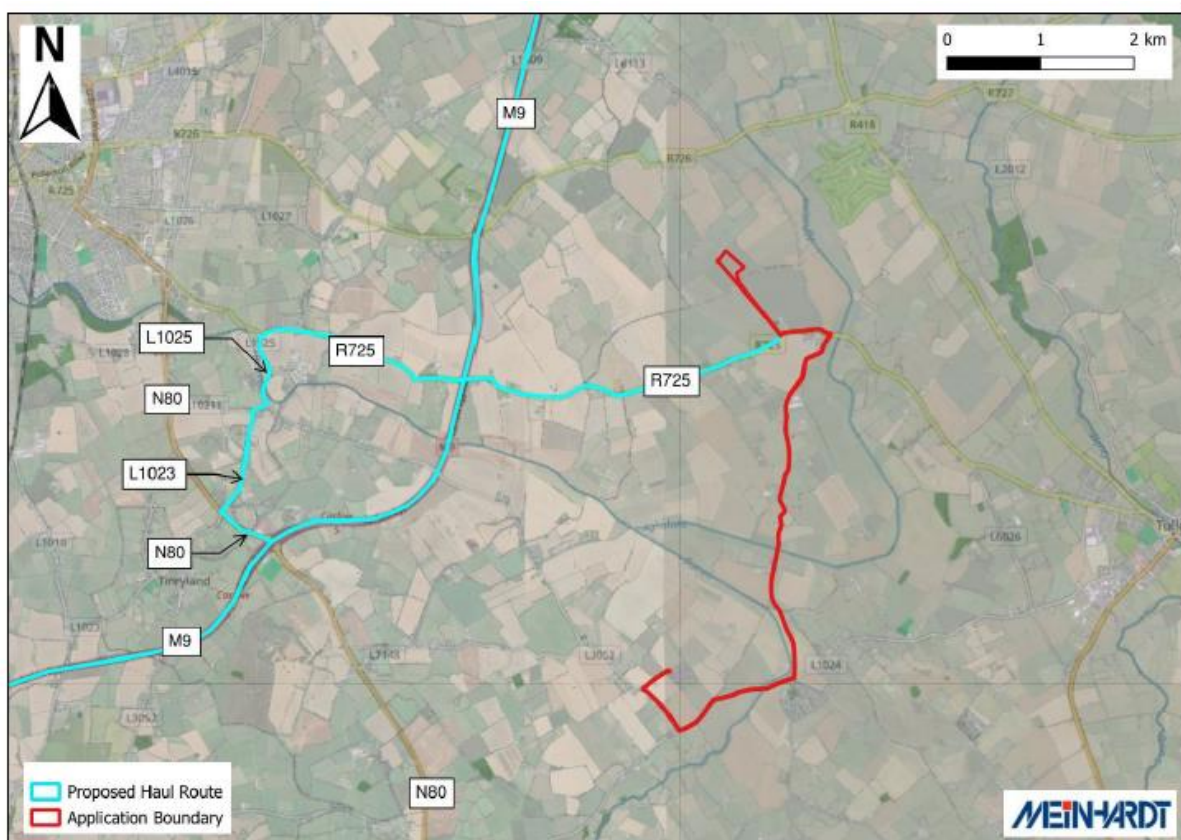
11.5.1 Construction Traffic Routing

The appointed contractor will outline the haul route to all sub-contractors and staff, ensuring that they are informed of these routes and any restrictions before commencing work. Heavy vehicles will use the haul route as illustrated in Figure 11-3, subject to agreement from CCC.

Delivery vehicles will travel along the M9, located to the west of the Site. Vehicles will exit the M9 at Junction 5 (Rathcroogue) onto the N80 in a northwest direction for approximately 900m, before turning right onto the L1023. They will then continue along the L1023 for approximately 1.4 km, before turning left onto the L1025 and travelling a further 1 km to the junction with the R725. From there, vehicles will turn right onto the R725 and proceed east for approximately 5.9 km before making a left-hand turn into the site access point.

This proposed haul route has been identified by considering the ability of the route to physically accommodate the required vehicles, in addition to the sensitivity of the route to potential disruption by the movements of traffic to and from the site.

Figure 11-3: Proposed Haul Route



This route has been carefully selected to maximise the use of the National Road network and to minimise impact on the surrounding road network.

All truck drivers will be notified of this route in advance of commencement of their journey. The main contractor will strictly enforce the traffic management plan to ensure that all construction vehicles will follow this route. Deliveries to the Site will be carefully coordinated, ensuring that the risk of arriving and departing trucks meeting on the R725 is significantly reduced.

There will be other local deliveries to the Site. Such deliveries will be carefully coordinated to minimise the risk of arriving and departing trucks meeting on rural roads.

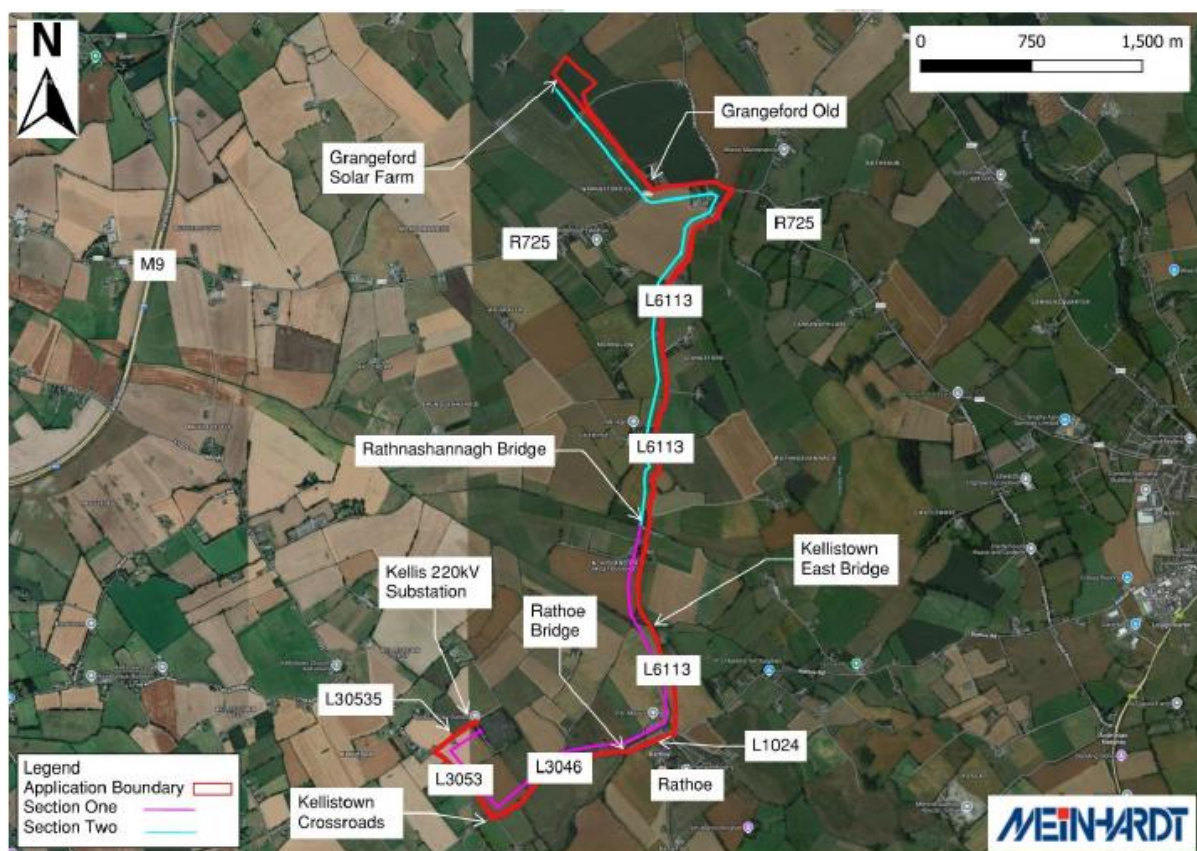
All materials will be stored in a temporary construction compound and will be transported around the Site via the existing access road and temporary construction crossings. This route has been carefully selected to maximise the use of the National Road network and to avoid urban centres such as Tullow.

11.6 Development Traffic -Underground Cable Route

A CTMP has been prepared by Meinhardt for the Proposed UGC Route. The purpose of the CTMP is to ensure construction works for the UGC are scheduled and carried out in a correct manner that will reduce the negative impact on the existing transport network over the construction period, whilst maintaining roadway safety and the amenity of the surrounding area.

The proposed grid connection utilises UGC with a route length of approximately 8 km in total. The proposed route is detailed below and presented in Figure 11-4. The route is divided up into two sections for the purpose of the construction programme, with further details provided in the CTMP prepared by Meinhardt and the Construction Methodology Report prepared by TLI and submitted as part of the overall planning application.

Figure 11-4: Proposed UGC Route



In general, it is proposed to minimise disruption to the surrounding road network as far as is practical within the scope of the works. Temporary road closures will only be implemented as

a last resort where the existing road width does not permit the use of a 'Stop / Go' traffic management system.

The primary disruptions to the road network are expected to occur during the installation of Joint Bay's. Joints Bays are to be provided approximately every 700-900 m along the UGC routes to facilitate the jointing of 2 no. lengths of UGC. 110kV Joint Bays are typically 6 m x 2.5 m x 2.05 m pre-cast concrete structures installed below the finished ground level. Where possible, Joint Bays will be located in the non-wheel bearing strip of roadways, however given the narrow profile of local roads this may not always be possible.

The proposed cable route includes one regional road (R725) and four local roads. Due to the scale of the Joint Bays, it is anticipated that only the R725 will have sufficient width to accommodate the minimum carriageway width of 2.5 metres required for a 'Stop/Go' traffic management system during the installations.

As a result, three temporary full road closures are proposed on the local roads to facilitate the installations, as detailed in Section 3.4 of the CTMP. Temporary full road closures will also be required to facilitate the HDD at the three bridge locations shown in along the underground grid connection route. As all three bridges are located along local roads, the same diversion arrangements implemented for the installation of the Joint Bay's may also be applied during the HDD at the bridge locations.

It is noted that where temporary full road closures are implemented, local and emergency access to houses and businesses along affected routes must be accommodated at all times.

11.6.1.1 Proposed Diversion Works

As part of the UGC, a total of three advisory traffic diversions are proposed along the cable route for through traffic as shown in Table 11-1 and Figures 11-4, 11-5 and 11-6.

- Diversion one – It is proposed to divert the L6113 via the L6026, R725 and L1024.
- Diversion two – Is proposed to divert traffic from the L3053 via the N80, using the L3046 and L7148.
- Diversion three – It is proposed to divert traffic from the L3046 after Rathoe Crossroads via the L7113, L7112 and L30464.

Figure 11-5: Diversion 1 – Joint Bay No. 5 to Joint Bay No. 9



Figure 11-6: Diversion 2 – Joint Bay No. 2

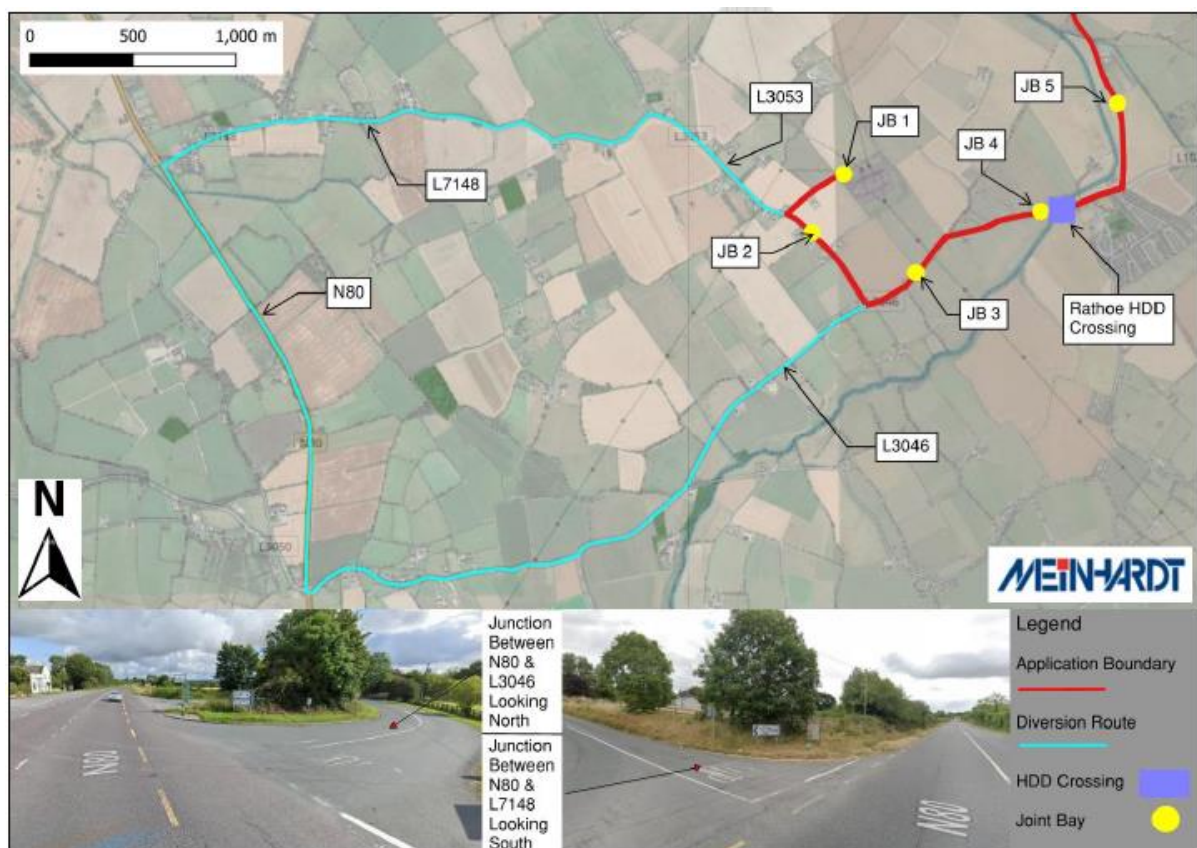


Figure 11-7: Diversion 3 – Rathoe HDD Crossing

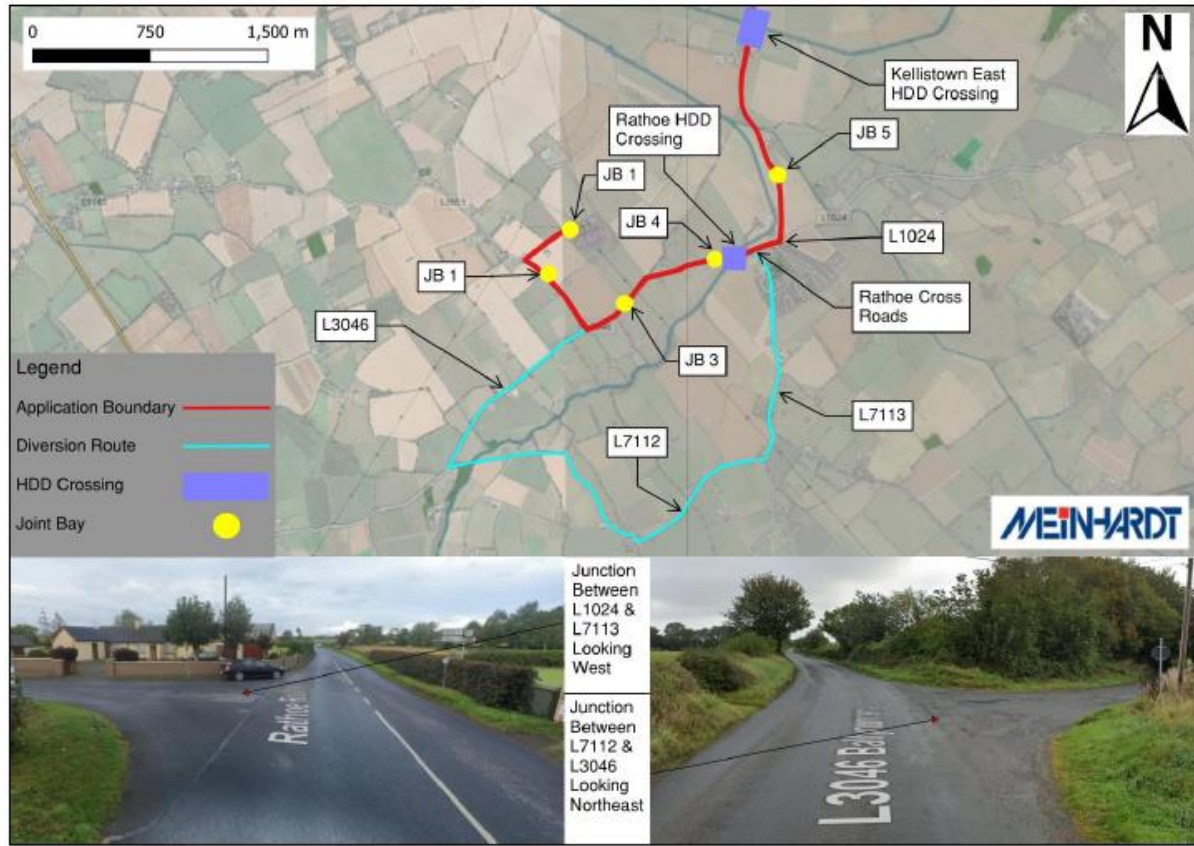


Table 11-1 presents a summary of the three advisory diversion routes and an estimated timeline of how long they will be in place. These timelines are subject to change based on the number of operatives and construction crews working on site and the provision of a detailed CTMP. It is noted that, in the case of Diversions 1 and 2, the approximate durations provided will not represent continuous works. There will be periods within these timeframes during which the road network will operate as normal. Please refer the CTMP in Appendix H for full details.

Table 11-1: Advisory Diversion Routes

Road Section	Joint HDD Crossing	Diversion Route	Advisory Diversion Route Length (197pprox.)	Approx Time and Activities
L6113	JB No. 4-10	Diversion 1: L6026 via R725 and L1024	6.6km	15 weeks – trenching & ducting, joint bay installation, HDD under bridges (Non-Consecutive)
L3053	JB No. 1-3	Diversion 2: N80 via L3046 and L7148	8.1km	3 weeks – trenching & ducting, joint bay installation (Non-Consecutive)
L3046	Rathoe Crossing	Diversion 3: L1024, L7113 and L7112	5.2km	2 Days – HDD Crossing at Rathoe Bridge

11.6.1.2 Local Residents

The following measures will be implemented to communicate relevant information to all households located along the cable route or for road's designated for use as a haul route:

- Information signage will be erected ahead of the commencement of construction / traffic management works.
- An informational flyer drop will be conducted to notify residents along the local road leading to the site about the planned construction programme; and,
- Contact details for a Liaison Officer will be provided so that any concerns can be easily communicated to the Developer.

11.6.1.3 Pedestrian Safety

There are no existing pedestrian facilities along the proposed cable route however, the contractor shall ensure that all construction activities are carried out in a manner that does not endanger pedestrians at any time. The contractor shall adhere to the guidance set out in the most recent edition of the Department of Transport's Traffic Signs Manual, Chapter 8: *Temporary Traffic Measures and Signs for Roadworks*, specifically in relation to pedestrian management.

11.6.1.4 Traffic Management Signage and Signals

Throughout all construction works, road warning signage indicating traffic movements associated with the development will be erected.

Temporary signage will be used to highlight the entrance to the Site and to direct construction traffic to the Site from the national and regional roads. Temporary signage will also be used to prohibit parking of delivery vehicles on the L7006 road. The signage will direct drivers to the construction compound within the Site. All signage will be in accordance with the Department of Transport's Traffic Signs Manual, Chapter 8 – Temporary Traffic Measures and Signs for Roadworks and will be installed prior to works commencing on-site. All signage will be inspected at least twice daily by the contractor to ensure that it is in place, secure and appropriately fitted with warning lights as required. All sign faces are to be retro-reflective material to Class Ref 2 of EN 12899. The colours, chromaticity and luminance factors shall be as specified in Specification TS4.

The traffic signals will be in place prior to the works commencing and will remain in place until after the works are completed. Temporary traffic signals will be implemented to allow road users safely pass through the works area by channelling them onto the open side of the road. All construction vehicles will be parked within the works area so as not to cause additional obstruction or inconvenience to road users or residents.

In the event of emergency, steel plates, which will be available on site, can be put in place across the excavation to allow traffic to flow on both sides of the road.

The construction compound area will allow loading and unloading of all construction vehicles and will provide a turning area for vehicles to exit the Site. Adequate signage will be erected where required.

11.7 Temporary Construction Compound

A secure construction compound will be set up in the existing farmyard at Grangeford, situated within the southern section of the Permitted Development. This compound will be utilised as part of the Overall Development. It is expected that the compound will contain the following:

- Temporary site facilities (Port-a-Cabin type) to be used for site office and welfare facilities, including welfare facilities with provision for sealed waste storage and removal;

- Container storage unit(s) for tools and equipment storage;
- Container storage unit(s) for components and materials;
- Refuelling compound for construction vehicles and machinery;
- Parking for staff, construction vehicles and machinery;
- Designated skips for construction waste; and,
- Wheel washing facility.

The Site Compound and Welfare area will be erected on existing hardstanding only and it will be located within the existing farmyard that is currently utilised for Nolan Farming. No earthworks or sub-surface disturbance will occur as part of these proposed facilities.

All materials for the construction of the Overall Development will be deployed and stored within the temporary construction compound located in the Nolan farmyard. Equipment and machinery will be stored in an existing lockable agricultural shed and bunded fuel stores will also be available.

The Nolan's Farming Tillage Business provides a concreted area with a wide sweep, and it will make an ideal delivery area where materials for the construction can be deployed and stored. All equipment and materials unloaded in the construction compound will be distributed throughout the site using smaller machines such as bobcats via a network of pre-existing hardcore tracks extending to all areas of the Site that will serve for providing internal access.

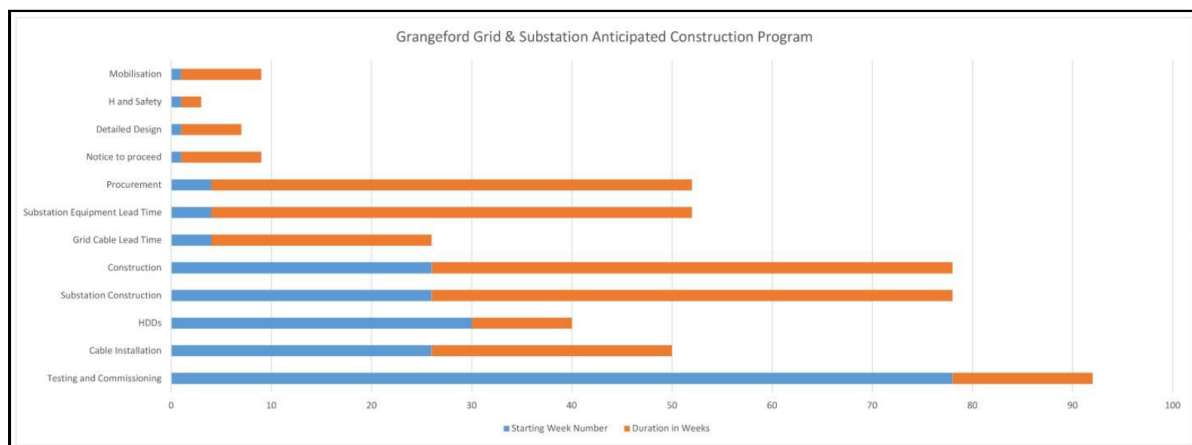
The construction compound area has been designed to allow for loading and unloading of all construction vehicles and will provide a turning area for vehicles to exit the Site. Adequate signage will be erected where required. The design of the compound will ensure no impacts will arise on the surrounding road network as a result of deliveries to the Proposed Development.

11.7.1 Construction Programme

The construction programme including testing and commissioning, of the substation and underground cable is anticipated to last for approximately 90 weeks.

It is envisaged that there will be one overall construction project comprised of the Proposed Development and the Permitted Development. This is an indicative Construction Programme with corresponding construction related traffic. The heavy construction traffic will be broadly spread evenly over the majority of the construction programme. Outside of this period, traffic will mostly be limited to light traffic from workers commuting to and from Site.

Figure 11-8: Indicative Construction Programme



Estimates for the duration of the UGC construction works are included in the table below. Please note that some of the elements are likely to happen concurrently, therefore the overall start-to-finish duration is estimated to be six months.

Table 11-2: Indicative Construction Phase – UGC Connection

Development Element	Estimated Construction Duration
Cable route (not including HDDs)	6 Months
HDD	2 Months

11.7.2 Construction Staff

During construction, taking into consideration the normal intensity of onsite activity and the duration of the programme, it is expected that the construction schedule is likely to require no more than 30 staff to be onsite at any one time. Staff are anticipated to arrive at the proposed site in the 30-minute period preceding the start of the operating day (i.e. 07:00 to 08:00hrs) and depart in the 30-minute period following the end of the operating day (i.e. 18:00 to 19:00hrs). Staff are likely to travel from different origins and hence distribute their impact across the roadway network.

It is expected that teams of specialist operatives will arrive together in shared transport and that other general operatives will arrive in single occupant cars. It is assumed that no operatives will arrive by walking, cycling or use of public transport.

All workers vehicles will park on the proposed site to avoid obstruction to the operation of the public roadway, and this will be strictly enforced. Temporary signage will be used to prohibit parking of staff vehicles on the local road. The signage will direct drivers to the staff parking area.

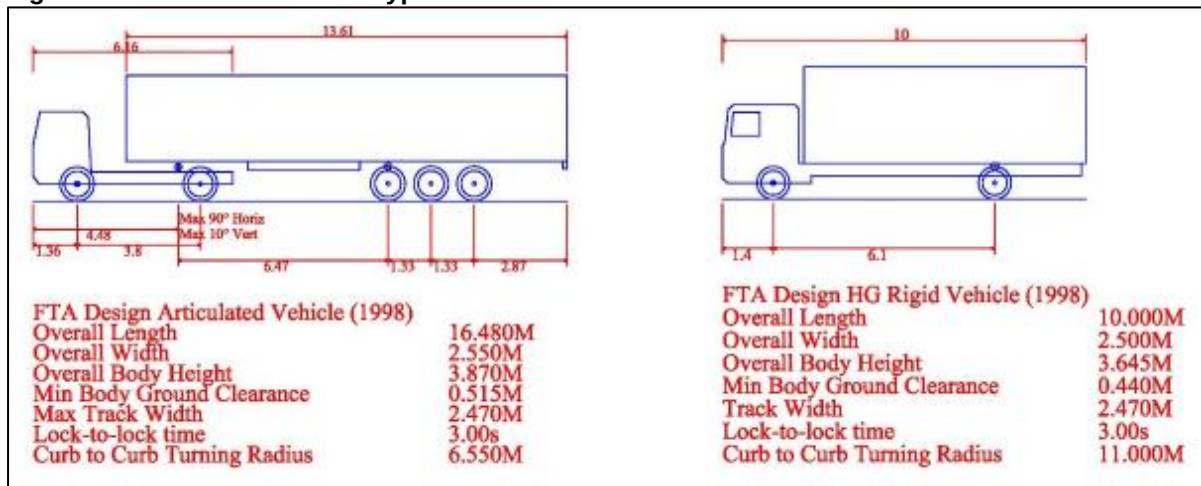
11.7.3 Construction Staff – Underground Cable Route

At the peak of construction, it is anticipated that there will be an approximate requirement for 6-10 construction workers actively engaged on the ducting, cable pulling and jointing works. The staff are forecast to arrive at site compounds and depart to site in crew-cab type vehicles to minimise traffic generation and parking requirements at structure locations.

11.7.4 Vehicles

The variety of vehicles that will need to access the proposed site during construction will include low-loaders to deliver plant / machinery and articulated goods vehicles to deliver materials. The dimensions of the largest of the typical vehicles likely to visit the Site during construction are shown in Figure 11-3.

Figure 11-9: Dimensions of a typical site vehicles



11.7.5 Traffic Management Speed Limits

Adherence to posted / legal speed limits will be emphasised to all staff / suppliers and contractors during induction training.

Drivers of construction vehicles / HGVs will be advised that vehicular movements in sensitive locations, such as schools and local community areas, shall be restricted to 50 km/h, or other as requested by Carlow County Council. Such recommended speed limits will only apply to construction traffic and shall not apply to general traffic. It is not proposed to signpost such speed limits in the interest of clarity for local road users.

11.8 Measures, Management and Control Processes

A management structure and control processes will be put in place to implement, monitor, and manage the CTMP. The appointed Site Manager will be responsible for the site works which will ensure that the control processes are efficiently communicated and implemented.

11.8.1 Working Hours

Construction work will generally be between 08:00hrs until 20:00hrs Monday to Friday, and between 08:00 and 18:00 on Saturdays, where required. No construction activities will take place on Sundays or Bank Holidays.

11.8.2 Delivery of Plant and Materials

The Contractor will be required to schedule all deliveries in such a way that construction activities and deliveries activities do not occur during peak traffic flows or run concurrently with other deliveries / activities. If required, the contractor will also liaise with the management of other construction projects and the Local Authority to co-ordinate deliveries.

All materials associated with the development process will be stored within the proposed site boundary:

- Skips and other plant will also be stored within the curtilage of the Site;
- A loading and unloading area for plant and materials is provided on the Site. It is anticipated that the majority of deliveries will be made via articulated vehicles; and,
- All car parking, by staff and others, will take place on the Site, not on the public road.

In order to streamline and manage the arrival / departure of construction vehicles over a working day, a delivery booking and scheduling system will be implemented. On a weekly basis the site manager will evaluate the daily profile of truck movements proposed for the upcoming week and schedule them to spread out over the day to prevent any potential overlap. Sufficient time will be given between truck movements to allow for any delays in arrival

times or when loading/unloading takes longer than expected. Prior to departure of a delivery truck from the site, the site manager will review the delivery schedule for that day, and if there is any risk of conflict with another scheduled delivery arrival, the departing vehicle will be held on site until that vehicle arrives.

11.8.3 Route Compliance

Use of the agreed vehicle route will be included as a contractual requirement of the Contractor and will be communicated to all drivers.

11.8.3.1 Road Opening Licences

The proposed UGC will require a road opening licence under Section 254 of the Planning and Development Act 2000-2015 from Carlow County Council.

The CTMP will be updated will be agreed upon with Carlow County Council before the commencement of the development. The CTMP will outline the location of traffic management signage, together with the location of any necessary road closures and the routing of appropriate diversions. Where diversions are required, these will be agreed with Carlow County Council in advance of the preparation of the CTMP.

The CTMP will outline the location of traffic management signage, together with the location of any necessary road closures and the routing of appropriate diversions. Where diversions are required, these will be agreed with Carlow County Council in advance of the preparation of the CTMP.

11.8.4 Vehicle Compounds

All vehicles will use the construction compound area. The compound will be capable of accommodating a turning vehicle whilst at least one vehicle is parked, to allow for vehicles to be held back during restricted periods. All car parking, by staff and others will take place on the Site, within the construction compound.

11.8.5 Road Cleaning / Dust and Dirt Control

Mud and debris on the road are typically amongst the main nuisances and safety problems arising from construction sites. Dust arises mainly when existing materials are removed or broken up, usually in demolition of existing structures or removal of earthworks. As such activities will not take place, the potential for dust generation is considered to be low as part of the Proposed Substation Development.

However, in the unlikely event of dust problems arising, the contractor will use hoses to saturate all bulk materials with water, both during the process and whilst loading / unloading. Burning of materials on-site will not be permitted, in order to prevent smoke emissions.

As part of the UGC, regular inspections of the road network in the vicinity of the Site will be required to be carried out. Where required, the contractor will carry out road sweeping operations employing a suction sweeper to remove any project related dirt and material deposited on the road network by construction related vehicle.

11.8.6 Waste Management

- All excavated materials will be reused onsite;
- Waste materials from grid connection trenching will be collected and stored in suitable receptacles before they will be taken offsite transported to a suitably licensed waste facility in strict accordance with all requirements of the Waste Management Act and subsequent regulations;
- Waste materials will not be allowed to accumulate because of the fire/vermin risk; and,

- All wastes will be appropriately segregated with the objective to maximise the level of recycling.

There will be no operational waste associated with the Proposed Development with the exception of the foul wastewater that will need to be removed periodically from the storage tank by a licensed contractor. The decommissioning plan prepared as part of the overall planning application addresses all aspects of waste management post the operational phase.

11.9 Operational Phase Traffic

Operational access will also be via the R725 and will be used for occasional maintenance visits during the Operational Phase.

The Proposed Development will not have staff on-site during the operational stage. There will be occasional visits only as required during the lifetime of the Proposed Development for the purpose of maintaining and checking the plant with no HGV traffic. The traffic generation during the operational stage will therefore be very small and insignificant.

The sightlines are in accordance with the TII Design Manual for Roads and Bridges as detailed in Section 12.2.1.

11.10 Site Manager

A Site Manager will be appointed prior to the commencement of any works. The principal contractor shall agree and implement monitoring measures to confirm the effectiveness of the TMP. Regular inspections / spot checks will also be carried out to ensure that all project staff and material supplies follow the agreed measures adopted in the TMP.

11.10.1 Transport Co-Ordination

The Site Manager for the Proposed Development will undertake the transport co-ordination role for the Site. In this respect, their main responsibilities will include:

- Managing the implementation of the TMP;
- Vehicle / Delivery scheduling;
- Scheduling refuse collections;
- Handling complaints; and,
- Acting as a point of contact for employees, contractors, and the general public.

11.10.2 Communication

The Site Manager will be responsible for ensuring that there is adequate liaison between the following key stakeholders throughout the construction period:

- The Contractor;
- The Applicant;
- Site neighbours;
- Other local stakeholders such as emergency services or local transport providers and,
- Carlow County Council.

Prior to any works starting the contractor will inform neighbours in close proximity to the proposed site of the nature of the works, proposed hours of work and their expected duration. In addition to this a notice will be placed at the main entrance to the proposed site informing neighbours of the hours of work. Meetings and telecommunication will be held between the Site Manager and the Council as required.

11.10.3 Complaints

The Site Manager will provide any monitoring data, delivery schedules, complaints, or breaches of agreements to the Council if requested.

Furthermore, the Site Manager will be available to meet and explore issues with concerned neighbours. Complaints will be addressed immediately by the construction team and will be reviewed in weekly Site meetings to ensure that any required actions are communicated to all employees.

Contact details for the Site Manager will also be displayed at the proposed site entrance.

11.11 Mitigation Measures

The impacts arising from the construction of the permitted development will be temporary in nature

extending over a period of 6 months as outlined in Section 2.5. However, it is still important to ensure the safe and convenient use of the public road by motorists, cyclists and pedestrians and that any impact is minimised as far as possible. To that end, the following mitigation measures have been considered.

- A dedicated person will be appointed for the management of the deliveries during the construction stage. It will also be this person's duty to make sure the haul route is adhered to;
- Where temporary full road closures are implemented, local and emergency access to houses and businesses along the effected routes must be accommodated at all times;
- The appointed contractor will conduct a pre – and post-construction condition survey of the roads and bridges along the haul and cabling route's (see Figure 4-1), with the contractor liable to repair any damage to the public roads attributed to the construction of the permitted development;
- Deliveries will be scheduled to avoid morning and evening peak hours. This will avoid HGV traffic arriving during the morning peak hours and creating conflict with local residents' commute or school run. Construction personnel will also be encouraged to car-pool;
- The site entrance points and works areas along the cable route will also be appropriately signed during the construction phase. Clear construction warning signs will be placed on the approach to the site access points and works areas, in accordance with Chapter 8 of the Traffic Signs Manual;
- Access to the working areas will be controlled by onsite personnel and all visitors will be asked to sign in and out of the site by security/site personnel. Site visitors will receive a suitable Health and Safety site induction and Personal Protective Equipment ("PPE") will be worn; and,
- To control, prevent and minimise dirt on the access route and emissions of dust and other airborne contaminants during the construction works, the following mitigation measures will also be implemented:
 - Wheel washing facilities should consist of a water bowser with pressure washer. The bowser will contain water only and no other additives. Run-off from this activity will be directed to the on-site drainage network. All drivers will be required to check that their vehicle is free of dirt, stones and dust prior to departing from the site;
 - Any dust generating activities will be avoided or minimised, wherever practical, during windy conditions;

- Drivers will adopt driving practices that minimise dust generation including a 30km/h speed limit within the works areas and the temporary compound; and,
- Once construction of the development is completed, all portacabins, machinery and equipment will be removed and any temporary hard standing excavated.

11.12 Assessment Conclusion

The main potential period in which traffic issues might arise will be the temporary construction phase. The established existing access to proposed site will provide a safe access for all construction vehicles.

The traffic management measures, as detailed in this chapter will minimise any potential roadway impacts, to ensure roadway safety and protect the amenity of the area surrounding the Proposed Development. The key element of these measures will be that all deliveries will be required to follow a specific route on arrival and departing the proposed site. A specific traffic management plan will be agreed with the Council for all large HGV's delivering materials to the proposed site. This plan will be managed by the contractor to minimise any potential disruption.

There will be no potential for traffic impacts to arise during the operational phase of the Proposed Development.

12 CONCLUSIONS

12.1 Cumulative Impacts

There is a clear justification for the need for the Proposed Development. The Proposed Development is in line with national action plans on greener energy. There has been extensive review of the planning history for the surrounding area and no cumulative impacts associated with the Permitted Developments are anticipated as a result of the Proposed Development. Furthermore, the Proposed Development will not give rise to any in combination impacts on ecological, landscape and visual, hydrological, acoustic, cultural heritage and traffic receptors.

12.2 Assessment Conclusions.

MOR have prepared this ER in support of an SID application in respect of both the construction and operation of the proposed one 110kV substations and grid connection in Co. Carlow.

The key conclusions of the ER are that the Proposed Development will not result in any likely or significant environmental impacts based on the following:

- The design has taken full cognisance of all requirements of all relevant development plans;
- The Permitted Development will not be able to function as a standalone development as they will be reliant on connections to the Proposed Development in order to connect to the grid;
- The NIS undertaken concluded that activities associated with the Proposed Development either alone, or in-combination with other projects or land uses, will not have any direct or indirect adverse impacts on the conservation objectives of any Natura 2000 Sites;
- The Ecological Assessment concluded that the lands within the Site are currently of low ecological value, and that the Proposed Development will not have any direct or indirect adverse impacts on the conservation objectives of any Natura 2000 sites or on any notable / protected flora and fauna.
- The Proposed Development will not require any alterations to the existing drainage network and no specific drainage infrastructure will be required.
- The landscaping proposed as part of the Permitted Development will ensure that the Proposed Development will not result in any significant residual impacts on receptors in regard to direct visual impacts;
- Sufficient setbacks will be implemented from all sensitive receptors – adjacent dwellings, transport route receptors (road) and onsite tree / hedge lines and therefore no adverse effects either during construction or operational phase will occur;
- A Preliminary Site-Specific Flood Risk assessment confirmed the absence of any notable flood risks on the Site or in the immediate vicinity of the Site, therefore the Proposed Development will not result in any increased flood risk;
- The Proposed Development will not require any alternations to the existing drainage network and no specific drainage infrastructure will be required;
- The Site is located in an area classed as having 'Low' landscape sensitivity. It is not considered that at a local level, this landscape is highly sensitive or highly susceptible to change. There will be no impacts, direct, indirect, or residual on receptors in regard to visual amenity of the area;
- During the construction period the potential exists for temporary noise nuisance. However, due to the distance of the proposed construction works from the NSR's identified and the general methods that will be involved in constructing the Proposed

Development, these will not exceed standard construction noise limits at nearby NSR's;

- Detailed noise modelling concluded that there will be no cumulative noise impacts arising from the Permitted Development and Proposed Development at any nearby receptors either during day or night-time periods;
- A Preliminary Construction Environmental Management ('pCEMP') has been submitted in support of the planning application. This pCEMP will be used by the appointed contractor to prepare an updated and comprehensive CEMP prior to the commencement of any on-site works. It is proposed that this plan will be agreed with the Council in advance and will be fully implemented during the construction of the Proposed Development;
- The CTMP outlines strategies to mitigate transport-related impacts during the proposed development's construction phase. The plan focuses on minimising congestion and disruption to the local road network, as well as reducing environmental impacts and safety risks associated with the permitted development. It includes details on working hours, temporary compounds, parking arrangements, traffic routing, deliveries, enforcement, complaint management, staff movements and travel, as well as controls for noise, mud, and debris;
- The CTMP is a working document and will be fully implemented during the construction of the Overall Development, to minimise any impacts on the existing road network during this temporary period;
- No protected archaeological sites will be impacted either directly or indirectly as a result of the Proposed Development;
- The applicant will fully implement all of the environmental commitments outlined in Section 13; and,
- The Proposed Development will have a design life of approximately 40 years at which time it will be fully decommissioned, and lands reinstated.

13 ENVIRONMENTAL COMMITMENTS

Commitment
General - Construction works will comply with all relevant legislation and best practice to reduce any potential environmental impacts; - A comprehensive Construction Environmental Management Plan (CEMP) will be submitted to the Planning Authority for approval prior to the commencement of construction works; - The contractor shall ensure that all personnel working on-site are trained and aware of the mitigation measures detailed within the ER; - Sufficient setbacks will be implemented from all sensitive receptors- adjacent dwellings, transport route receptors (road or rail), on-site tree / hedge lines and drainage ditches; and, - Construction works will be restricted to normal working hours, 08:00-20:00 Monday to Friday and 08:00-18:00 on Saturday with the exception of essential activities such as repairs.
Biodiversity General Measures – Construction - An ecological clerk of works (EcoW) will inspect the Site before works commence and will undertake Site inspections as required during the works; - Any removal of vegetation will be scheduled to take place outside of the nesting bird season, typically considered to be between the 1st March to 31st August (weather dependant). Should works be required within this season, they will need to be approved by the appointed project EcoW; - In advance of works, all Site personnel will receive an induction which will include reference to mitigation measures in relation to protected species; - The management of any trees will be undertaken in accordance with relevant legislation between August and February to avoid potential disturbance of nesting birds; - During construction, all boundary trees and treelines that are to be retained will be protected from unnecessary damage; - All works and infrastructure will be set back a minimum of 5 -6m to ensure that no impacts occur on existing drainage ditches or hedge / treeline; - All works will be set back a minimum of ca.50m from all EPA watercourses; - Should construction works be required outside of daylight hours, the appointed project EcoW will be consulted as required;

Commitment
- Protected Species posters will be erected on the Site notice board and maintained throughout the duration of the works; and, - All vehicles, machinery and any other equipment that may be used for the works will be washed and cleaned as required prior to being used on the Site to prevent the import of plant material / seeds.
Protection for Mammals: <u>Bats</u> - A variety of bat boxes will be erected within the Site as detailed in the Biodiversity Management Plan (Appendix C); and, - Increased botanical diversity will occur through planting native fruit and flower-bearing species (of local provenance) as part of the landscaping plans, particularly night-scented species. This will increase invertebrate diversity and thus prey for bats. Further details are provided in the detailed Landscape Plan (see Appendix D). <u>Badgers</u> - Where deep excavations will be required on-site, appropriate measures to protect mammals from ingress will be installed; - Obvious mammal paths will be left clear of obstruction to allow for the free movement of smaller mammals throughout the landscape; and, - If unidentified burrows are identified within the works area during construction, the project EcoW will be contacted for advice.
General Measures – Operational - A detailed Landscape and Biodiversity Management Plan (see Appendix C and D) will be implemented to ensure long-term benefits to the Site's flora and fauna by ecological enhancement works which will include: - Enhancement of existing planted areas with additional hedgerow species-rich planting along the Site boundaries. Species should be selected to provide flowers and / or fruit for birds and night-scented flowers to attract insect-prey for bats; - The creation of a Biodiversity Enhancement Zone; - The creation and maintenance of species rich grassland; - The provision of wildlife shelters providing nesting opportunities for protected and locally important species including bird boxes, bat boxes and mammal gates.
Noise and Vibration

Commitment
Construction - Activities and deliveries to the Site to occur only during permitted hours; - The following noise limits will apply the façade of dwellings during construction activities (BS5228 ABC Method for assessing Construction Noise Impact); - L_{Aeq,1hour} 65dB – Daytime (7am to 7pm Monday to Friday, & 7am to 1pm Saturday); - L_{Aeq,1hour} 55dB – Evening & Weekends; and, - L_{Aeq,1hour} 45dB – Night-time (11pm to 7am). - NSR01 is a workplace and not a residential dwelling, a L_{Aeq,1hour} 75dB limit will apply for this NSR. - A Site Representative will be appointed to receive and respond to any noise complaints received from local residents, the Local Authority, and any other regulatory body.
Landscape and Visual
A comprehensive landscape plan will be implemented on-site.
Material Assets – Traffic
- All construction vehicles arriving and departing from the site will follow a dedicated route. This route has been carefully selected to maximise the use of the National Road network, to avoid urban centres such as Tullow Town Centre. All truck drivers will be notified of this route in advance of commencement of their journey. The main contractor will strictly enforce the traffic management plan to ensure that all construction vehicles will follow this route. Deliveries to the Site will be carefully coordinated to minimise the risk of arriving and departing trucks meeting on the L725. If required departing trucks will be held on-site until a truck delivering to the Site has arrived. - Where temporary full road closures are implemented, local and emergency access to houses and businesses along the effected routes must be accommodated at all times; - The appointed contractor will conduct a pre – and post-construction condition survey of the roads and bridges along the haul and cabling route's, with the contractor liable to repair any damage to the public roads attributed to the construction of the permitted development;

Commitment

- Deliveries will be scheduled to avoid morning and evening peak hours. This will avoid HGV traffic arriving during the morning peak hours and creating conflict with local residents' commute or school run. Construction personnel will also be encouraged to car-pool;
- The site entrance points and works areas along the cable route will also be appropriately signed during the construction phase. Clear construction warning signs will be placed on the approach to the site access points and works areas, in accordance with Chapter 8 of the Traffic Signs Manual;
- Access to the working areas will be controlled by onsite personnel and all visitors will be asked to sign in and out of the site by security/site personnel. Site visitors will receive a suitable Health and Safety site induction and Personal Protective Equipment ("PPE") will be worn; and,
- To control, prevent and minimise dirt on the access route and emissions of dust and other airborne contaminants during the construction works, the following mitigation measures will also be implemented:
 - Wheel washing facilities should consist of a water bowser with pressure washer. The bowser will contain water only and no other additives. Run-off from this activity will be directed to the on-site drainage network. All drivers will be required to check that their vehicle is free of dirt, stones and dust prior to departing from the site;
 - Any dust generating activities will be avoided or minimised, wherever practical, during windy conditions;
 - Drivers will adopt driving practices that minimise dust generation including a 30km/h speed limit within the works areas and the temporary compound; and,
 - Once construction of the development is completed, all portacabins, machinery and equipment will be removed and any temporary hard standing excavated.

14 REFERENCES

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